



Source: Maryland Emergency Management Association (left and right)



2017

Somerset County Hazard Mitigation Plan Update

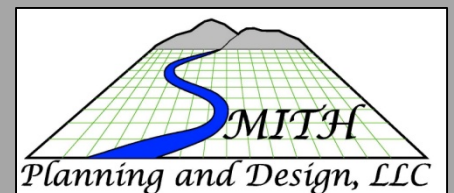


Source: Maryland Business News, 2013



**Somerset County Department
of Emergency Services**
11916 Somerset Avenue
Princess Anne, MD 21853

Smith Planning and Design
76 Baltimore Street
Cumberland, MD 21502



RESOLUTION NO. 1124

BOARD OF COUNTY COMMISSIONERS
FOR SOMERSET COUNTY, MARYLAND

SOMERSET COUNTY MULTI-HAZARD PLAN

WHEREAS, Somerset County adopted, by Promulgation, the Somerset County Multi-Hazard Mitigation Plan on May 22, 2012; and

WHEREAS, be it resolved that the Somerset County Multi-Hazard Plan is designed to comply with all applicable state and county regulations under the authority of the Disaster Mitigation Act of 2000; and

WHEREAS, Section 3222 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, enacted under 104 the Disaster Mitigation Act of 2000 (DMA 2000) P.L. 106-390, Section 322 of the Stafford Act addresses State mitigation planning, identifies new local mitigation planning requirements, authorizes Hazard Mitigation Grant Program (HMGP) funds for planning activities, and increases the amount of HMGP funds available to States that develop a comprehensive, enhanced mitigation plan; and

WHEREAS, Somerset County recognizes the threat that natural, man-made, and technological hazards pose to people and property; and

WHEREAS, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for hazard mitigation projects; and

WHEREAS, Somerset County participated jointly in the planning process with other local units of government and non-governmental agencies within the County to prepare a Multi-Hazard Mitigation Plan; and

NOW THEREFORE BE IT RESOLVED that the Board of County Commissioners for Somerset County do hereby adopt the Somerset County Multi-Hazard Mitigation Plan as an official plan to supersede all previous plans; and

BE IT FURTHER RESOLVED that the Somerset County Department of Emergency Services is authorized to submit on behalf of the County Government and other participating municipalities the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency for final review and approval.

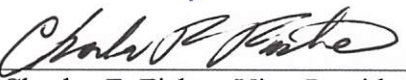
Adopted this 14th day of November, 2017.

ATTEST:


Ralph D. Taylor
County Administrator-Clerk

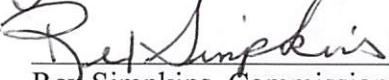
BOARD OF COUNTY COMMISSIONERS
FOR SOMERSET COUNTY


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Rex Simpkins, Commissioner

RECORD OF CHANGE

Page Number	Section Affected and Comments	Date of Change

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CHAPTER 1: INTRODUCTION

INTRODUCTION

Mitigating risks will enable the County and its communities to withstand extreme events more readily. The *2017 Somerset County Hazard Mitigation Plan Update* identifies various hazard types, the associated risk to address vulnerability and adaptation strategies to future conditions.

The Hazard Mitigation Plan is Somerset County's roadmap to evaluating hazards, identifying resources and capabilities, selecting appropriate actions, and implementing mitigation measures to eliminate or reduce future damages.

Hazard Mitigation

Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to human life and property from hazards.

PLANNING REQUIREMENTS

The Plan Update effort is 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 01-Hazard Mitigation Planning.

Disaster Mitigation Act of 2000

DMA 2000 (Public Law 106-390), provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal Governments.

Plan Update

The local jurisdiction is required by 44 CFR §201.6(d)(3) to review and revise its plan, and resubmit it for approval within 5 years to continue to be eligible for mitigation project grant funding.

Regarding updating the plan, mitigation planning regulations mandate jurisdictions to update the Hazard Mitigation Plan every five (5) years from the date of FEMA approval. This is essential for determining the effectiveness of programs, reflecting changes in the land development, or programs affecting mitigation priorities. By updating the plan, local communities can also determine the strengths and weaknesses of the plan and what elements may need to be changed.

To that end, Somerset County has undertaken the update of the *Somerset County Hazard Mitigation Plan* using grant funding received through the FEMA Hazard Mitigation Grant Program. The Town of Princess Anne and the City of Crisfield have chosen to participate in the planning process, and therefore are included under the county hazard mitigation plan in compliance with DMA 2000.

PLANNING PROCESS

In March 2017, Smith Planning & Design (SP&D) was contracted by Somerset County to assist in the development of the *2017 Somerset County Hazard Mitigation Plan Update*. The requirements of the local hazard mitigation plan include hazard identification and risk assessment, which leads to the development of a comprehensive mitigation planning strategy for reducing risks to life and property. In addition, the plan requirements include a mitigation strategy section that identifies a range of specific mitigation actions and projects that reduce the risks to new and existing buildings and infrastructure. The mitigation strategy includes an action plan describing how identified mitigation activities will be prioritized, implemented, and administered.



To meet the plan requirements, county staff, stakeholders, and SP&D worked closely together, meeting monthly throughout the planning process.

- April 26, 2017;
- June 7, 2017;
- July 12, 2017;
- August 9, 2017; and,
- September 13, 2017.

Organize Resources

The first step in Organizing Resources is to acquire adequate technical assistance and expertise to form a planning committee. Therefore, Somerset County Department of Emergency Services assembled a Planning Committee composed of representatives from various organizations, county, State, and municipal agencies, including: Emergency Services, Planning

Organize Resources

At the start, a state, tribe, or community should focus on assembling the resources needed for a successful mitigation planning process. This includes identifying and organizing interested stakeholders, as well as securing needed technical expertise.

and Zoning, Health Department, Hospital, Utilities, Roads, Fire and Police, Social Services, University of Maryland Eastern Shore, Coast Guard, Department of Natural Resources, United States Department of Agriculture, Information Technology, Economic Development, County Administrator, Domestic Relations, Technical and Community Services, Education, the City of Crisfield, and the Town of Princess Anne to review information concerning the hazards that are most likely to affect the County and provide public information to citizens concerning the planning process.

In addition, a regional planning group was identified. Victoria Lloyd, Somerset County Emergency Planner, regularly attends the Quarterly Eastern Shore Planners Meetings. Participants have either completed or are in the process of completing their hazard mitigation plan updates. Discussing the hazard mitigation plan process within this group has proven beneficial.

The Hazard Mitigation Planning Committee (HMPC) was comprised of the following members, as shown on Table 1-1.

Table 1-1: HMPC Members

Hazard Mitigation Planning Committee Members	
Member Name	Agency/Department
Victoria Lloyd	Somerset County Emergency Services
Yvette Cross	Somerset County Emergency Services
Anthony Sofo	United States Coast Guard
Mike Tabor	Crisfield Police Department
Mark Tyler	UMES Police Department
Mark Konapelsky	Somerset County Planning & Zoning, Crisfield Commissioner, and Disaster Assessment
Liz Tyler	Maryland National Resource Police
Jeff Howard	Maryland National Resource Police
John Redden	Somerset County Department of Public Works
Ralph Taylor	Somerset County Administrator
Tracy Grangier	Town of Princess Anne
Tim Bozman	Princess Anne Police Department
Joyce Cottman	Somerset County Social Services
Michael McIntyne	Somerset County Health Department
Danny Thompson	Somerset County Economic Development
Andrew Beauchamp	Somerset County Information Technology
Donald Ford	Somerset County Fire Services
Patrick Metzger	MSP – Princess Anne
Ronnie Howard	Somerset County Sheriff's Office
Gary Powell	Somerset County Emergency Services
Ken Sterling	McCready Health
Bruce Parkinson	Somerset County Detention Center
Gary Beauchamp	Somerset County Roads Department
Barbara Logan	Somerset County Health Department
Rick Pollitt	City of Crisfield
Mary Phillips	Somerset Department Technical & Community Services
Brian Holloway	Somerset County Information Technology
Jen Rafter	City of Crisfield
Danielle Weber	Somerset County Health Department

Member Name	Agency/Department
Elizabeth Habic	Maryland Department of Transportation/State Highway Administration
Gina Goettler	Maryland Department of Transportation/State Highway Administration
Gary Pusey	Somerset County Planning & Zoning
Tony Stockus	Somerset County Sanitary District
<i>Source: Somerset County HMPC</i>	

Furthermore, to complete the update, a data collection effort was conducted to ensure that the most up-to-date information was utilized. During the initial review, various data sources were identified. Data collected include: comprehensive plans, water resources elements and municipal growth elements; zoning ordinances; development ordinances; building codes; and other relevant documents.

Additional information was collected throughout the plan development process from Public Works, Planning and Zoning, and Emergency Services. To inform the plan, further information was requested from both the Town of Princess Anne and the City of Crisfield. Each municipality completed the following forms: Municipal Questionnaire, Flood/Bridge Issue Infrastructure Data Table, Municipal Mitigation Capability Assessment Matrix, Permit Data Update and Risk Analysis Ranking, as requested. Moreover, data and information from several State and Federal agencies was obtained including the Maryland Emergency Management Agency (MEMA), Maryland Department of Natural Resources (DNR), the Federal Emergency Management Agency (FEMA), Maryland Department of the Environment (MDE), and the U.S. Army Corps of Engineers. A listing of resources gathered and utilized throughout the Plan can be found in *Appendix G: Sources*.

Assess Risks

Another step in the planning process included the update of the hazard identification and vulnerability assessment. An initial planning meeting was held on April 26, 2017. The Director of Emergency Services, the Emergency Services Planner, and SP&D staff attended. In addition to organizing resources, two new hazards, Epidemic (including Opioid and Zika Virus) and Cyber Attack were identified for discussion with the HMPC members at the Kick-Off Meeting. In addition, Sea Level Rise was identified for inclusion under Coastal Hazards. Next, public outreach was discussed, and the decision was made to draft a press release to inform citizens that the hazard mitigation plan update was underway.

Assess Risks

Next, the state, tribe, or community needs to identify the characteristics and potential consequences of hazards. It is important to understand what geographic areas different hazards might impact and what people, property, or other assets might be vulnerable.

During the Kick-off Meeting held on June 7, 2017, the HMPC reviewed the identified hazards. Hazard data and probability information was distributed. Following committee discussion, hazards were ranked as part of the Risk Assessment included in Chapter 3 of the Plan.

Next, Mitigation actions and projects identified in the *2012 Somerset County Hazard Mitigation Plan* were reviewed and discussed by committee members during the meeting. The HMPC members provided any status updates and other additional mitigation projects that have been completed since 2012.

Develop a Mitigation Plan

SP&D held two meetings on June 12, 2017. The first meeting was held with the HMPC to discuss hazard vulnerability results, review new mapping products and reassess repetitive flood issues. Small groups were formed to review large area maps of various portions of the county. Committee members labeled segments of roadway and bridges that are known to experience frequent flooding. Problem areas that were identified included the following information: cause/source of flooding, detailed location information, and whether the route was used for evacuation purposes. In addition, SP&D presented coastal flooding assessment results, which included: critical facilities, FEMA flood zones, depth of flooding at lowest adjacent grade, hurricane storm surge, and 2050 mean sea level rise. Finally, the updated critical and public facilities inventory was reviewed for accuracy.

Develop a Mitigation Plan

Based on an understanding of risk, the state, tribe, or community then needs to set priorities and develop long-term strategies for avoiding or minimizing the undesired effects of disasters. The product is a mitigation plan and implementation approach.

At the second meeting held on July 12, 2017, a targeted group of representatives from the City of Crisfield, Town of Princess Anne, Somerset County Planning and Zoning, Public Works, and Emergency Services were in attendance. SP&D provided a Community Rating Systems overview sheet and application letter of interest for review and discussion. Both the county and the two municipalities expressed interest in the program and a willingness to go forward with the next steps in the process.

Next in the plan development process, several work sessions were held on August 9, 2017 to review, update, and finalize items within the Plan. These items included repetitive flood issues and new mapping products.

Figure 1-2: August 9, 2017 HMPC Meetings



Source: Smith Planning & Design



A guest speaker was invited to attend the August 9th HMPC meeting. Elizabeth Habic, Climate Risk and Resiliency Program Manager from the Maryland Department of Transportation/State Highway Administration (SHA) presented a vulnerability/adaptation study for Somerset County. The SHA study focused on the State roads that are vulnerable to flooding and future conditions in consideration of sea level rise projections. The meeting was an excellent opportunity to share data and areas of concern from both the State and local perspectives.

Finally, a special session of the HMPC was held on September 13, 2017. This session primarily focused on a NFIP & CRS. A new Appendix, Appendix B – NFIP & CRS was added during the update. Committee members discussed and reviewed the new Appendix during the meeting. A guest speaker, Kevin Wagner, Natural Resources Planner, State NFIP Coordinating Office, with the Maryland Department of the Environment presented a Power Point presentation on the NFIP & CRS to those in attendance.

Developing Mitigation Strategies

Finally, the HMPC discussed and reviewed past and future mitigation projects for inclusion in the Plan throughout the plan development process. All new 2017 mitigation projects include a discussion, estimated cost, responsible agency, timeframe and eligible grant programs.

Project sheets were distributed to all members for review. Members ranked each project for prioritization. Results were compiled and are presented in Chapter 19: Mitigation Strategies of the Plan.

SOMERSET COUNTY
HAZARD MITIGATION PLAN
August 9, 2017
AGENDA
<ul style="list-style-type: none"> • Presentation: Elizabeth Habic, Climate Risk & Resiliency Program Manager MD Dept. of Transportation/SHA • Flooding Issues – Roads & Bridges • Mitigation Projects “New Ideas” • Next Steps <ul style="list-style-type: none"> ▪ September 13, 2017 – Small Group Workshop with a presentation by Kevin Wagner - MDE

Figure 1-3: Project Sheet

PROJECT A: Community Rating System

Action Items #1, #10, and #24 directly relate to the Community Rating System and may be implemented separately or concurrently as discussed in the following project.

DISCUSSION: 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. 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

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
- Flood Preparedness

PROJECT: Prepare a CRS application to reduce insurance costs within the county. Currently, Somerset County is not enrolled in the CRS. As of April 2017, there are 1,388 NFIP policy holders in the county with \$1,085,258 being paid in insurance premiums. On average, Somerset County policy holders pay \$782 per year in flood insurance. By participating in the CRS, policy holders could potentially save between \$39 (5%) to \$352 (45%) per year. The Federal Emergency Management Agency (FEMA) website has a vast amount of detailed information pertaining to the CRS program, including a reference guide to the CRS program titled "National Flood Insurance Policy - Community Rating System Coordinators Guide". The following table was taken from this guide and depicts the point system for activities.

Project A: Actions

Action #1: Work with MDE to complete CRS (Community Rating System) application process. The CRS rating reduces the cost of flood insurance for all county residents.

Action #10: Develop and administer outreach programs to identified business organizations that should prepare for flood events.

Action #24: Target residents located within the 100-year floodplain with literature on flood related issues and protection measures. As of April 2011, 2,024 NFIP flood insurance policies were in effect in Somerset County, however over 3,000 structures are located in the floodplain.

Responsible Organizations: Somerset County Emergency Services, MDE, Somerset County Planning and Zoning

Estimated Costs: Staff Time

Possible Funding Sources: MDE Technical Assistance

Timeline for Implementation:

Implement the Plan & Monitor Progress

The Department of Emergency Services will implement the Plan and continue to perform periodic reviews and revisions to the Plan through on-going Hazard Mitigation Planning Committee meetings. An implementation matrix has been included in *Chapter 20: Plan Maintenance and Implementation* as a tool for monitoring plan progress and implementation status.

Implement the Plan & Monitor Progress

The state, tribe, or community can bring the mitigation plan to life in a variety of ways, ranging from implementing specific mitigation projects to changing aspects of day-to-day organizational operations. To ensure success in ongoing implementation, it is critical that the plan remain relevant. Thus, the state, tribe, or community should conduct periodic evaluations to assess changing risks and priorities and make revisions as needed.

PUBLIC MEETINGS

Two public meetings were scheduled, one to coincide with the review of the draft plan and the other to coincide with the public hearing for the draft Hazard Mitigation Plan Update. Copies of minutes for both the planning committee meetings and the public meetings are included in the *Appendix H: Public Meeting Announcements & Minutes*.

MEDIA ANNOUNCEMENTS

A press release was initially released to inform citizens that the Plan update was underway. Additionally, media announcements designed to coincide with the public meeting schedule provided the public with an overview of the update planning process and the new mitigation measures being considered.

MUNICIPAL PARTICIPATION

To obtain specific information from the municipal perspective, the Town of Princess Anne and the City of Crisfield were once again invited to serve on the Hazard Mitigation Planning Committee. Municipal Hazard Mitigation packets were provided for review and for municipal information gathering and input. The packets contained the following:

- Municipal Questionnaire;
- Update Flood/Bridge Issue Infrastructure Data Table;
- Municipal Mitigation Capability Assessment Matrix;
- Permit Data Update; and,
- Risk Analysis Ranking

Local hazard mitigation plan due for update

PRINCESS ANNE — Are you prepared for the next storm? Are you familiar with Somerset County's Hazard Mitigation Plan?

Hazard mitigation is the action you take to reduce or eliminate in the long-term hazards to human life and property. It can occur before or after a disaster. The last plan adopted by Somerset County and its two municipal governments was in 2012 and the Federal Emergency Management Agency (FEMA) has awarded Somerset County a \$30,000 grant so it can be updated.

"Mitigation is the foundation of community resilience and touches all parts of a community," said an Emergency Services spokesperson. It includes "how floodplains and natural resources are managed, how a community builds, and where infrastructure and critical facilities are placed. The plan addresses the physical and environmental impacts of disasters, plus the economic and social impacts. A stakeholder committee has formed to assist with the development of a new plan. For more details, visit the Somerset County Emergency Services page at www.somersetmd.us/agencies/emergency.html.

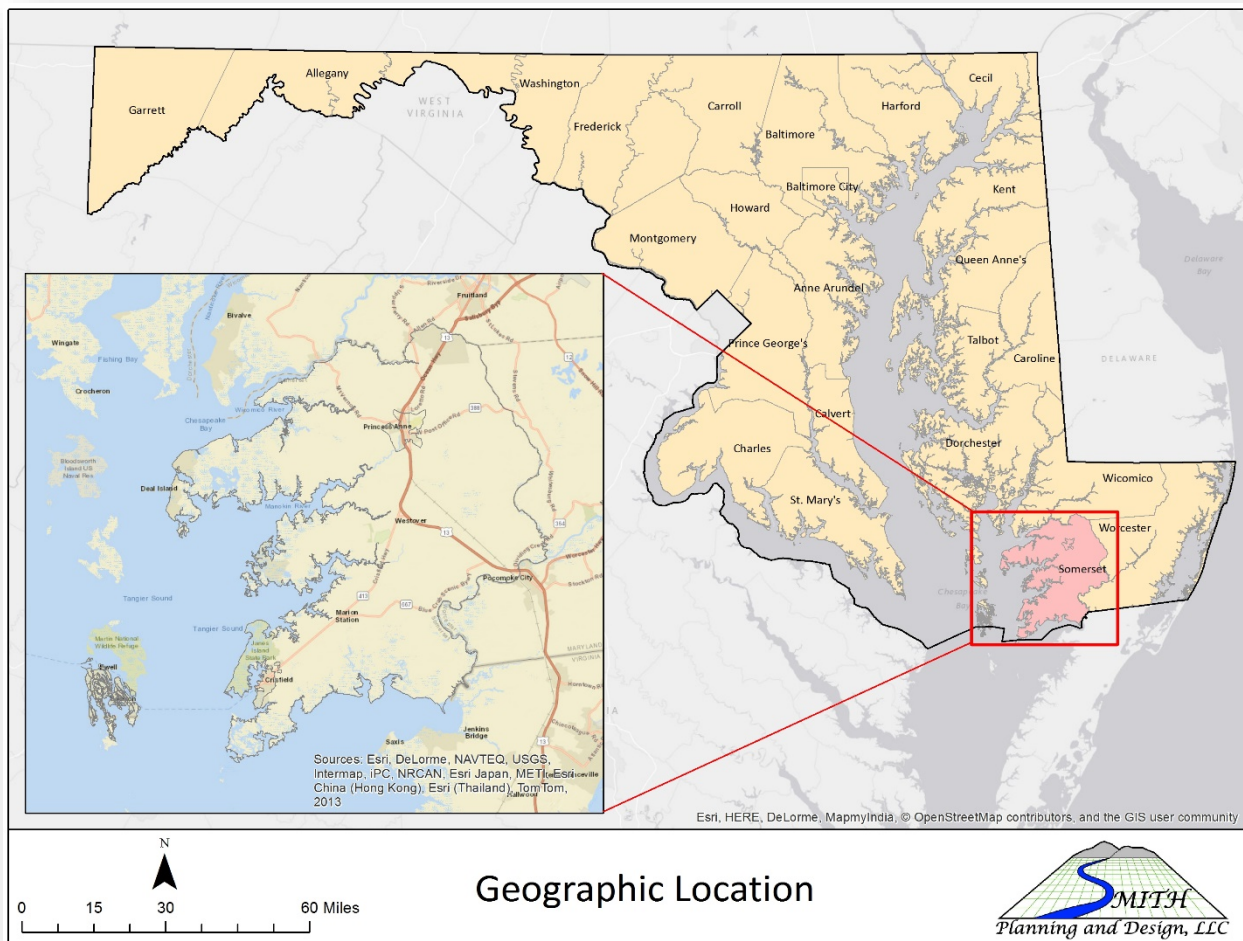
Both the Town of Princess Anne and the City of Crisfield participated throughout the entire Plan update process.

CHAPTER 2: COUNTY PROFILE

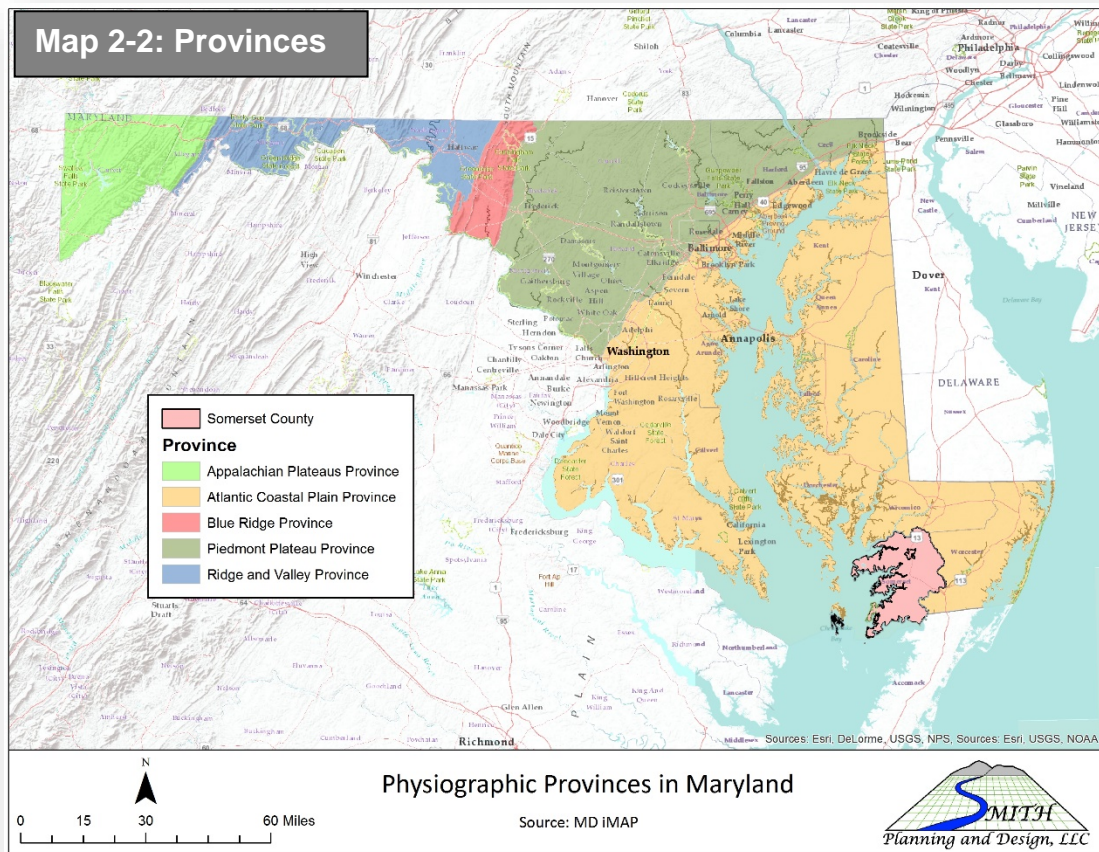
PHYSICAL LOCATION

Somerset County is in the southern part of the eastern shore of the Chesapeake Bay and is adjacent to Worcester and Wicomico Counties in Maryland, and Accomack County, Virginia as shown on Map 2-1. Somerset County also shares a boundary through the Chesapeake Bay with Dorchester and St. Mary's counties, and with Northumberland County, Virginia on the western shore. Somerset County was named for Lady Mary Somerset, the sister of Lady Anne Arundel, wife of Cecilius Calvert, the second Lord Baltimore. According to the Maryland Geologic Survey, Somerset is one of the smaller counties in Maryland, containing over 338.41 square miles of land area, 35.85 square miles water area, and 1,106 miles of shoreline.

Map 2-1: Location Map



As shown on Map 2-2, Somerset County is in the Atlantic Coastal Plain Physiographic Province.



Atlantic Coastal Plain

The Atlantic Coastal Plain Province is underlain by a wedge of unconsolidated sediments including gravel, sand, silt, and clay, which overlaps the rocks of the eastern Piedmont along an irregular line of contact known as the Fall Zone. Eastward, this wedge of sediments thickens to more than 8,000 feet at the Atlantic coast line. Beyond this line is the Atlantic Continental Shelf Province, the submerged continuation of the Coastal Plain, which extends eastward for at least another 75 miles where the sediments attain a maximum thickness of about 40,000 feet.

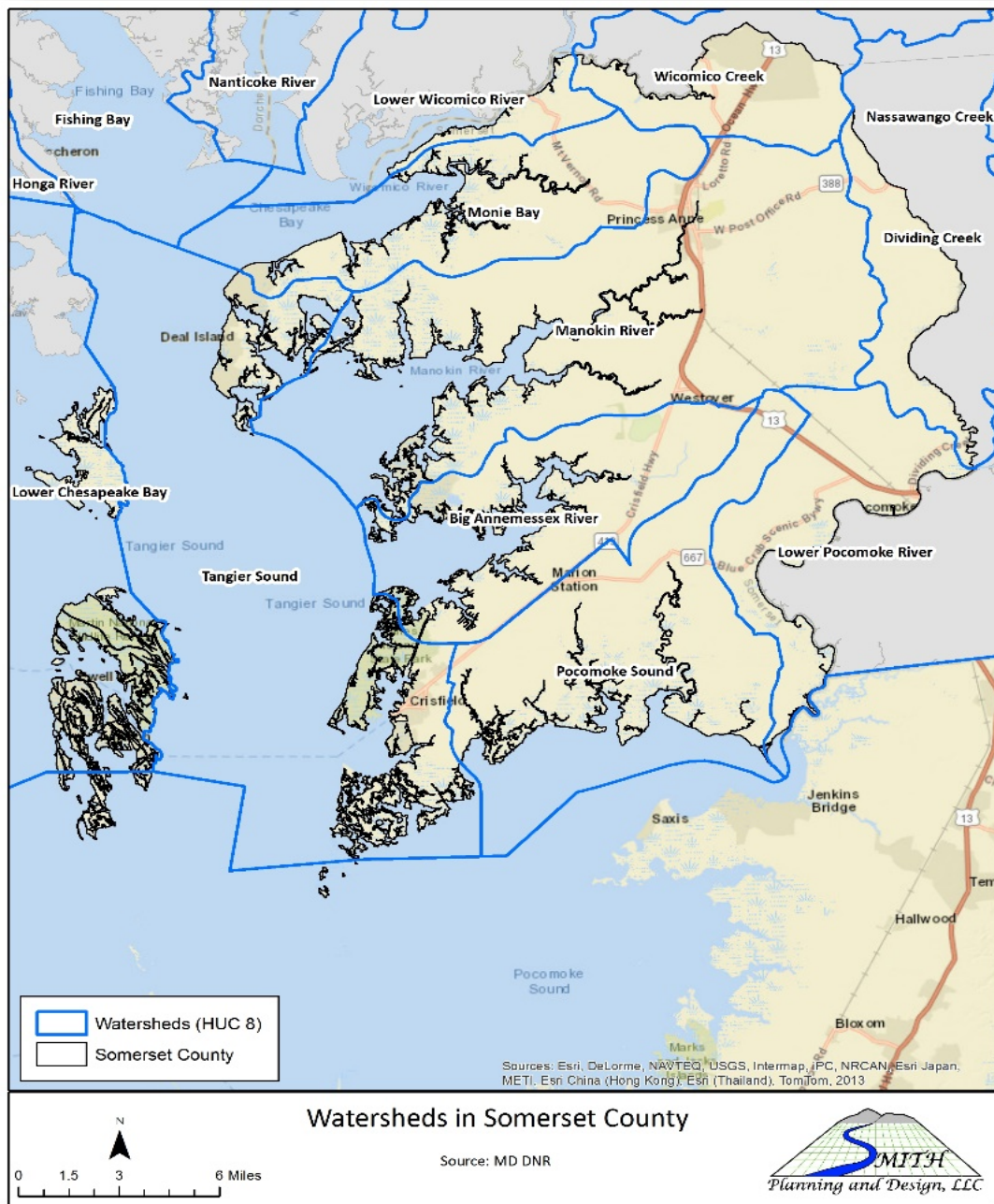
The sediments of the Coastal Plain dip eastward at a low angle, generally less than one degree, and range in age from Triassic to Quaternary. The younger formations crop out successively to the southeast across Southern Maryland and the Eastern Shore. A thin layer of Quaternary gravel and sand covers the older formations throughout much of the area.

Mineral resources of the Coastal Plain are chiefly sand and gravel, and are used as aggregate materials by the construction industry. Clay for brick and other ceramic uses is also important. Small deposits of iron ore are of historical interest. 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.

Source: Maryland Department of Natural Resources, Maryland Geological Survey

The county is situated between the Wicomico and Pocomoke Rivers and is also on the Manokin and Big Annemessex Rivers which flow into Tangier Sound. These watersheds are shown on Map 2-3. Other major water bodies include Monie Bay and Pocomoke Sound.

Map 2-3: Watersheds



CLIMATE

Due to its nearly level terrain and low elevation (sea level to approximately 50 feet), Somerset County is susceptible to high winds and rain during summer thunderstorms and to heavy damage from storm surge and wind during the passage of hurricanes or nor'easters either on or near the eastern shore. The county is also susceptible to tornadoes that are occasionally spawned by thunderstorms or hurricanes. Precipitation averages 41 inches annually. Somerset County receives on average less than 6 inches of snow per year. Most of this snow falls during the passage of the occasional mid-latitude winter storm. Due to its southern location and its proximity to the Atlantic Ocean, Somerset receives less snowfall on average than counties to the north and west.

The county must deal with fog conditions approximately 15-20 times a year, like the rest of the eastern shore. A synopsis of climatic data for Crisfield is shown on Table 2-1.

Table 2-1: Climatic Data for Crisfield, MD – (1601-1990 Normals)

Month	Average Temperature in Degrees Fahrenheit	Average Precipitation in Inches
January	37	3.27
February	39	2.99
March	46.5	4.29
April	56	2.8
May	65.5	3.11
June	74	2.83
July	79	4.13
August	78	4.13
September	71.5	2.76
October	61	2.8
November	50.5	2.8
December	41.5	2.52
Annual	---	38.43
Average	58.3	3.20

Source: U.S. Climate Data, Crisfield, Maryland, 1961-1990 Normals

GEOLOGY, SLOPE, GROUND WATER AND SOILS

According to the Maryland Geological Survey, the highest elevation in the county is approximately 46 feet above sea level, so steep slopes are virtually nonexistent in Somerset County. The rock units that make up the county's surface are primarily unconsolidated alluvial deposits of relatively recent age. Older coastal plain sediments are found at some depth below this surface and provide the source of most fresh water used in the county. These sediments are recharged primarily from sources on the western shore and are subject to contamination by pollutants both in Somerset County and from areas outside the county. Salt-water intrusion is also possible when aquifers are drawn down significantly.

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 glaciation, 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.

Most of the soil types in Somerset County are formed on unconsolidated material and are sandy in nature. The low-lying areas are poorly drained and are susceptible to erosion along the coast and in tidal estuaries. Shore erosion and land subsidence are most prevalent along the coastal islands where the beach front has retreated noticeably during the past 50 years. In the western part of the county, areas further inland that were once in agricultural production are now marshland. Where well drained, to the north and east, the soils are well suited for agricultural uses.

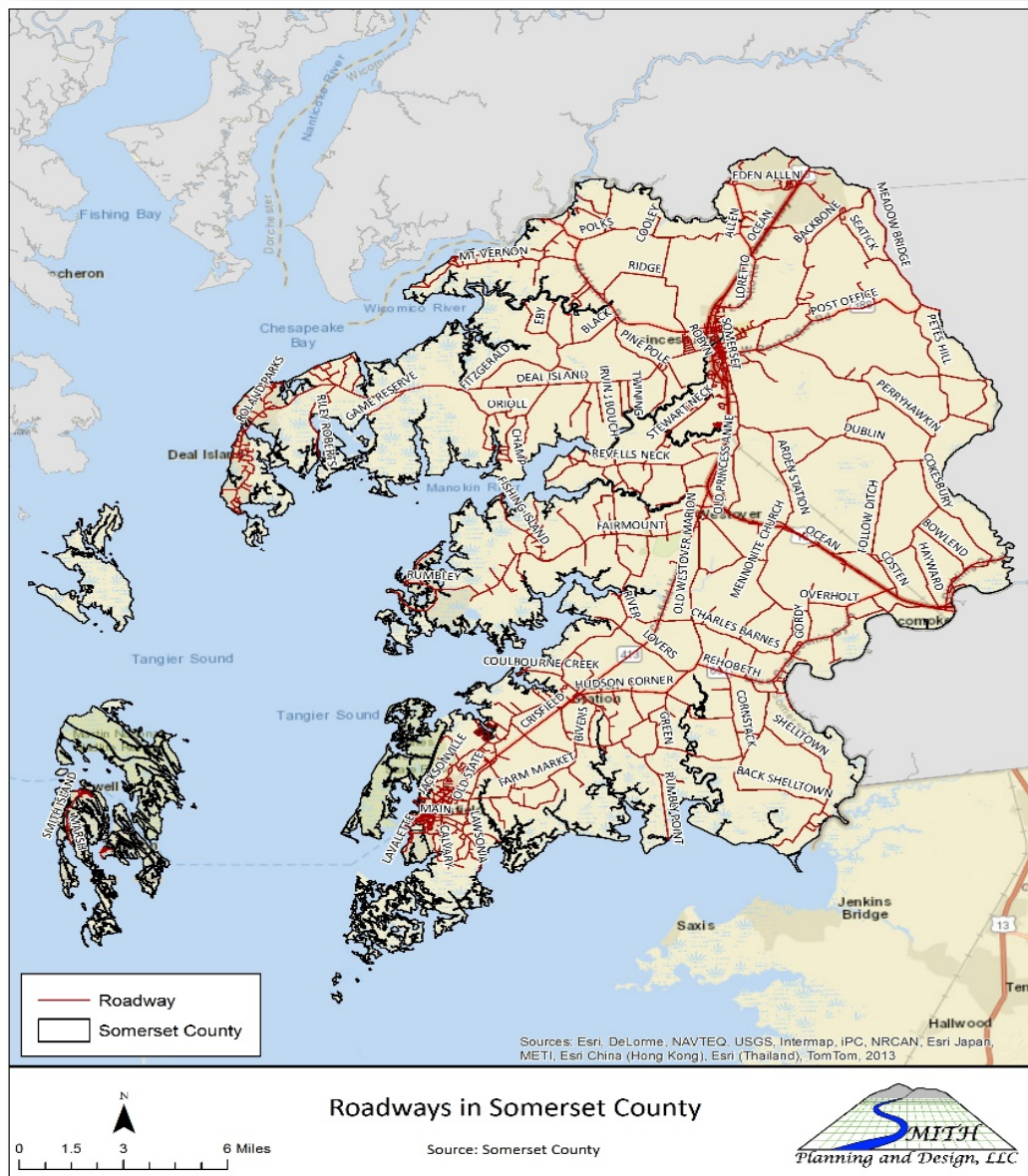
TRANSPORTATION

In addition to the county-wide Shore Transit, a shuttle bus runs between Salisbury State University and the University of Maryland Eastern Shore in Princess Anne, Monday through Friday. 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.

Due to its strategic location on the Bay, Crisfield has historically been a seaport for watermen. Many marinas operate in the Crisfield area and on other tributaries of the Wicomico and Pocomoke Rivers. Additionally, considerable barge traffic moves along the Wicomico River to Salisbury and on the Pocomoke River to Pocomoke City.

Route 13 is the major north-south highway corridor through Somerset County and connects the county with Salisbury to the north and Pocomoke City to the south. This highway also connects the eastern shore of Maryland with Delaware and the Philadelphia area to the north and with Virginia and the Norfolk area through the Bay-Bridge Tunnel to the south. Route 13 is complemented by state Route 413, which connects the county seat of Princess Anne with the port of Crisfield. Many other state highways and county roads connect the two municipalities with smaller communities to the east and west of the two major highways. Other transportation routes include the Delmarva Central Railroad which runs parallel to Route 13 through Delaware, Maryland and Virginia and connects Princess Anne with Salisbury and Pocomoke City. The Crisfield-Somerset Airport, which serves the county, is located just to the northwest of Crisfield off Route 413.

Map 2-4: Roadways



ECONOMIC DEVELOPMENT

Since its initial settlement, Somerset County has gone through several phases of economic development including a period of planting during the first two centuries of its existence, a period when the port of Crisfield spawned water-based development, a long period of relative stability related to that development, and, more recently, a period of state sponsored development related to the construction and operation of the University of Maryland Eastern Shore and the Eastern Correctional Facility, both near Princess Anne.

In 2009 the labor force was 10,908 and in 2015 the labor force decreased slightly to 9,613 persons employed. Residents commuting from outside of the county from 2010-2014 was 3,601 persons. According to the Bureau of Labor Statistics, U.S. Department of Labor, unemployment in the county has decreased from 11.7% in 2011 to approximately 8.3% in 2015.

Somerset County's 420 businesses employ 3,650 workers; the top five private sector employers include:

- The University of Maryland Eastern Shore (UMES);
- Sysco Eastern Maryland;
- Somerset Community Services;
- McCready Health; and,
- Aurora Sr. Living of Manokin.

According to the Maryland Department of Commerce, Somerset is a major seafood processor and poultry producer, and provides a rich agricultural harvest. In addition, plans for a hotel conference center are moving forward along with the future development of an industrial park in the City of Crisfield. Furthermore, the Economic Development Commission is looking to assist in attracting the aerospace industry, natural gas, wind, solar, energy projects and broadband to the Crisfield waterfront.

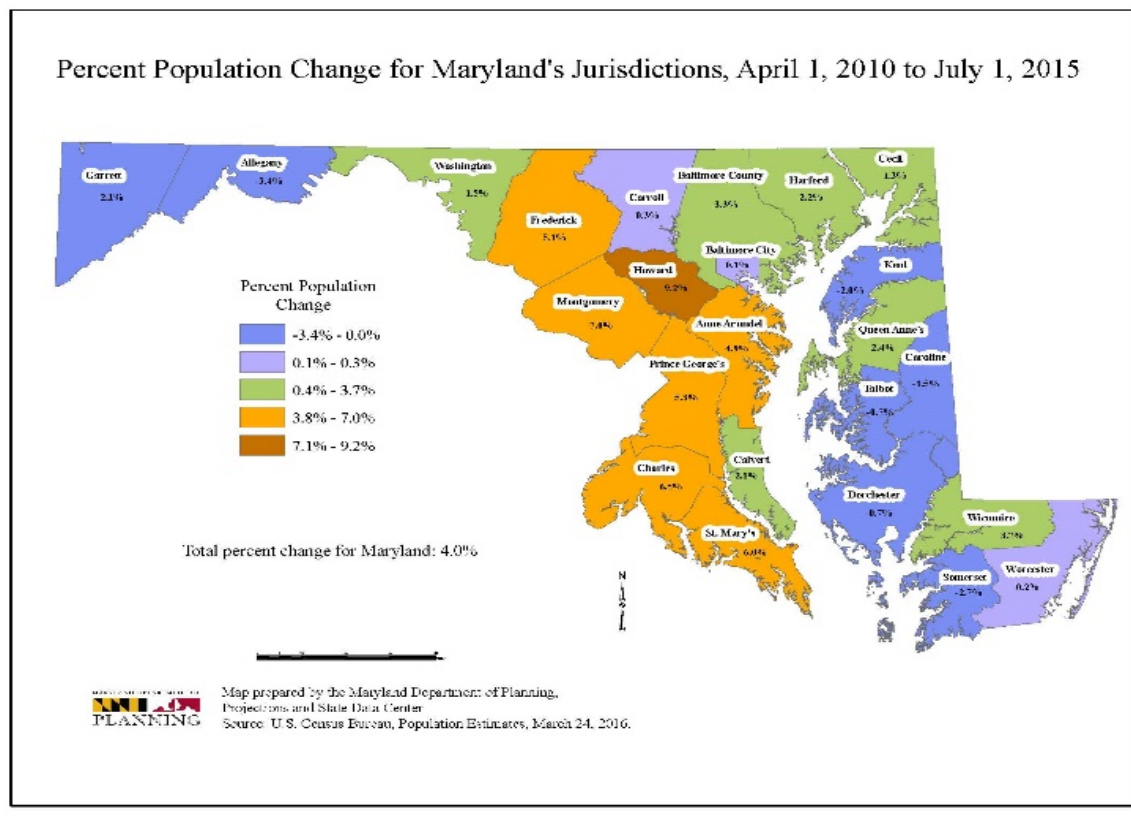
POPULATION

Somerset County's population growth has mirrored the above economic periods with higher rates of growth occurring during the early settlement of the county. In the 2010 Census report, Somerset County had a population of 26,470 people, an increase of 1,723 people over the 2000 Census. In 2010, the two incorporated towns, Princess Anne and Crisfield, had populations of 3,290 and 2,726 people respectively. According to the U.S. Census Bureau, Population Estimates from April 1, 2010 thru July 1, 2015, the total population change in total resident population for Somerset County was an estimated decrease of 702 persons or -2.7%, as shown on Figure 2-1.

According to the Maryland Department of Planning, Hispanics continue to lead Maryland's Population gain in 2015. Somerset County has a high percentage of residents of Hispanic origin and a high percentage of residents over the age of 65. A significant number of these residents live in the storm surge area in the western and southern sections of the county and on Smith Island and are considered "at risk" populations. The U.S. Census for 2010 indicates a Hispanic population of 863 people, a 158.4% increase from 2000. The population of people for the group 65 and older was 3,660 people in 2010. During the 2017 HMP update process, the 2015 U.S. Census Population Estimates for Somerset County residents over the age of 65 has

According to the Maryland Department of Planning, Somerset County's population is projected to grow to 27,750 people by the year 2020 and to 29,500 people by 2040.

Figure 2-1: Percentage Population Change for Maryland's Jurisdictions, April 1, 2010 to July 1, 2015



HOUSING

According to the 2010 U.S. Census and the 2011-2015 American Community Survey 5-Year Estimates, the county's residents were housed in 11,130 units in 2010, and estimated at 11,181 units in 2015. The median value of owner occupied housing was \$155,900 in 2010 as compared to \$81,100 in 2000. It is estimated that in 2015, the median value of owner occupied housing will decrease to \$149,600. Median monthly rents were \$679/month in 2010, as compared to \$429/month in 2000. It is estimated that in 2015 median monthly rents will increase to \$703/month.

During the 2017 HMP update, data from the Maryland Department of Planning was collected to show the historical and projected households in the county.

Table 2-2: Historical and Projected Households

Year	Households
1970	5,945(Census)
1980	6,751(Census)
1990	7,977(Census)
2000	8,361(Census)
2010	8,800(Census)
2015	8,875
2020	9,075
2025	9,350
2030	9,500
2035	9,625
2040	9,700

Source: Maryland Department of Planning, July 2014

INCOME

The U.S. Census indicates that Somerset County is showing a decline in its economic condition with a median household income of \$42,443 in 2010 decreasing to \$35,154 in 2015. The poverty rate for the county has continued to increase from 15% in 1990 and 2000 to 20.4% in 2012. This upward trend has continued as evident through information gathered from the U.S. Census. Estimates indicate that the poverty rate had increased up to 24.7% in 2015.

SCHOOL ENROLMENT

Public school enrollment has been relatively stable in recent years with 2,820 students in 2016, according to the county's public school website. Even though the county's population is projected to increase to 27,750 people through the year 2020, school enrollment is projected to decrease by 50 students to 2,770 in 2025 according to the Maryland Office of Planning.

LAND USE PROFILE

According to the *Somerset County Comprehensive Plan* adopted in 1996, the most recent version of the plan, most residential and commercial development is concentrated in the areas within or near Princess Anne and Crisfield. Projections in that plan call for a continuation of this development style with most new urban development in the Princess Anne area and in the corridor between Crisfield and Princess Anne through 2010. Countywide land use tabulations from 1990 showed a total of 215,000 acres of land in the county with nearly 8,125 acres being devoted to urban type development. Based on permit records since 1998 that show 100 to 115 single family permits per year it appears reasonable to conclude that another 500-1,000 acres have been developed since 1990 in the county.

Even with this new urban development, the vast majority of land in Somerset County remains in either in agriculture (64,627 acres in 1990), forest use (81,693 acres in 1990), or wetland (60,410 in 1990). More than 31,000 acres of forest and wetland areas are in State Wildlife Management Areas, and Federal Wildlife Refuges.

According to the most recent data provided by the Maryland Department of Planning, agricultural land decreased from 64,627 acres in 1990 to 49,693 acres in 2010, while forest use increased from 81,693 acres in 1990 to 82,822 acres in 2010. This may be attributed to Maryland's Natural Resources Article 5-1601-1613, Forest Conservation Act, enacted in 1991. Maryland offers forest conservation easements resulting in property tax credit as an incentive to property owners. In addition to agriculture land decreasing, wetland areas decreased from 60,410 in 1990 to 55,572 in 2010.

According to the 2010 Somerset County Water Resource Element, there are three scenarios of future growth that may be expected for the county, these scenarios are described below:

- **Trends:** Continues past trends whereby approximately half of all new residential and non-residential growth is directed to existing Priority Funding Areas (PFAs), or to areas identified for future public water and sewer service by the County's Water and Sewer Master Plan. Remaining development would occur in areas outside of public water and sewer service. This scenario represents the 1996 Comprehensive Plan, as expressed through current zoning.
- **PFA Focus:** All new growth would be directed to existing PFAs, including Princess Anne, Crisfield, and areas surrounding the two municipalities that have been identified for future public water and sewer service by the County's Water and Sewer Master Plan. A negligible amount of new development would occur in areas outside of public water and sewer service.
- **Hybrid:** This scenario is a middle ground between the Trends and PFA Focus scenarios. Approximately three-quarters of new development would be directed to existing PFAs, or to areas identified for future public water and sewer service by the County's Water and Sewer Master Plan. Remaining development would occur in areas outside of public water and sewer service.

The following table from the Element shows the locations of projected growth in housing units expected to occur in the county using the three future growth scenarios until 2030 by watershed.

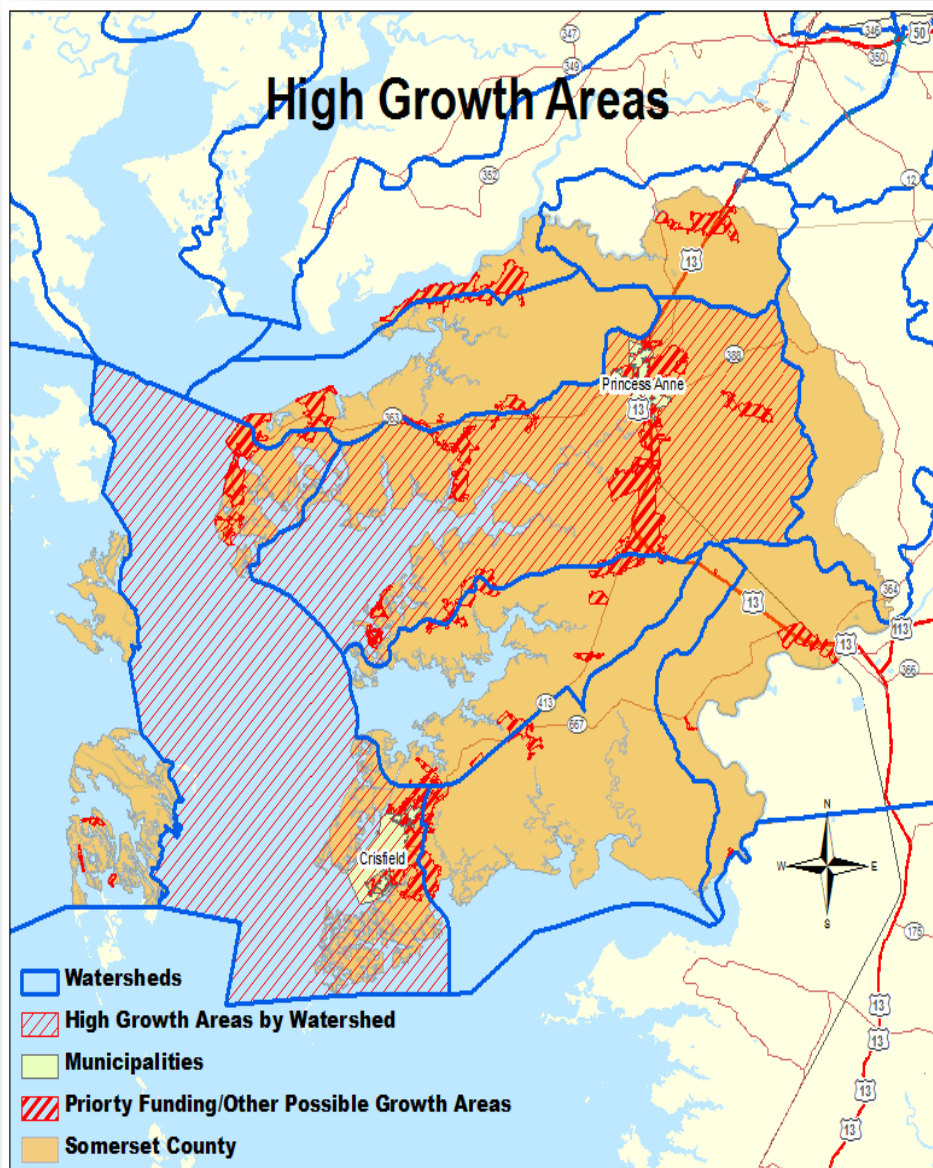
Table 2-3: Projected Growth of Housing Units

Watersheds	2008 Existing Units	2008-2030 Growth					
		Trends		PFA		Hybrid	
		Growth	Total	Growth	Total	Growth	Total
Big Annemessex River							
Crisfield	192	41	233	82	274	62	254
Remainder of Watershed	656	82	728		656	41	254
Dividing Creek	168	67	235		168	33	201
Lower Chesapeake Bay	233	8	241		533	4	237
Lower Pocomoke River	526	88	614		526	44	570
Lower Wicomico River	292	18	310		292	9	301
Manokin River							
Princess Anne	2,793	316	3,109	632	3,425	474	3,267
Remainder of Watershed	1,062	203	1,265		1,062	101	1,163
Monie Bay	527	69	596		527	35	562
Pocomoke Sound							
Crisfield	227	149	376	299	526	224	451

Remainder of Watershed	803	110	913		803	55	858
Tangier Sound							
Crisfield	2,058	208	2,266	416	2,474	321	2,370
Remainder of Watershed	625	7	632		625	3	628
Wicomico Creek	616	64	680		616	32	648
Total	10,778	1,428	12,206	1,428	12,206	1,428	12,206
<i>Source: 2010 Somerset County Water Resource Element</i>							

Using these scenarios, Figure 2-2 shows the two watershed areas and the priority funding areas in the county. These areas are predicted to have the highest growth in housing units.

Figure 2-2: High Growth Areas



MUNICIPAL PERSPECTIVE

The two municipalities in Somerset County, as shown in Figure 2-2 above are in large part still the centers for most residential and commercial activity in the county. In 1940, Crisfield's population was far greater than Princess Anne's (3,908 as opposed to 942), but today the towns are close in size. The development of UMES and the Eastern Correctional Facility have provided the impetus for a great deal of growth in the Princess Anne area over the past several decades. Currently, Princess Anne has overtaken Crisfield in population growth within the past decade.

The *2009 Town of Princess Anne Comprehensive Plan* states the following on growth in the municipality:

The Town also experienced rapid growth between 2000 and 2008. An inventory of the existing structures show that nearly half of the structures were built between 1970 and 1990. Of the 397 structures built before 1970, 181 were built before 1940. However, in the past eight years (2000-2008), growth has outpaced any of the previous decades with 283 residential units constructed or permits issued to be constructed. 77 building permits were issued in 2007. Within the last five years the Town has annexed several properties with development plans indicating 857 housing units.

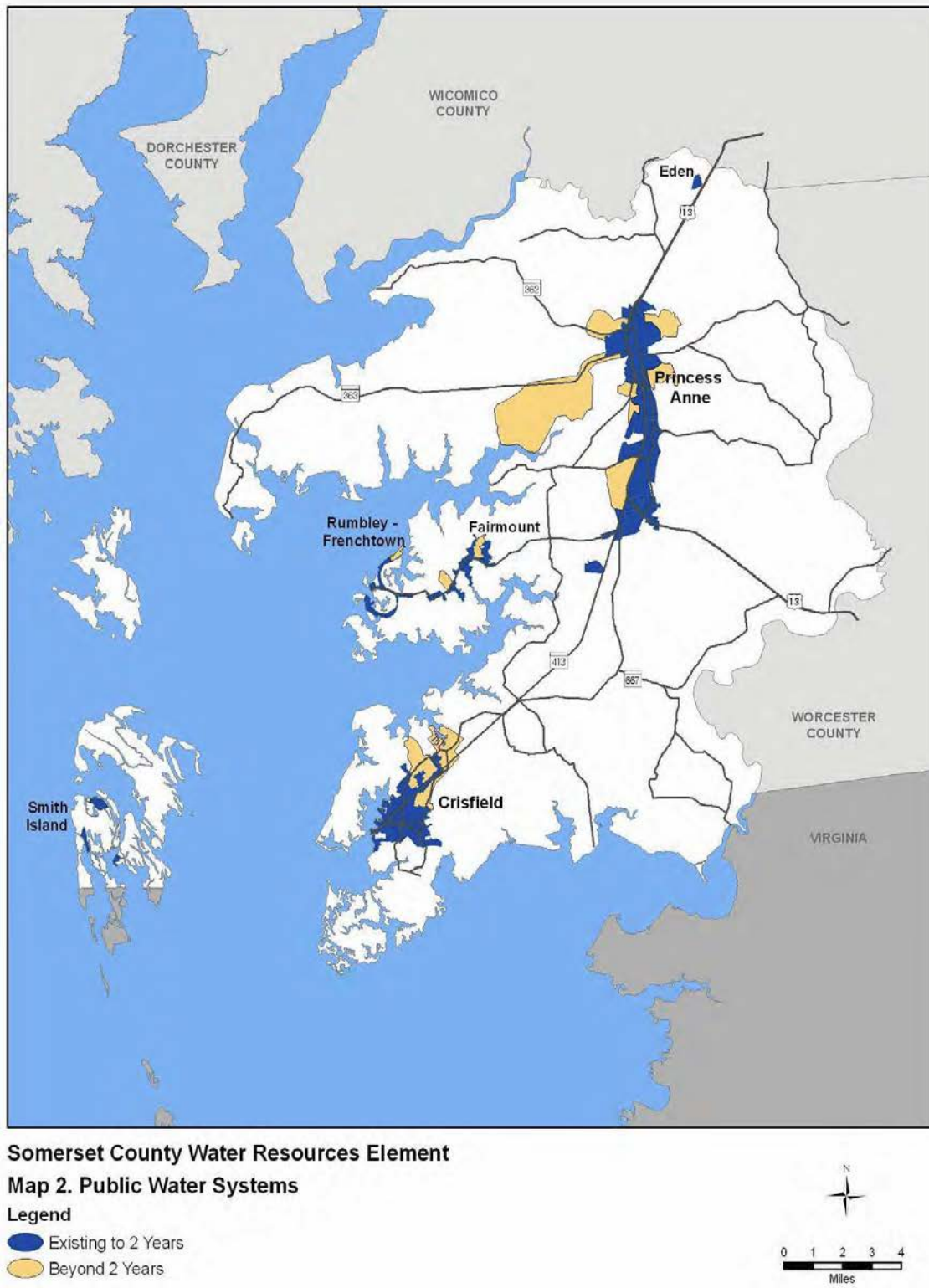
However, all approved residential development has not advanced, with approximately 639 units pending because of insufficient water allocation or due to recent economic downturn. There are two sources of growth pressure on Princess Anne—residential demand in the region and enrollment growth at UMES. Prior to recent enrollment increases at UMES, the Town was growing at a modest pace; 2.2 percent per year on average between 1960 and 2000.

The *2007 City of Crisfield Comprehensive Plan (with 2010 amendments)* states that the municipality has only recently experienced growth. From 1960 to 2000, the city's population has declined by 23 percent. Only in the past decade has the population stabilized. Building permits for the city experienced a spike in the 2003-2005 and have now diminished again due to a poor economic status in Crisfield, as well as the county. The city expects to increase 16% in population and add an additional 238 dwelling units by 2030. The city predicts this development to occur inside the existing municipal boundaries on vacant and underutilized lots.

POPULATION PROJECTIONS AND LAND USE TRENDS

As noted earlier in the Population discussion, the Maryland Department of Planning projects Somerset County to have a population of 27,750 people by the year 2020 and to 29,500 by 2040. The County Comprehensive Plan projects that most of the population growth and associated urban development in the county will continue to be centered on designated growth areas in the Princess Anne-Crisfield corridor. Future urban development will most likely follow the water and sewer projections and be concentrated in the same corridor as shown on Figure 2-3 below from the *2010 Somerset County Water Resources Element*. The county expects most new development to occur in and around the two municipalities of the county. Another area for potential growth is the area west of Princess Anne and south of the unincorporated town of Venton, depending on the extent of water and sewage system expansion projects.

Figure 2-3: Public Water Systems



CHAPTER 3: HAZARD IDENTIFICATION, RISK, AND CRITICAL FACILITIES

MARYLAND HAZARD ANALYSIS

The first step in preparing mitigation strategies for Somerset County involves the identification of various hazards and the risk associated with each hazard. 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, Somerset County ranked “High” for coastal and flood hazard risk; “Medium-High” for the risk of high wind; and “Medium” for drought, thunderstorm, wildfire, and winter storm. The county ranked “Medium-Low” for the risk of a tornado.

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 Somerset County in the *2016 Maryland State Hazard Mitigation Plan Update*:

Table 3-1: 2016 Maryland State Hazard Mitigation Plan Update Rankings

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

Source: 2016 Maryland State Hazard Mitigation Plan Update

PLANNING COMMITTEE ANALYSIS

In consideration of the State’s 2016 Plan, and previous planning efforts completed by Somerset County, the Hazard Mitigation Planning Committee (HMPC) utilized all hazards identified by the State and updated rankings on previously identified local hazards. Committee members rated each identified hazard based on their agency or community perspective and the results were combined into one table. Flood, Coastal, Epidemic (including Opioid and Zika Virus), Shoreline Erosion, and Cyber Attack rated “High”, while Drought, Thunderstorm, and High Wind rated “Medium-High”. The committee rated Winter Storm, Wildfire, HazMat, and Major Transportation

Accident as “Medium” risks, while Tornado and Fire/Explosion rated as “Medium-Low” risks. Lastly, Earthquake was rated as “Low” during the hazard assessment. The results of the HMPC’s risk assessment is listed on Table 3-2. Additionally, included in the table is the previous 2011 Plan rankings and rankings of new hazards established by the HMPC for the 2017 Plan.

Table 3-2: HMPC Risk Analysis Ranking for Somerset County, 2011 & 2017

HMPC Risk Analysis Ranking for Somerset County, 2011 & 2017										
HAZARD	High		Medium High		Medium		Medium Low		Low	
	2011	2017	2011	2017	2011	2017	2011	2017	2011	2017
Drought (Drought & Extreme Heat)			X	X						
Flood (Riverine & Coastal Flooding)	X	X								
Hurricane	X	X								
Shoreline Erosion & Sea Level Rise	X	X								
Thunderstorm			X	X						
Tornado							X	X		
Winter Storm (Weather)					X	X				
Wildfire					X	X				
High Wind			X	X						
Hazards not included in the 2016 State Plan										
Fire/Explosion							X	X		
HazMat					X	X				
Major Transportation Accident					X	X				
Epidemic (Including Opioid and Zika Virus)		X					X			
Earthquake							X			X
New hazards established by the HMPC for the 2017 Plan										
Cybersecurity		X								

Source: 2017 Hazard Mitigation Planning Committee

The 2017 HMPC rankings were identical to the 2016 State rankings. As for comparing the results from the previous 2012 Plan with the 2017 Plan Update, most of the hazard rankings by the HMPC remained the same. However, Earthquake was reduced from “Medium-Low” to “Low” and Epidemic (Including Opioid and Zika Virus) was increased from “Medium-Low” to “High”.

COMBINED RISK

By combining the results of the above studies and exercises, and reviewing updated frequencies, fatalities, injuries and impacts for the identified hazards from the National Center for Environmental Information and MFS (Wildfire), the combined risk ranking was developed. Table 3-3 lists the combined risk for the identified hazards in Somerset County on a scale of 1 to 30 with 30 being the highest risk. The local assessment weight was double the amount of the other factors in determining the final rankings due to each committee member representing a community or agency that deals first hand with these hazards.

Table 3-3: Summary of Combined Risk

HAZARD	Property Damages & Crop Damages	Frequency	Fatalities	Injuries	Local Assessment	Combined Risk **
Drought	\$2.00M	0.09	0	0	Medium-High	Medium-High (16)
Coastal	\$12.288M	0.48	0	0	High	High (19)
Flood	\$500,000	0.39	0	0	High	Medium-High (17)
Thunderstorm	\$347,000	0.31	0	4	Medium-High	Medium-High (17)
Tornado	\$68,000	0.08	0	0	Medium-Low	Medium (11)
Winter Storm	\$0	2.48	0	0	Medium	Medium (14)
High Winds	\$1.345M	.088	0	0	Medium-High	Medium-High (17)
Wildfire	\$116,543	13.89	0	0	Medium	Medium-High (16)

Source: National Center for Environmental Information, MFS (Wildfire), State of Maryland 2016 Hazard Mitigation Plan

**Combined risk is determined by assigning a 1-5 ranking for each of the five categories: Property Damages/Crop Damages, Frequency, Fatalities, Injuries, and Local Assessment. For each hazard, a total of the combined risk was determined and assigned.

CRITICAL AND PUBLIC FACILITIES

The 2012 critical and public facility database was reviewed for accuracy. Corrections were made and new data was added as part of the plan update process. New public facilities added

included transportation and utility facilities, such as follows: heliports, pumping stations, well houses, water towers, and a SD control building.

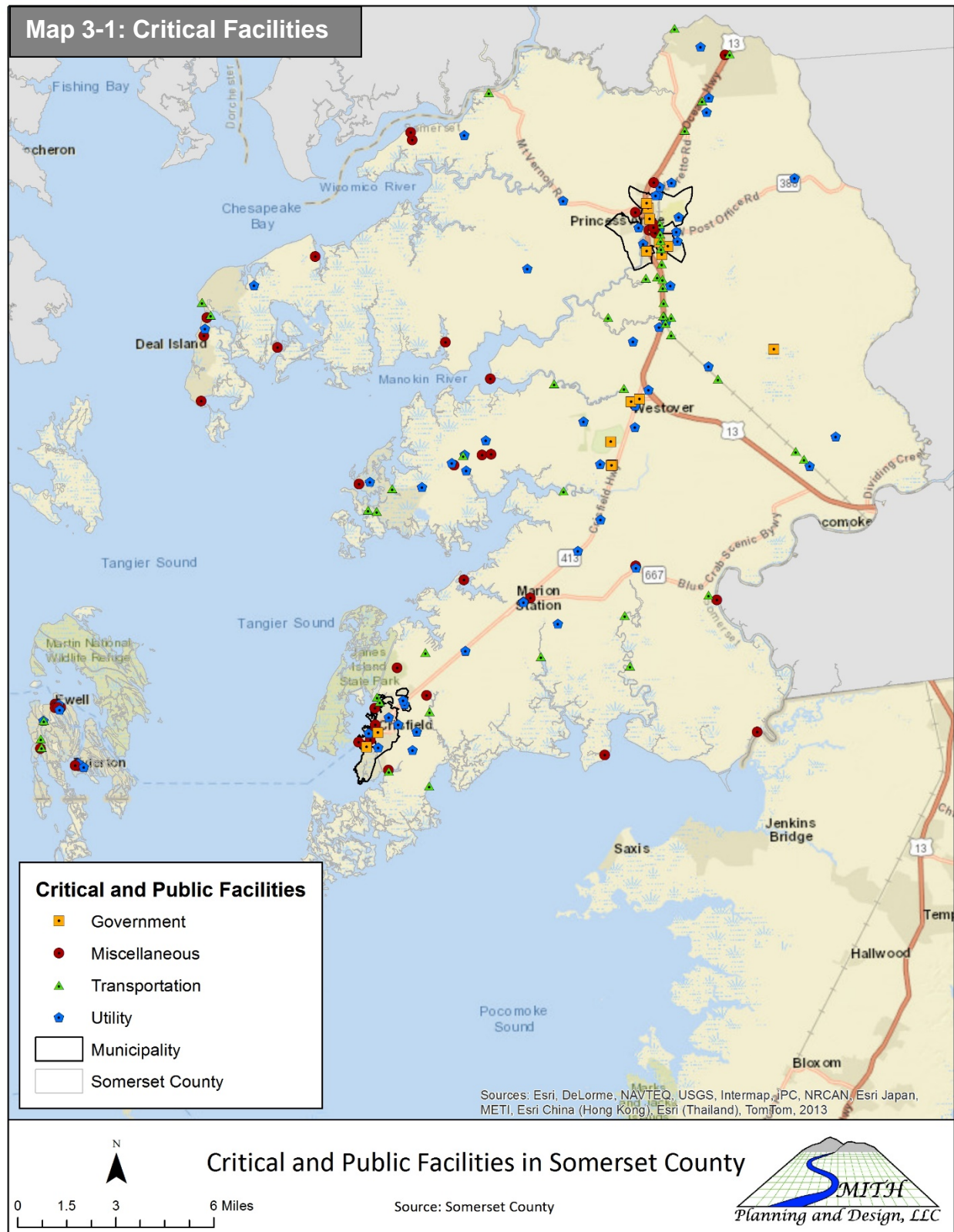
The new critical and public facilities database has been compiled and used for analysis throughout the hazard chapters of the plan, as shown in Table 3-4. The detailed database has been added in Appendix A: Critical Facilities & Public Facilities Methodology & Database.

Table 3-4: Essential and Public Facilities 2017

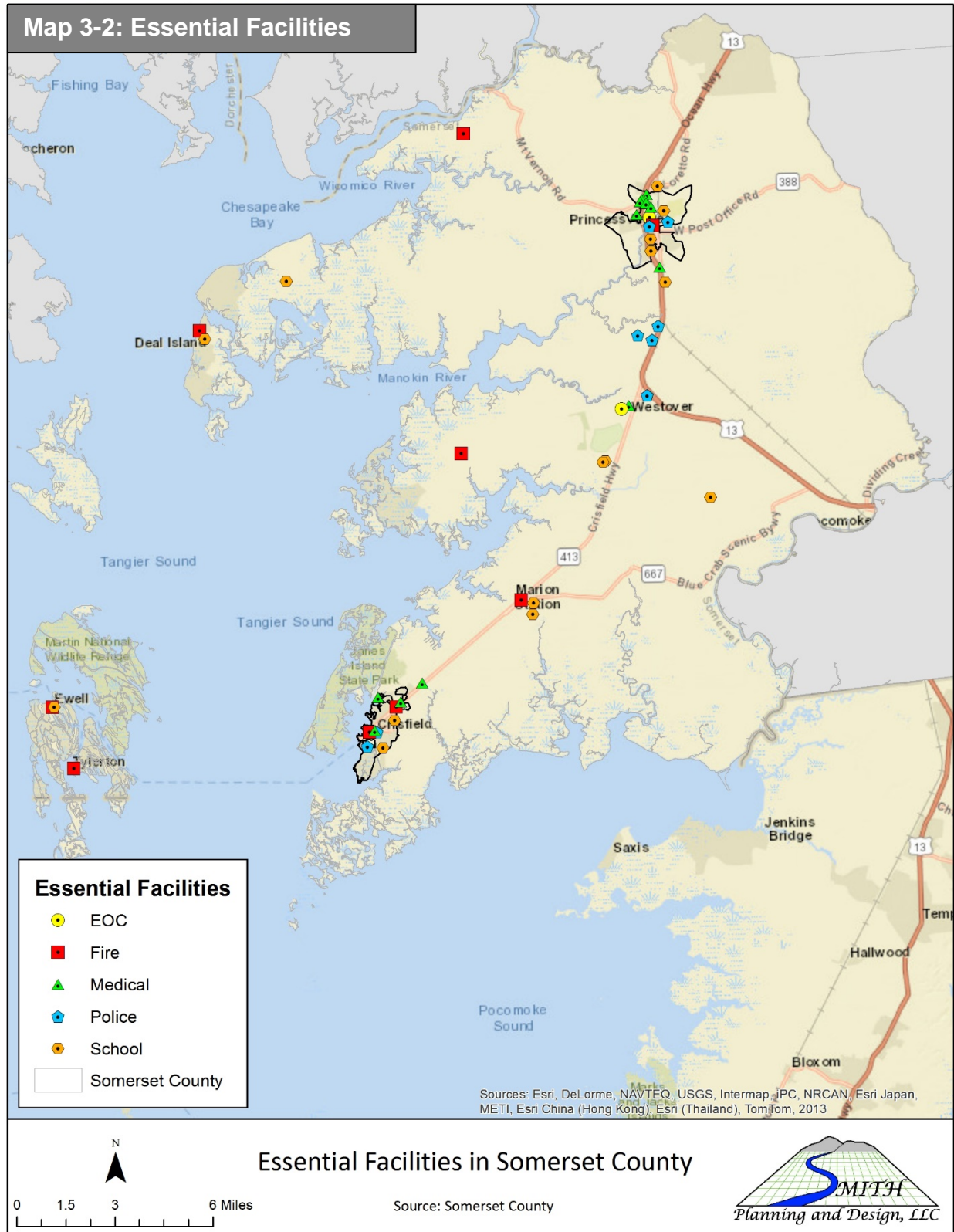
Critical and Public Facilities 2017		
Critical or Public Facility	Facility Type	Total
Essential	EOC & 9-1-1 (co-located)	1
	EOC & 9-1-1 (Back-up)	2
	Fire	9
	Medical (Hospital, Health Care, and Nursing Home)	14
	Police	9
	School	15
Public	Government (Town, County, State, Federal, and Military)	21
	Miscellaneous (Community Centers, Library, Marina/Dock, Museum, Park, and Post Office)	45
	Transportation (Heliport, Bridges, Railroad Crossings, and Airport)	46
	Utilities (Communications, Electric, Transfer Station, WTP, WTP, Pumping Station, Well House, Water Tower, and SD Control Building)	66
Total		238

Source: Somerset County Emergency Services

Critical facilities listed in the Table 3-4 above have been plotted on Map 3-1 below.



Essential facilities listed in Table 3-4 above have been plotted on Map 3-2 below:



CHAPTER 4: FLOOD

PROFILE

The FEMA definition for flooding is “a general and temporary 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 frontal storms, thunderstorms, hurricanes, snow melt or some combination of the above events. According to the *2016 Maryland State Hazard Mitigation Plan Update*, Maryland has been affected by 1,591 floods events between 1993 and January 2015, these flood events have resulted in \$177.932 million in property damages. Historically, the greatest riverine flooding events remain the 1936 flood on the Potomac and the 1972 flood resulting from Hurricane Agnes.

There are various types of flooding including: flash flooding, riverine flooding, and tidal flooding. Flash floods occur suddenly after a brief but intense downpour. Although the duration of these events are usually brief, the damages can be quite severe. Flash floods are more likely to occur in places with steep slopes and narrow stream valleys, and along small tributary streams. However, flash floods can be the result of improper stormwater drainage. Riverine flooding is defined as ‘run off from sustained rainfall or rapid snow melt exceeding the capacity of a river's channel.’

In regards to Somerset County, the *2015 Flood Insurance Study (FIS)* states that the County has a total area of 611 square miles of which 320 square miles is land. Streams located within Somerset County include: Wicomico Creek, Monie Bay, Manokin River, Kings Creek, Back Creek, the Big Annemessex River, the Little Annemessex River, the Pocomoke River and Dividing Creek. The FIS reviewed the streams and determined that all of the streams previously studied in the FIS were controlled by tidal backwater except for Dividing Creek, which is controlled by riverine flooding.

Considering the State of Maryland is a coastal state with over 12 percent of its surface area in floodplains and having approximately 8,000 miles of shoreline, flooding is a major concern. Over 90% of the United States’ Presidential Declarations involved flooding. Of the thirty-one (31) Declarations for the State of Maryland, nine (9) Declarations were for flooding.

HISTORY

According to the U.S. Geological Survey data, the lower eastern shore has been affected by several 100 year flood events since the mid 1960’s and by a number of 25-50 year storm events. While there are only a few gauging stations on the lower eastern shore, it is safe to say that Somerset County has been affected to some extent by these events. However, due to the county’s low elevation and relief, riverine flooding does not cause the same type of problems that it does in areas on the western shore where relief is much more pronounced.

In terms of number of occurrences, the National Center for Environmental Information (NCEI) database listed a total of 20 flood events affecting Somerset County from 1998-2017. Therefore, the County experiences 1.0 flood events per year.

Table 4-1: Flood Events

Flood Events			
Location	Type	Date	Event Narrative
Princess Anne	Heavy Rain	January 27 to 28, 1998	A Nor'easter produced heavy rain and strong winds across the Lower Maryland Eastern Shore on Tuesday, January 27th and Wednesday, January 28th. Rainfall totals generally ranged from 3 to 5 inches. This rainfall caused street flooding and flooding of poor drainage areas throughout the region.
Princess Anne	Heavy Rain	February 6, 1998	A Nor'easter produced heavy rain and strong winds across the Lower Maryland Eastern Shore from Tuesday, February 3rd through Thursday, February 5th. Rainfall totals generally ranged from 2 to 4 inches. Heavy rain caused some urban flood/poor drainage flood problems with a few roads closed due to high water.
Princess Anne	Flash Flood	July 5, 2006	Numerous flooded roads.
Princess Anne	Heavy Rain	October 24 to 27, 2007	The combination of low pressure over the Southeast United States and a nearly stationary frontal boundary across the Middle Atlantic Region helped to produce heavy rain across portions of the Lower Maryland Eastern Shore. The storm system brought an average of two to three inches of rainfall to the area.
Countywide	Heavy Rain	December 10 to 12, 2008	Rainfall amounts between one and four inches occurred across the county. Rainfall amount of 2.99 inches was measured at Princess Anne.
Countywide	Heavy Rain	November 11 to 13, 2009	Rainfall amounts ranged between three and six inches across the county. Princess Anne recorded 4.69 inches of rain.
Countywide	Heavy Rain	March 29, 2010	Rainfall amounts of one to three inches occurred across the county. Princess Anne reported 2.65 inches of rain.
2017 Hazard Mitigation Update			
Countywide	Flood	August 27, 2011	Heavy rains associated with Hurricane Irene produced widespread low-land flooding across much of the county, including roadways which were washed out or closed. Storm total rainfall generally ranged from five to ten inches. Princess Anne reported 9.73 inches of rain. Deal Island reported 5.75 inches of rain.
Countywide	Flood	October 29, 2012	Numerous roads were closed due to flooding produced by Hurricane Sandy. Storm total rainfall ranged from five to nine inches across the county.
Princess Anne	Heavy Rain	November 9, 2015	Rainfall amounts generally ranged between 1.5 inches and 2.8 inches across the county. Deal Island (1 SSW) reported 2.78 inches of rain. Princess Anne (2 SSW) reported 2.50 inches of rain.
Princess Anne	Heavy Rain	June 28, 2016	Rainfall total of 2.40 inches was measured in Princess Anne.
Kings Creek	Heavy Rain	June 28, 2016	Rainfall total of 3.60 inches was measured at 3 miles south of Princess Anne.
Deal Is	Heavy Rain	July 29, 2016	Rainfall total of 2.21 inches was reported from July 28.

Location	Type	Date	Event Narrative
Princess Anne	Heavy Rain	September 19, 2016	Rainfall totals generally ranged from 1 inch to 3 inches across the county. Princess Anne (2 SSW) reported 1.77 inches of rain. Deal Island reported 1.77 inches of rain. Oriole (2 E) reported 1.02 inches of rain.
Princess Anne	Heavy Rain	September 28, 2016	Rainfall totals generally ranged from 2 to 8 inches across the county. Princess (2 SSW) reported 8.13 inches of rain. Oriole (2 E) reported 6.16 inches of rain. Manokin (1 NNE) reported 6.12 inches of rain. Deal Island reported 4.55 inches of rain.
Crisfield	Flood	September 28, 2016	Water was reported over Spruce and Myrtle Streets in Crisfield.
Crisfield	Flash Flood	September 29, 2016	Numerous roads were closed in and around Crisfield. Some areas were isolated due to flood waters.
Princess Anne	Flash Flood	September 29, 2016	Widespread flooding was reported around Princess Anne. Numerous roads were closed including several State Highways including Somerset Avenue. There was also flooding reported around the University of Maryland Eastern Shore.
Oriole	Heavy Rain	October 8, 2016 to October 9, 2016	Rainfall totals generally ranged from 3 to 5 inches across the county. Oriole (2 E) reported 3.50 inches of rain. Princess Anne (2 SSW) reported 3.44 inches of rain. Manokin (1 NNE) reported 3.08 inches of rain.
Princess Anne	Flood	October 9, 2016	Heavy rain caused an extended period of significant flooding across portions of the county. Several roads were impassable or closed for a couple of days, and some homes and businesses were impacted.

SOURCE: NWS, NCEI (NOAA)

COUNTY PERSPECTIVE

As discussed in Chapter 3, the *2016 State of Maryland Hazard Mitigation Plan* ranked flood as 'High' for Somerset County. Based on local experience, the 2017 HMPC ranked flood as 'High' also due to the potential loss of life and possible severe property damage inherent with flooding of roadways and bridges. Man-made activities such as timbering, and road construction can cause increased runoff that makes downstream areas more susceptible to damage from natural occurring events.

Furthermore, local climatic conditions can produce large amounts of precipitation at any time of the year; the potential for flooding is not limited to any particular season. Historically, however, most major floods have occurred during heavy thunderstorm activity or in late summer or early fall during the hurricane season.

Since Somerset County is prone to various forms of flooding including riverine flooding and flash flooding, a Digital Flood Insurance Rate Map (DFIRM) published by the Federal Emergency Management Agency (FEMA) was utilized to depict flood risk areas. The DFIRM is the basis for floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP). Changes since the last Flood Insurance Rate Map (FIRM) include:

- Special Flood Hazard Area (SFHA) boundaries within Somerset County were updated due to new engineering analysis performed within the Flood Risk Project. The updated modeling produced new flood zone areas and new base flood elevations in some areas

and leveraged recently developed LiDAR-based topographic data. The previously effective FIRM, preliminary FIRM, and current effective FIRM dates are listed below:

- Previous FIRM effective date: March 3, 2011
- Preliminary FIRM date: March 21, 2013
- Current FIRM effective date: February 4, 2015
- The CSLC dataset includes the following information for areas within the Coastal Flood Risk Study:
 - Increase: new area in the current effective FIRM compared to the previous effective FIRM.
 - Decrease: loss of area in the current effective FIRM compared to the previous effective FIRM.
 - Net Change: calculated as “increase” minus “decrease.”

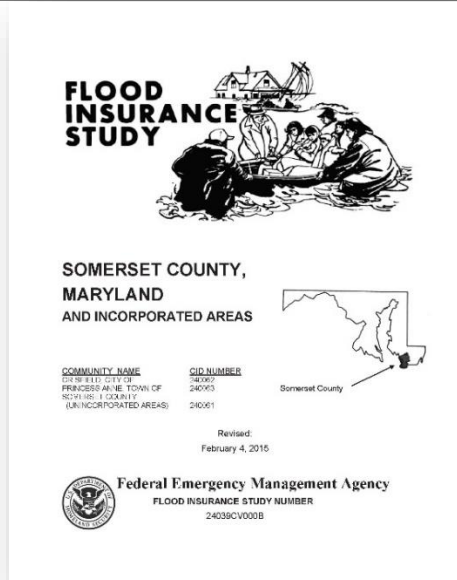
The table below summarizes the increases, decreases, and net change of SFHAs, Floodways, and Coastal High Hazard Areas (CHHAs) for the county.

Table 4-2: Changes Since Last Firm

Area of Study	Total Area (mi ²)	Increase (mi ²)	Decrease (mi ²)	Net Change (mi ²)
Within SFHA	179.9	24.8	0.4	24.4
Within Floodway	0	0	0	0
Within CHHA (Zone VE or V)	28.4	<0.1	0	<0.1

Source: FEMA Flood Risk Report - Somerset County, Maryland Coastal Study, May 4, 2016

Figure: 4-1 Flood Insurance Study



Flood Insurance Study

A **Flood Insurance Survey (FIS)** is a compilation and presentation of **flood** risk data for specific watercourses, lakes, and coastal **flood** hazard areas within a community. When a **flood study** is completed for the NFIP, the information and maps are assembled into an FIS.

Source: FEMA

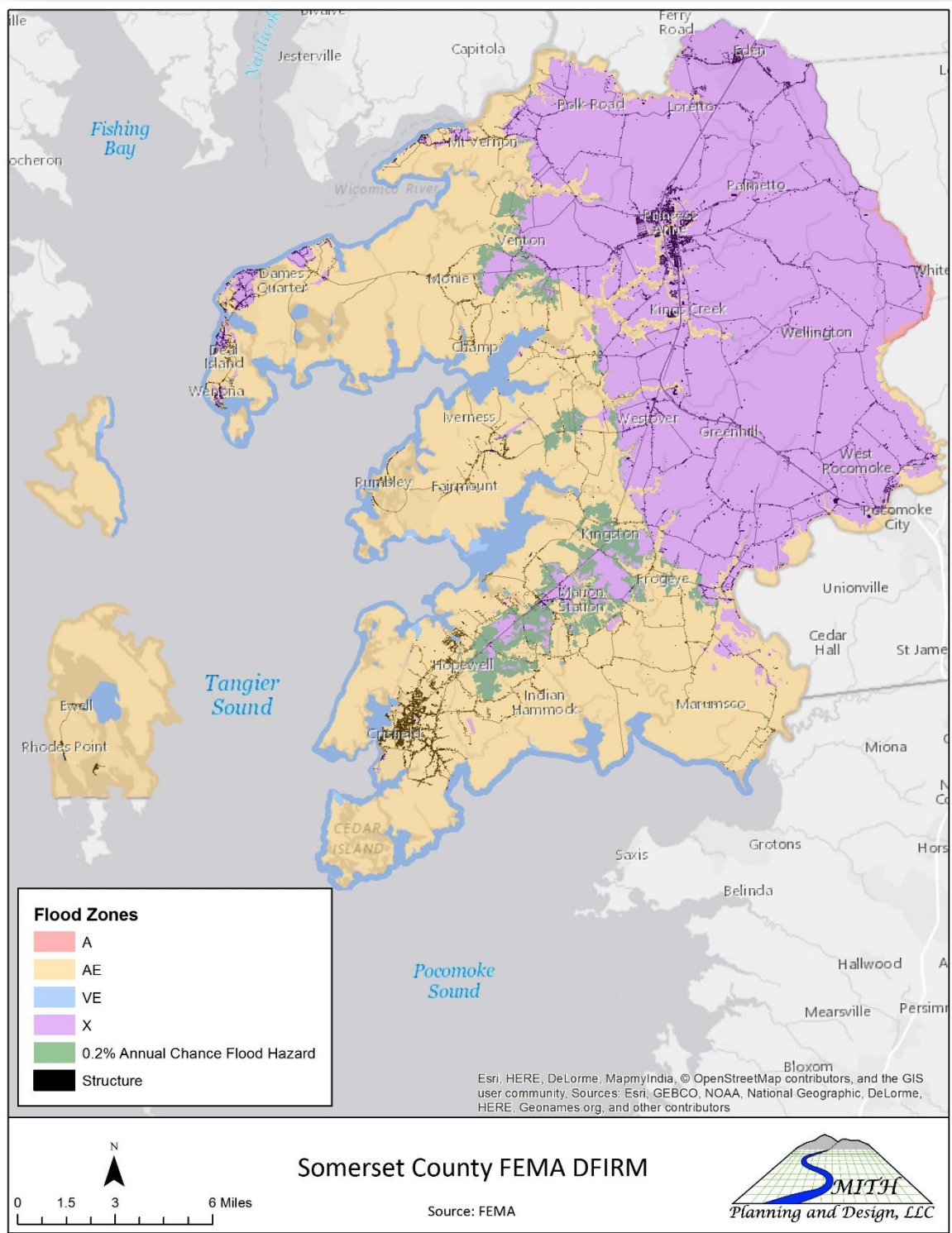
The DFIRM Database categorizes floodplains into flood zones, which are geographic areas that FEMA has defined according to their varying levels of flood risk, as shown on Table 4-3. Map 4-1 provides a visual representation of the flood zones in Somerset County.

Table 4-3: FEMA Flood Zones

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

SOURCE: FEMA: DEFINITIONS OF FEMA FLOOD ZONE DESIGNATIONS

Map 4-1: FEMA DFIRM Map



As of May 28, 2017, the National Flood Insurance Program (NFIP) reported a total of 1,940 flood insurance policies filed for Somerset County and its two municipalities. Total housing units in the county was 11,130 in 2010 and an estimated 11,420 total units in 2016. Therefore, 16.9 percent of housing units within the county are covered by flood insurance policies.

Table 4-4: NFIP Insurance Policies

Location	Number of Policies	Total Coverage
Crisfield	536	\$96,442,300
Princess Anne	9	\$1,606,100
Somerset County	1,395	\$265,540,500
Total	1,940	\$363,588,900

Source: Federal Emergency Management Agency NFIP Insurance Report, Maryland, 28 May 2017

The NFIP report provided the total claims reported since 1978 as 1,107. The total amount paid since 1978 for the reported claims was \$12,782,376.53, as shown below in Table 4-5.

Table 4-5: NFIP Total Claims Since 1978

Location	Number of Claims	Total Paid
Crisfield	432	\$5,373,175.41
Princess Anne	6	\$107,329.73
Somerset County (unincorporated)	669	\$7,301,871.39
Total	1,107	\$12,782,376.53

Source: Federal Emergency Management Agency NFIP Insurance Report, Maryland, 28 May 2017

Note: Flood insurance is available to anyone in the County and even those structures outside of the 100-year mapped floodplain area. Therefore, in some cases, the number of policies includes structures that are outside the 100-year mapped floodplain.

Considering the amount of flood insurance policies and the number of claims that have been reported, identifying areas of repetitive loss within a community is a good indicator to use in determining areas of high flood damage vulnerability. While flood damage is not necessarily limited to these areas, repetitive loss data provides location indicators for areas where structures are experiencing recurring and costly damage from flooding.

FEMA defines a repetitive loss property as:

- Any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP; or
- A property that has incurred flood damage on two occasions, in which the cost to repair, on average, equaled or exceeded 25 percent of the market value of the structure.

FEMA defines a severe repetitive loss property as:

- A single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such

claims payments exceeding \$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

As of 30 June 2017, two (2) condos, one (1) non-residential, and thirty-four (34) single family structures were located within the unincorporated portions of Somerset County. These structures are located on the following streets:

- | | |
|-------------------------|---------------------------|
| ➤ Jacksonville Road | ➤ Hearts Drive |
| ➤ Locust Point Road | ➤ Johnson Creek Road |
| ➤ Deal Island Road | ➤ Manokin Court |
| ➤ Ape Hole Road | ➤ Marsh Road |
| ➤ Byrd Road | ➤ Marina Drive |
| ➤ Byrdtown Road (2) | ➤ Old State Road |
| ➤ Cassandra Drive | ➤ Oriole Road |
| ➤ Caleb Jones Road | ➤ West Pear Street |
| ➤ Champ Road | ➤ South Pomfrett Road (2) |
| ➤ Deal Island Road (4) | ➤ Roland Parks Road |
| ➤ Drawbridge Road | ➤ Riley Roberts Road |
| ➤ Ford Road | ➤ Sackertown Road (2) |
| ➤ Frenchtown Road | ➤ Tuff Street |
| ➤ House Pine Beach Road | ➤ Tylertown Road |
| ➤ Hotel Road | ➤ Walter Jones Road |

There are no Severe Repetitive Loss properties located in Somerset County.

MUNICIPAL PERSPECTIVE

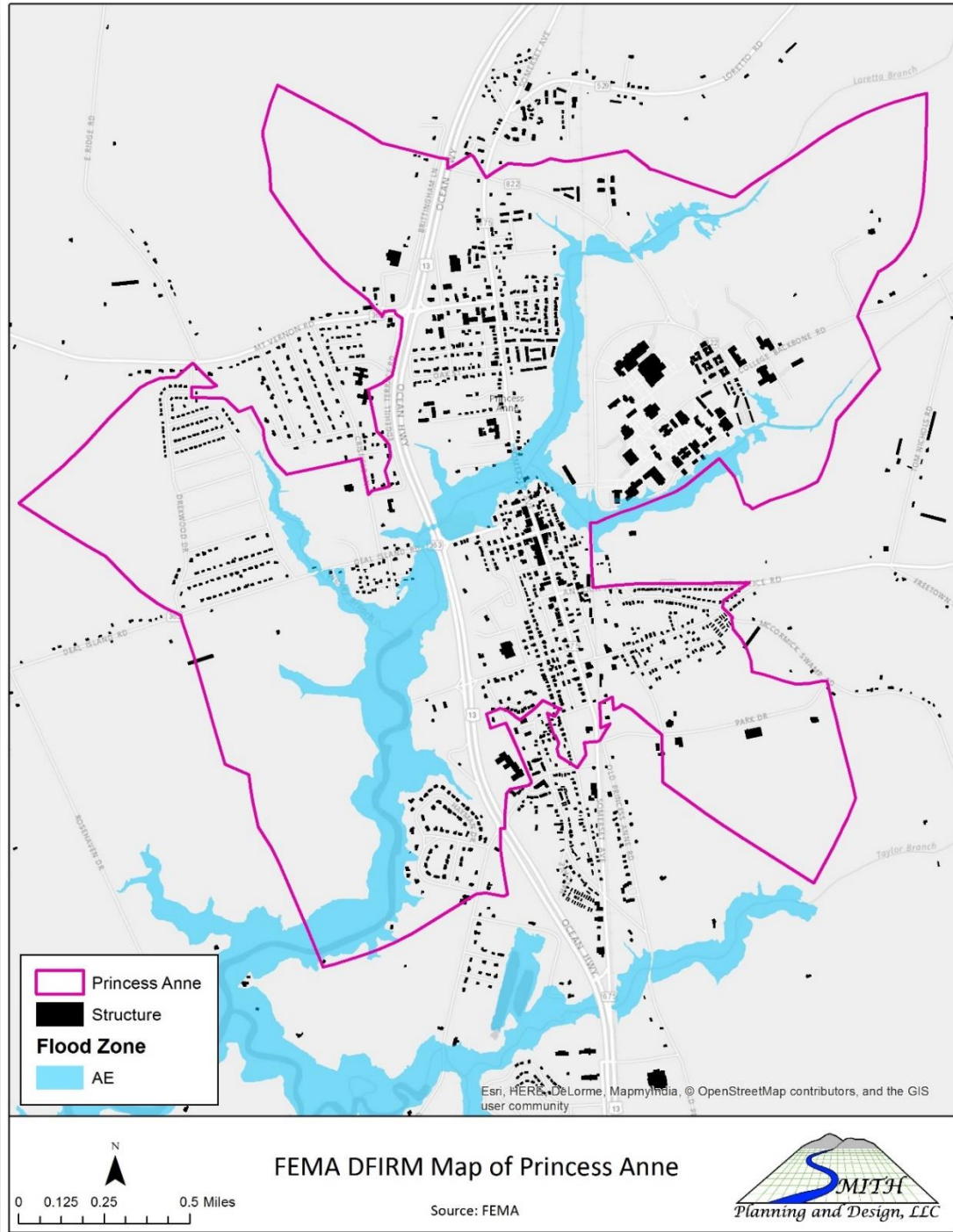
As of 30 June 2017, one (1) single family repetitive loss structure is within the Town of Princess Anne and located on Deal Island Road. A total of one (1) condo, two (2) non-residential, and twelve (12) structures located within the City of Crisfield are listed as repetitive loss properties. These structures are located on the following streets:

- | | |
|--------------------------|-----------------------|
| ➤ West Main Street (2) | ➤ Maryland Avenue (2) |
| ➤ 7 th Street | ➤ Populer Street |
| ➤ Cove Street | ➤ Potomac Street |
| ➤ Calvary Road | ➤ Somerset Avenue |
| ➤ Hall Highway (2) | ➤ Tylerton Road |
| ➤ Myrtle Street | ➤ Wynfall Avenue |

The town of Princess Anne is the only municipality in Somerset County located along the 100-year floodplain of a major inland stream, the Manokin River. The Manokin River 100-year floodplain is depicted below in blue and is categorized as Zone AE; base floodplain where base flood elevations are provided for a 100-year flood event. Tributaries leading into the Manokin River include: Wesley Branch, Manokin Branch and the Loretta Branch. Each of the tributaries are, for the most part, surrounded by woodlands with limited amounts of development located on the fringes of the woodlands. However there are several areas along these tributaries that border the 100-year floodplain, such as Front Street, Manokin Avenue and the small community developed around Daphne Lane. Furthermore, the Manokin River and its tributaries intersect

with several roads including: Deal Island Road, Route 13, Broad Street and Somerset Avenue. These areas could be highly susceptible to flooding if proper stormwater management techniques are not utilized.

Map 4-2: FEMA FIRM Map of Princess Anne



Crisfield is primarily within FEMA Flood Zone AE. The AE Flood Zone indicates that over the life of a 30-year mortgage, properties within the zone have a 26% chance of flooding. The City of Crisfield is highly susceptible to coastal flooding due to tidal influences and storm surges, as discussed in *Chapter 5: Hurricane and Coastal Flooding*. The Special Flood Hazard Area (SFHA) in Crisfield is designated as Zone AE, which indicated that base flood elevations (BFEs) for the 100-year floodplain event are determined. In the City of Crisfield, the Zone AE floodwater levels are controlled by tidal influences and storm surge levels. Considering the City of Crisfield is located entirely within the 100-year floodplain, it is crucial that all evacuation routes are accessible and warnings are issued in a timely manner.

**Figure 4-2: Manokin River Floods
Princess Anne**



The Manokin River flooded Somerset Avenue in Princess Anne after a line of strong thunderstorms overnight dumped 4 to 8 inches of rain on the area.

Source: Manokin River Floods Princess Anne: delmarvanow; Photo Source: Staff photo by Liz Holland <http://www.delmarvanow.com/picture-gallery/news/2016/09/29/manokin-river-floods-princess-anne/91268936/>

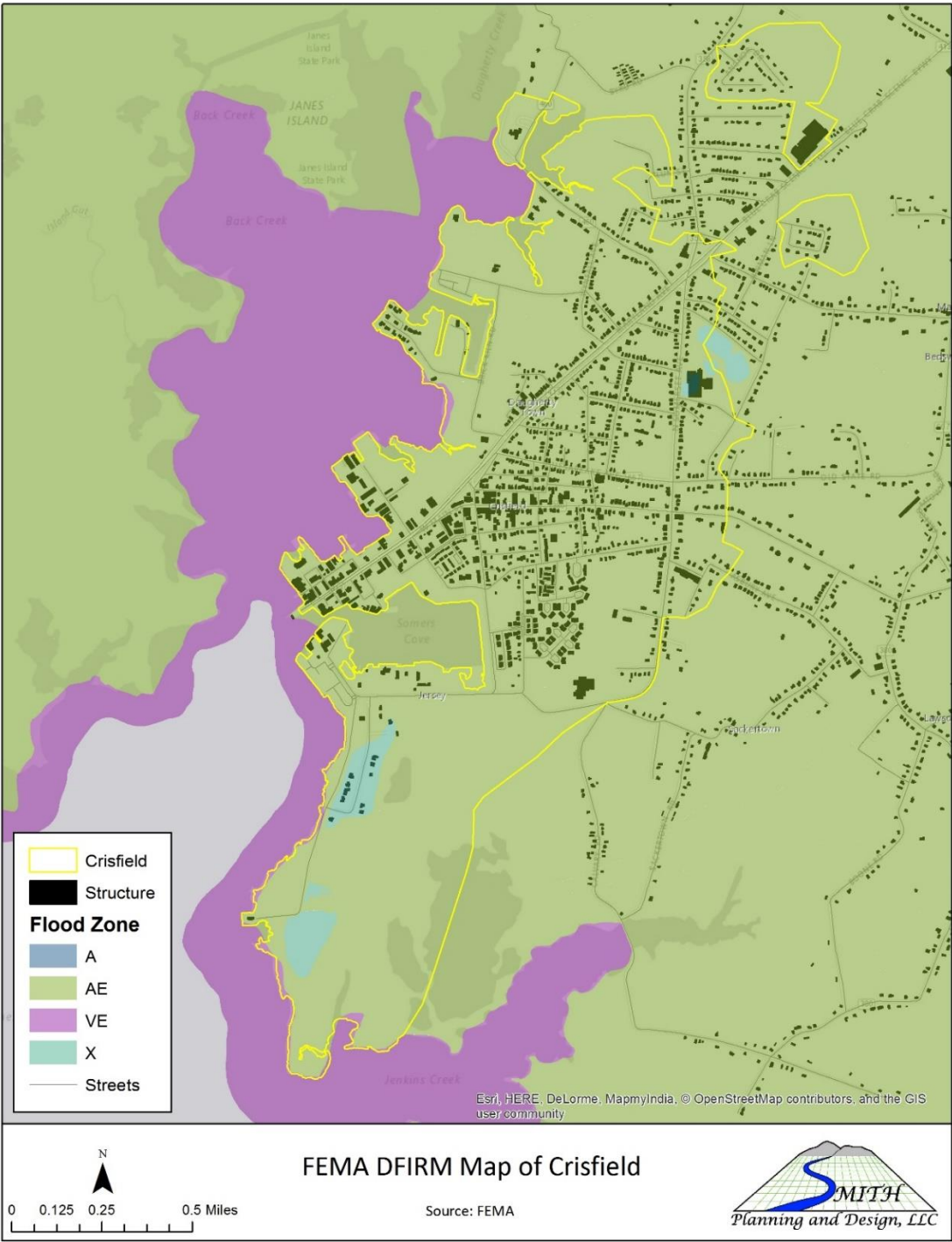
Damage and flooding to Crisfield as a result of Superstorm Sandy.

Source: WBAL News Radio; Photo Source: MEMA <http://www.wbal.com/article/103561/9/superstorm-sandy-brought-wind-rain-snow-and-death>

Figure 4-3: Crisfield – Hurricane Sandy



Map 4-3: FEMA FIRM Map of Crisfield



ESSENTIAL FACILITIES AT-RISK

Essential facilities have been assessed for flood vulnerability. The County contains five (5) essential facilities within FEMA Flood Zone AE. These facilities have a modeled flood depth ranging from 1.3 feet to 4.2 feet of flooding. The City of Crisfield contains ten (10) essential facilities within FEMA Flood Zone AE. These facilities have a modeled flood depth ranging from 0.5 feet to 3.8 feet of flooding. While Princess Anne contains one (1) essential facility, the Mt. Vernon Fire Department, within FEMA Flood Zone AE. The flood depth at this facility is 0.5 feet.

Essential Facilities

Essential facilities are those facilities that provide services to the community and should be functional after a disaster event. Essential facilities include hospitals, police stations, fire stations and schools.

Source: FEMA HAZUS Technical Manual

Table 4-6: Essential Facilities & Flood Vulnerability

Essential Facilities & Flood Vulnerability				
Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)
County	Fire	Fairmount Fire Dept.	AE	1.3
County	Fire	Ewell Fire Dept.	AE	2.8
County	School	Ewell E.S.	AE	2.9
County	School	Macedonia School	AE	3.9
County	Fire	Tylerton Fire Dept.	AE	4.2
Crisfield	School	Woodson E.S.	AE	0.5
Crisfield	Medical	Marion Pharmacy	AE	0.8
Crisfield	Medical	Crisfield Clinic	AE	1.3
Crisfield	Fire	Lower Somerset Ambulance Squad	AE	1.5
Crisfield	Police	DNR Police	AE	1.6
Crisfield	Fire	Crisfield Fire Dept.	AE	2.5
Crisfield	Police	Crisfield Police	AE	3.0
Crisfield	Medical	Crisfield Pharmacy	AE	3.1
Crisfield	Medical	McCready Health	AE	3.2
Crisfield	School	Crisfield H.S.	AE	3.8
Princess Anne	Fire	Mt. Vernon Fire Dept.	AE	0.5

Source: 2017 Somerset County Critical and Public Database

CRITICAL & PUBLIC FACILITIES AT-RISK

In addition to essential facilities, other critical and public facilities have been assessed for flood vulnerability. The County contains sixty-four (64) facilities within the FEMA AE Flood Zone, ranging from a modeled flood depth of 0.5 feet to 8.5 feet of flooding. Two facilities are located within the FEMA VE Flood Zone and have modeled flood depths of 2.6 and 11.1. The City of Crisfield has nineteen (19) facilities located within the FEMA AE Flood Zone, with modeled flood depths between 0.5 feet to 4.3 feet of flooding. Furthermore, a total of three (3) public facilities

located in the Town of Princess Anne are within the FEMA AE Flood Zone. Modeled flood depths for these three (3) facilities are between 0.5 feet and 1.3 feet of flooding.

Table 4-7: Critical & Public Facilities & Flood Vulnerability

Critical & Public Facilities & Flood Vulnerability				
Location	Facility Type	Facility Name	Flood Zone	Food Depth (Feet)
County	Transportation	Bridge @ Deal Island Road/Upper Thorofare	VE	11.1
County	Miscellaneous	Shelltown Boat Ramp	AE	8.5
County	Miscellaneous	Webster Cove Marina	AE	8.0
County	Transportation	Bridge @ Whitehaven Ferry Road/Waukaki Creek	AE	7.6
County	Transportation	Bridge @ Marumsco Road/Marumsco Creek	AE	7.1
County	Transportation	Bridge @ Millard Long Road/Back Creek	AE	6.3
County	Miscellaneous	Rhodes Point Dock	AE	6.2
County	Miscellaneous	Rumbly Point Boat Ramp	AE	6.2
County	Transportation	Bridge @ Lq Powell Road/East Creek	AE	6.0
County	Miscellaneous	St. Peters Creek Marina	AE	5.8
County	Miscellaneous	Deal Island Wma (3)	AE	5.7
County	Transportation	Bridge @ Stewart Neck Road/Kings Creek	AE	5.1
County	Utility	Ewell WWTP	AE	5.0
County	Miscellaneous	Fairmount Academy	AE	5.0
County	Transportation	Bridge @ Marsh Road/Shanks Creek	AE	5.0
County	Transportation	Bridge @ Smith Island Road/Ewell	AE	5.0
County	Utility	Pumping Station	AE	4.9
County	Utility	WWTP	AE	4.9
County	Transportation	Smith Island Heliport	AE	4.8
County	Transportation	Bridge @ Frenchtown Road/Mine Creek	AE	4.7
County	Transportation	Bridge @ Ape Hole Road/Little Ape Hole Creek	AE	4.6
County	Transportation	Bridge @ Coventry Parish Road/Rehobeth Branch	AE	4.6
County	Miscellaneous	Ewell Ramp/Wharf	AE	4.6
County	Transportation	Bridge @ Bryan Hall Road/Marumsco Creek	AE	4.5
County	Utility	Telecom Tower	AE	4.5
County	Transportation	Bridge @ Frenchtown Road/Goose Creek	AE	4.3
County	Miscellaneous	Coulbourn Creek Boat Ramp	AE	4.1
County	Miscellaneous	Burgess Early Am. Museum	AE	4.0
County	Miscellaneous	Dames Quarter Dock & Ramp	AE	4.0
County	Utility	Tylerton Transfer Station	AE	4.0
County	Transportation	Bridge @ River Road/Big Annemessex River	AE	3.8
County	Miscellaneous	Tylerton Marina	AE	3.6
County	Utility	Chance Transfer Station	AE	3.5

Location	Facility Type	Facility Name	Flood Zone	Food Depth (Feet)
County	Transportation	Fairmount Heliport	AE	3.4
County	Miscellaneous	Rehobeth Boat Ramp	AE	3.4
County	Miscellaneous	Tylerton Wharf	AE	3.4
County	Transportation	Bridge @ Calvary Road/Jenkins Creek	AE	3.3
County	Miscellaneous	Raccoon Point Rec. Area	AE	3.1
County	Miscellaneous	Smith Island Cultural Center	AE	3.1
County	Miscellaneous	Smith Island Library	AE	3.1
County	Utility	Well House	AE	3.0
County	Utility	Well House	AE	3.0
County	Utility	WWTP	AE	3.0
County	Transportation	Bridge @ Cash Corner Rd/Johnson Creek	AE	2.9
County	Utility	Halls Creek Road Wtp	AE	2.8
County	Utility	Well House	AE	2.7
County	Utility	Pumping Station	AE	2.6
County	Miscellaneous	Rumbley Marina	AE	2.6
County	Miscellaneous	Upper Fairmount P.O.	AE	2.6
County	Transportation	Bridge @ Sign Post Road/Back Creek	AE	2.4
County	Transportation	Bridge @ Hanes Point Road/Scotts Cove	AE	2.3
County	Miscellaneous	Wenona Marina	AE	2.3
County	Utility	Smith Island Incinerator	AE	2.2
County	Transportation	Bridge @ Stewart Neck Road/Jones Creek	AE	2.2
County	Transportation	Bridge @ Rumbley Road/Teague Creek	AE	1.8
County	Miscellaneous	Deal Island/Last Chance Marina	AE	1.7
County	Utility	Telephone	AE	1.7
County	Miscellaneous	Tylerton P.O.	AE	1.7
County	Utility	Well House	AE	1.6
County	Miscellaneous	Eddie Evans Ball Field	AE	1.4
County	Miscellaneous	Ewell P.O.	AE	1.3
County	Miscellaneous	Upper Hill Playground	AE	0.8
County	Transportation	Bridge @ Hall Highway/Trib Little Annemessex River	AE	0.5
County	Transportation	Bridge @ Old Princess Anne Rd/Kings Creek	AE	0.5
County	Utility	Pumping Station	AE	0.5
Crisfield	Miscellaneous	Crisfield Library	AE	4.3
Crisfield	Transportation	Mccready Health Heliport	AE	4.3
Crisfield	Miscellaneous	Glen Ward Ballfield	AE	3.5
Crisfield	Utility	Telephone	AE	3.5
Crisfield	Miscellaneous	City Dock	AE	3.3
Crisfield	Transportation	Crisfield Airport	AE	3.3
Crisfield	Miscellaneous	Crisfield P.O.	AE	3.2
Crisfield	Government	City Hall	AE	3.0
Crisfield	Miscellaneous	American Legion	AE	2.9
Crisfield	Miscellaneous	Jenkins Creek Dock & Boat Ramp	VE	2.6
Crisfield	Utility	Pumping Station	AE	2.4
Crisfield	Utility	Pumping Station	AE	2.4

Location	Facility Type	Facility Name	Flood Zone	Food Depth (Feet)
Crisfield	Utility	Telephone & Wireless Tower	AE	2.1
Crisfield	Utility	WWTP	AE	2.0
Crisfield	Miscellaneous	Janes Island Boat Ramp	AE	1.8
Crisfield	Miscellaneous	Somers Cove	AE	1.8
Crisfield	Utility	Water Tower	AE	1.2
Crisfield	Utility	Well House	AE	0.8
Crisfield	Government	Coast Guard	AE	0.5
Crisfield	Utility	Crisfield Electric Substation	AE	0.5
Princess Anne	Miscellaneous	Mt. Vernon Park	AE	1.3
Princess Anne	Utility	Communication	AE	0.5
Princess Anne	Miscellaneous	Manokin River Park	AE	0.5

Source: 2017 Somerset County Critical and Public Database

FLOOD RISK RESULT LOSS ESTIMATIONS

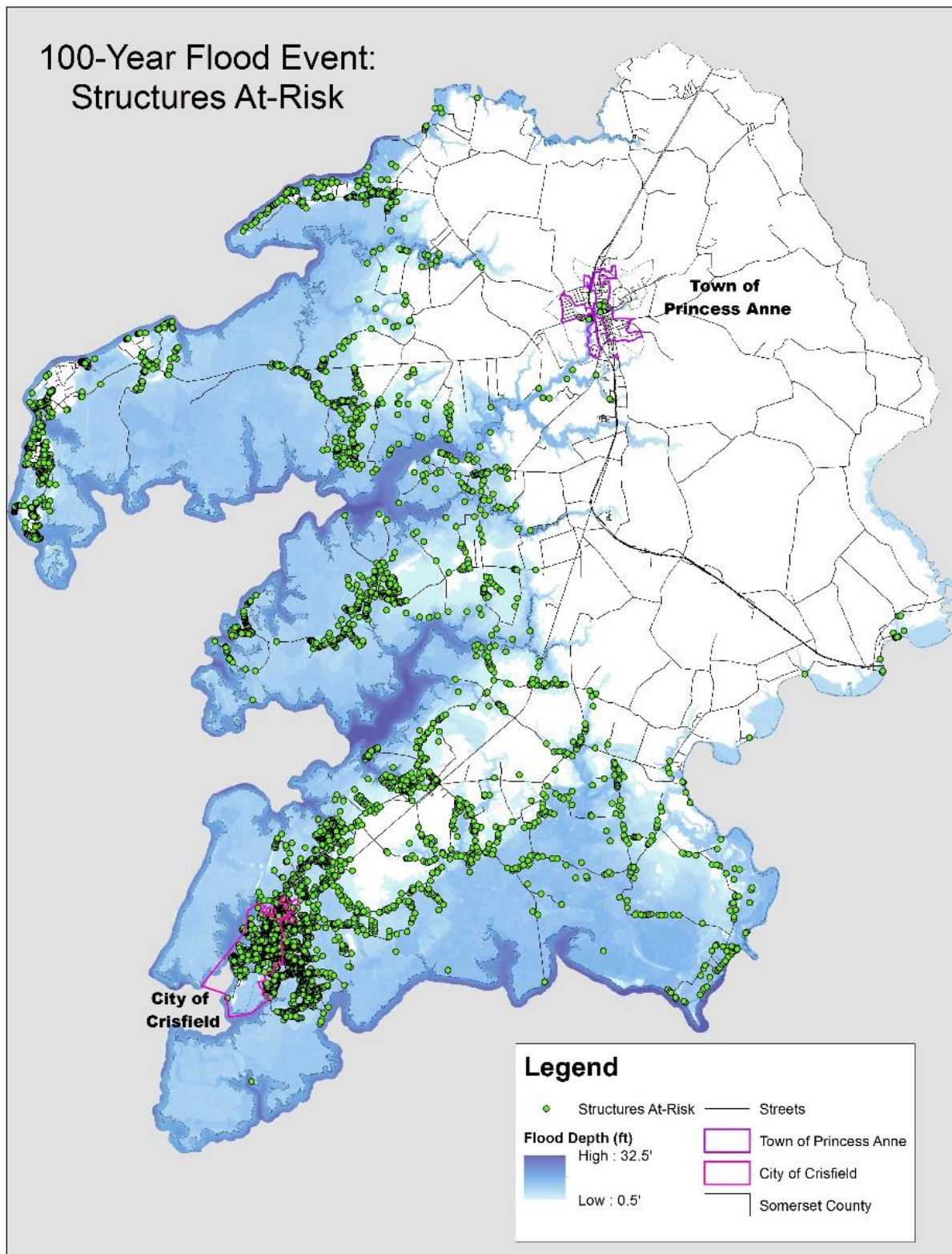
HAZUS is a GIS-based risk assessment methodology and software application created by FEMA and the National Institute of Building Sciences for analyzing potential losses from floods. Somerset County's coastal flood risk analysis incorporates results from a FEMA HAZUS analysis (Version 2.1 for the 2010 AAL Study Data, Version 2.2 for Flood Risk Project Refined Data), 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 computed using state-level tax data(parcel centroids from the Maryland Department of Planning) and local building footprints provided by Somerset County to estimate loss ratios for the 1-percent-annual-chance flood scenario.

Table 4-8: Estimated Potential Losses for 100-year Flood Event Scenario

Flood Risk Refined Losses			
Type	Inventory Estimated Value	% Of Total	1% (100-yr) Dollar Losses
Residential Building & Contents	\$424,900,000	71%	\$57,600,000
Commercial Building & Contents	\$104,400,000	18%	\$13,400,000
Other Building & Contents	\$65,600,000	11%	\$11,800,000
Total Building & Contents	\$594,400,000	100%	\$82,800,000
Business Disruption	N/A	N/A	\$5,700,000
Total	\$594,400,000	N/A	\$88,500,00

Source: FEMA Flood Risk Report - Somerset County, Maryland Coastal Study, May 4, 2016
Flood Risk Project Refined Losses calculated using HAZUS Version 2.2

Map 4-4: 100-Year Flood Event: Structures At-Risk



The National 2010 AAL Study Data for Somerset County uses features and tables from the default HAZUS (Version 2.1) General Building Stock inventory, U.S. Census data, and data resulting from the FEMA National 2010 Average Annualized Loss (AAL) Study.

Table 4-9: National 2010 AAL Study Losses

Type	Inventory Estimated Value	% Of Total	2% (50-yr) Dollar Losses	2 %Loss Ratio	0.2 % (500-yr) Dollar Losses	0.2 % Loss Ratio
Residential Building & Contents	\$1,353,300,000	71%	\$235,500,000	17%	\$361,400,000	27%
Commercial Building & Contents	\$322,800,000	17%	\$60,700,000	19%	\$91,100,000	28%
Other Building & Contents	\$223,300,000	12%	\$51,900,000	23%	\$75,500,000	34%
Total Building & Contents	\$1,899,500,000	100%	\$348,100,000	18%	\$528,000,000	28%
Business Disruption	N/A	N/A	\$12,200,000	N/A	\$16,300,000	N/A
Total	\$1,899,500,000	N/A	\$360,300,000	N/A	\$544,200,000	N/A

Source: FEMA Flood Risk Report - Somerset County, Maryland Coastal Study, May 4, 2016
Flood Risk Project Refined Losses calculated using HAZUS Version 2.2

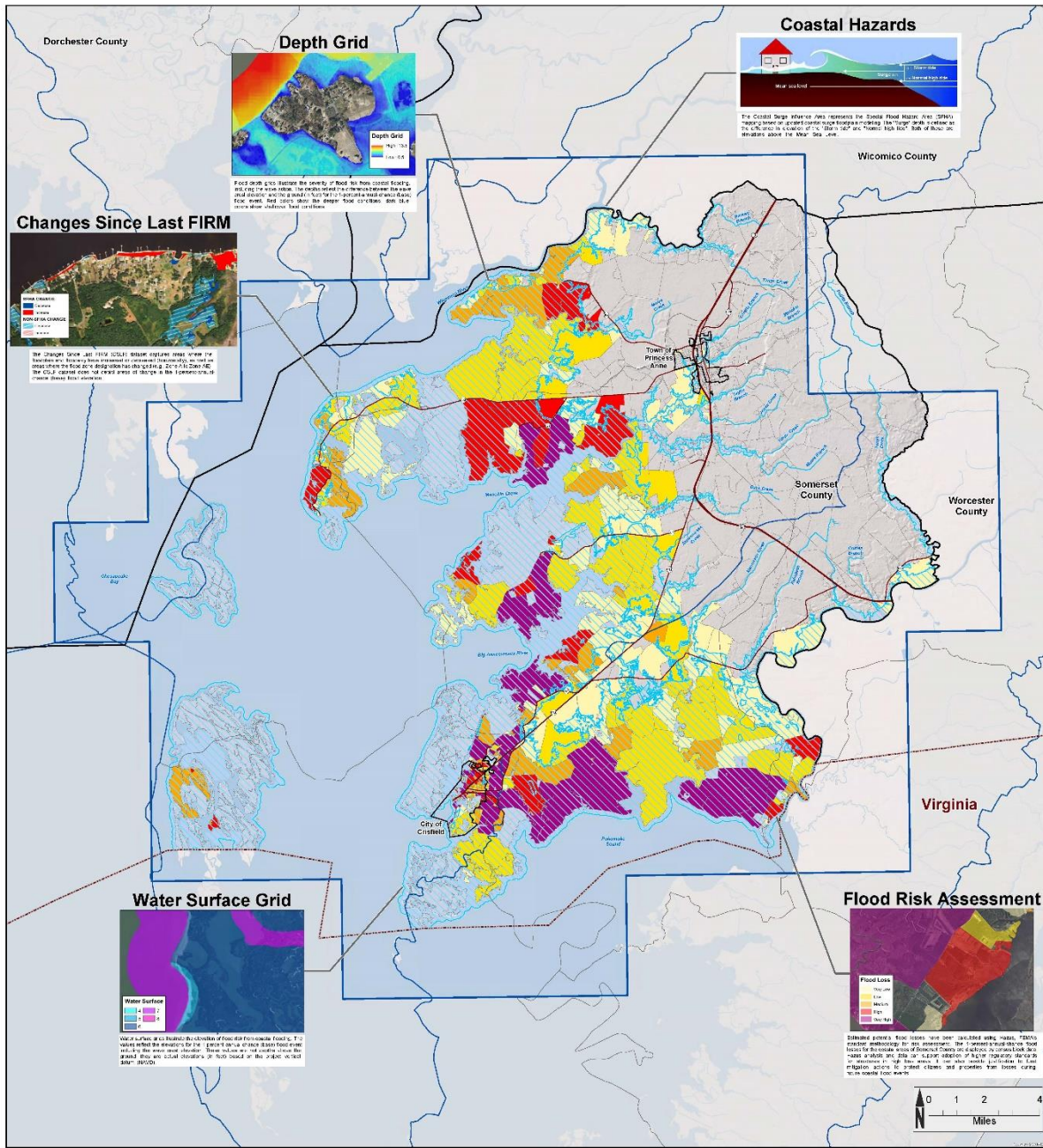
Figure 4-4: City of Crisfield – Hurricane Sandy



Source: *The Storm over Surges: When Sandy Came to Crisfield*, by Michael W. Fincham; Chesapeake Bay Quarterly-A Magazine from Maryland Sea Grant

Map 4-5: Flood Risk Map: Somerset County, MD (Coastal) Effective 05/04/2016

Flood Risk Map: Somerset County, MD (Coastal) Effective 05/04/2016



MAP SYMBOLOLOGY

Base Data



-  Coastal Study Project Area
-  State Boundary
-  Corporate Limits
-  Major Roads
-  HUC8 Watershed Boundary
-  HUC10 Watershed Boundary

Flood Data



Flood Data

-  Rivers and Streams
-  Coastal Surge Influenced Area
-  Census Blocks

Coastal Flood Risk

Coastal Flood Risk

- Very Low
- Low
- Medium
- High
- Very High

COASTAL STUDY LOCATOR



Risk Mapping, Assessment, and Planning (Risk MAP)

FRM FLOOD RISK MAP: COASTAL
Somerset County, MD



FEMA

HUC-8 CODE

For more information of data used for this non-regulatory map, please consult the Somerset County, MD Coastal Study Flood Risk Database & Flood Risk Report.

MITIGATION STRATEGIES - FLOODPLAIN MANAGEMENT OVERVIEW

The information below provides an overview of Somerset County's floodplain management program according to the FEMA Flood Risk Report.

Table 4-11: Floodplain Management Overview

Community Name	Population	Percent of Population in County (Coastal)	Total Land Area (sq. mi)	Percent of Land Area in County (Coastal)	Participation NFIP	CRS Rating
Unincorporated Areas	20,475	99%	316.4	96%	Yes	10
City of Crisfield	2,726	100%	1.6	100%	Yes	10
Town of Princess Anne	3,269	100%	1.7	100%	Yes	10

Source: FEMA Flood Risk Report - Somerset County, Maryland Coastal Study, May 4, 2016

The 2011 Somerset County Floodplain Ordinance required first floor elevations to be built at base flood elevation (BFE). The ordinance was updated February 4, 2015 in conjunction with the adoption of new FEMA DFIRM maps. While the new Somerset County Floodplain Ordinance does not use the word "Freeboard" specifically, the code does adopt a higher standard by two references:

- a. The ordinance requires the lowest horizontal structural member to be at or above BFE (Ordinance 1084 see Section 5.3A(1). This would be the bottom of the floor joist, which makes the first floor elevation approximately 10.5-11" BFE.
- b. The ordinance also references the Building code (Ordinance 1084 see Sec 4.4A. In Somerset County's case the 2015 International Building Code requires a 12" freeboard which is the more restrictive of the two ordinances. By enforcing the International Building Code requirement, we automatically comply with our floodplain ordinance.

In addition, both Princess Anne and Crisfield have adopted a new floodplain ordinance, which requires all new development to be built at two feet above BFE.

Finally, the Somerset County 2015 Floodplain Ordinance includes Coastal A Zone using the Limit of Wave Action (LiMWA). However, the FEMA Flood Insurance Rate Maps (FIRMs) have been found to be incorrect by the County, specifically the lines denoting the LiMWA. As such, the County has requested that FEMA correct the LiMWA on the effective FIRMs, which will enable the County to successfully manage the floodplain based on reasonable mapping products.

CHAPTER 5: HURRICANE

PROFILE

Hurricane, tropical storm, and tropical depression are all examples of a tropical cyclone. The categories and associated characteristics are as follows:

- 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.

Figure 5-1: Tropical Storm Isabel Flooding, Somerset County - Crisfield



Source: Maryland
Emergency
Management
Association;
<http://www.mdem.a.org/gallery/detail/%2015991>

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 One to Five, with Category One having winds from 74-95 mph and pressure greater than 980 mb, while a Category Five hurricane can have winds in excess of 157 mph and pressure of less than 920 mb. The table below describes the five categories of hurricane strength.

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

According to the National Weather Service (NWS), June 1 through November 30 is the official Atlantic hurricane season, with September being the peak month of activity in Maryland. 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; Hanna in 2008; Irene in 2011; and Sandy in 2012.

Figure 5-2: Flooding in Crisfield, Maryland – Hurricane Sandy



Source: Episcopal Diocese of Easton;
<http://dioceseofeaston.org/bishops-christmas-appeal/>

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 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 sudden 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. This rise in sea level will certainly affect the relative height of future storm surge events.

HISTORY

A Guide to the Disaster Declaration Process and Federal Disaster Assistance from FEMA states the following about presidential declarations:

Local and State governments share the responsibility for protecting their citizens and for helping them recover when a disaster strikes. In some cases, a disaster is beyond the capabilities of the state and local government to respond. In 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act was enacted to support state and local governments and their citizens when disasters overwhelm them and exhaust their resources. This law, as amended, established a process for requesting and obtaining a Presidential disaster declaration, defines the type and scope of assistance available from the Federal government, and sets the conditions for obtaining that assistance.

Table 5-2 listed below shows Presidential Disaster Declarations used for hurricanes that have been declared in Somerset County. It is important to note that the first Presidential Disaster Declaration designed for Maryland was in 1962 and that the FEMA database does not address what counties were affected by a particular event until 1971.

Table 5-2: Presidential Hurricane Disaster Declarations

Disaster Number	Date Declared	Incident Period	Description
341	June 23, 1972	June 23, 1972 to June 23, 1972	Tropical Storm Agnes
1303	September 24, 1999	September 16, 1999 to September 20, 1999	Hurricane Floyd
1492	September 19, 2003	September 18, 2003 to September 29, 2003	Hurricane Isabel
4034	September 16, 2011	August 24, 2011 to September 5, 2011	Hurricane Irene
4091	November 20, 2012	October 26, 2012 to November 4, 2012	Hurricane Sandy

Source: FEMA

Table 5-3 details hurricane and coastal flooding events as reported by the National Weather Service (NWS) - National Center for Environmental Information (NCEI). Map 5-1 below depicts past hurricane tracks (1848-2015) impacting Somerset County.

Table 5-3: Hurricane and Coastal Flood Events

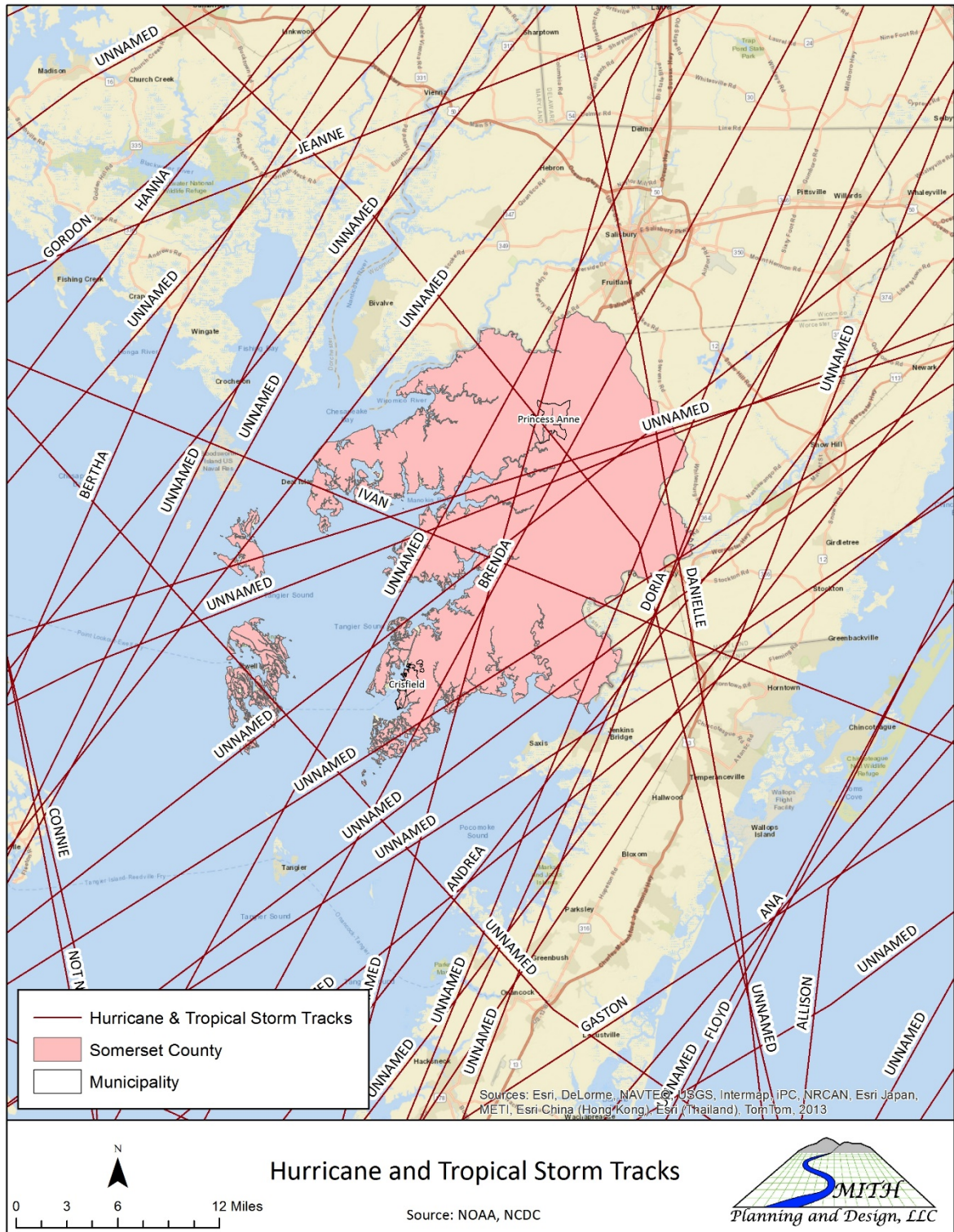
Date	Type	Event Narrative	Property Damage
July 13, 1996	Hurricane	Hurricane Bertha moved across the Lower Maryland Eastern Shore on July 13th. The highest sustained wind speed recorded was 23 mph at Salisbury, but the Fenwick Island Buoy, which is just offshore along the Delaware-Maryland border, recorded a sustained wind speed of 47 mph. The highest gusts recorded were 63 mph at Ocean City, and 55 mph at the Fenwick Island Buoy. Numerous trees and power lines blown down resulted in scattered property damage and power outages. Rainfall amounts generally ranged from 3.0 to 5.0 inches and caused some street flooding.	\$100,000
September 6, 1996	Hurricane	Spiral bands associated with Hurricane Fran affected the Lower Maryland Eastern Shore during Friday, September 6th. In some locations, nearly 10 feet of shore was lost due to surge effects. This was considered the worst storm surge flooding since Hurricane Hazel in October 1954. Some minor flooding also occurred in Somerset county in the towns of Crisfield and Wenona. Tides were 2 feet above normal. Also, a few trees and power lines were blown down.	\$ 1 Million
October 8, 1996	Tropical Storm	Remnants of Tropical Storm Josephine moved quickly up the East Coast during Tuesday, October 8th, affecting the Lower Maryland Eastern Shore. The storm produced 1.5 to 3.5 inches of rain resulting in flooding of several roads. Several trees and power lines were blown down resulting in some minor structural damage and scattered power outages.	\$100,000
September 15 to 16, 1999	Hurricane	Hurricane Floyd was a Category 1 hurricane as it crossed the Wakefield WFO county warning area. Tropical storm force wind gusts occurred over the northwest quadrant of the storm over portions of the Lower Maryland Eastern Shore. Few trees and power lines were blown down across the Lower Maryland Eastern Shore resulting in scattered power outages. Storm surge flooding of 5 to 7 feet occurred over central portions of the Chesapeake Bay inundating sections of Dorchester and Somerset counties. Five feet of water flooded portions of Crisfield in Somerset county. Rainfall amounts generally ranged from 3 to 6 inches across much of the Lower Maryland Eastern Shore and caused some crop damage and street flooding.	\$278,000
September 18 to 19, 2003	Tropical Storm	Hurricane Isabel was a Category 1 hurricane as it crossed the Wakefield WFO county warning area. Isabel produced tropical storm force sustained winds and wind gusts over the Lower Maryland Eastern Shore. Approximately several thousand persons were evacuated and housed in numerous shelters across the Lower Maryland Eastern Shore. The unusually large wind field uprooted many thousands of trees, downed many power lines, damaged hundreds of houses, and snapped thousands of telephone poles and cross arms. Hundreds of roads, including major highways, were blocked by fallen trees. Local power companies reported many thousands of customers were without power. Also, Isabel will be remembered for the extensive power outages across the Lower Maryland Eastern Shore, and permanent change to the landscape from all the fallen trees and storm surge. Rainfall amounts ranged from 1 to 3 inches across the Lower Maryland Eastern Shore. Inland flooding due to heavy rainfall occurred over parts of the Lower Maryland Eastern Shore. Eight deaths can be directly attributed to Isabel in the Wakefield area of responsibility, with 0 in Lower Maryland. There were more than 15 deaths indirectly attributed to the storm.	\$2.5 Million
May 12 to 13, 2008	Coastal Flood	Coastal flooding at times of high tide contributed to several roads being closed. Police closed the Inlet parking lot due to flooding.	\$5,000

September 6, 2008	Tropical Storm	Tropical Storm Hanna affected much of the Lower Maryland Eastern Shore during Saturday, September 6th. Storm total rainfall ranged from around one inch to just below three inches. Coastal storm tides of 1 to 3 feet above astronomical tide levels were common, with only minor beach erosion reported. Near the coast, as well as inland, tropical storm winds knocked down several trees and power lines, as well as caused minor structural damage. No fatalities or injuries were attributed to the winds.	\$5,000
November 12 to 14, 2009	Coastal Flood	Several streets, homes and businesses were flooded in low lying areas of the county close or directly exposed to the Chesapeake Bay.	\$100,000
2017 Hazard Mitigation Update			
August 27 to August 28, 2011	Tropical Storm Irene	Tropical storm force winds knocked down several trees and power lines, as well as caused some substantial property damage. In addition, heavy rains contributed to significant crop damage. Storm total rainfall generally ranged from five to ten inches.	\$100,000
October 29 to October 30, 2012	Coastal Flood	Water levels reached 3.0 feet to 4.5 feet above normal adjacent to the Chesapeake Bay resulting in moderate to severe coastal flooding. The town of Crisfield experienced severe flooding...with some areas inundated with 5 feet of water. Numerous homes and business were flooded. Water levels were above those experienced in 1999 with the remnants of Hurricane Floyd, and were likely enhanced by runoff from the very heavy rainfall associated with Sandy. The bulk of the damage in Somerset county occurred in Crisfield, and the nearby town of Fairmount.	\$5 Million
December 21, 2012	Coastal Flood	Water levels reached 3.0 feet to 4.0 feet above normal adjacent to the Chesapeake Bay resulting in moderate to severe coastal flooding. Most roads in Crisfield were flooded and impassable to small vehicles.	\$100,000
October 4 to October 5, 2015	Coastal Flood	A tidal departure of 2 to 2.5 feet resulted in moderate flooding along the Chesapeake Bay.	0
February 9, 2016	Coastal Flood	Minor to Moderate coastal flooding occurred across western portions of Somerset county. Water levels reached 4.3 feet MLLW at Bishops Head MD. No property damage was reported, but some minor inundation of property resulted from the high tide.	0
September 2 to September 5, 2016	Tropical Storm Hermine	Rain bands associated with Tropical Storm Hermine produced generally 0.25 inch to 1 inch of rainfall across the county. Princess Anne (4.4 WSW) reported 0.83 inch of rain. Princess Anne (2.1 SSW) reported 0.69 inch of rain. Deal Island (0.5 SSW) reported 0.43 inch of rain.	0

Source: NWS, NCEI (NOAA)

In terms of number of occurrences, the NWS, NCEI listed a total of 14 hurricane and coastal flooding events affecting Somerset County from 1996-2017. Therefore, Somerset County experiences 0.64 hurricane and coastal flooding events per year. Hurricane and Coastal flooding have cost the county over four million dollars in property damage. These events have caused road closings, erosion, infrastructure damage, and power outages from downed trees and power lines.

Map 5-1: Hurricane & Tropical Storm Tracks (1848-2015)



COUNTY PERSPECTIVE

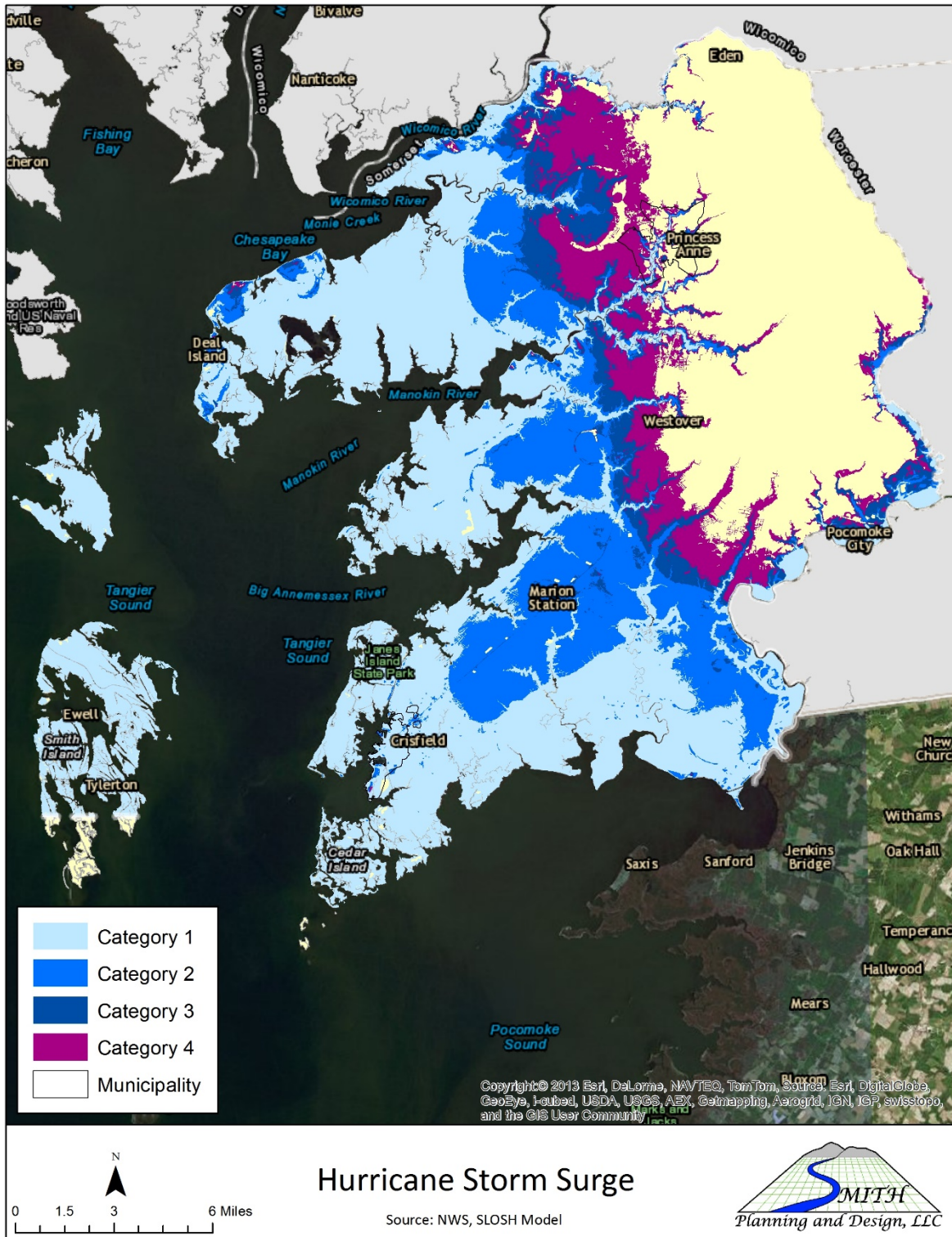
According to the *2016 Maryland State Hazard Mitigation Plan Update*, Somerset County has a composite risk of “High” for coastal hazard. The county’s Hazard Mitigation Planning Committee agrees with this risk ranking. Somerset County has been affected over the years by the passage of hurricanes as shown on Table 5-3 above, including an unnamed hurricane in 1933, Hurricane Hazel in 1954, Hurricane Floyd in 1999, Hurricane Isabel in 2003, Hurricane Irene in 2011, and most recently, Hurricane Sandy in 2012. As shown on Map 5-1 above, data provided by the National Oceanic Atmospheric Administration (NOAA) indicates that hurricanes and Tropical Storms can impact Somerset 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 as was the case with Isabel.

The most common coastal storms that impact Somerset County are Category One Hurricanes and Tropical Storms. As shown on Map 5-1, the County has experienced many past hurricane events. Although, they typically are downgraded to a Hurricane Category One or Tropical Storm by the time they make landfall in Somerset County. Most of the County is mainly concerned with the flooding aspect of a coastal storm brought on by storm surge and/or high tide. Coastal erosion may also occur from coastal storms. Due to population growth and increased development in shoreline areas in Maryland, the risk of human injury and property loss will most likely continue to increase.

Somerset County is the southernmost county on Maryland’s Eastern Shore. The western half of the county, as well as the Lower Pocomoke River region in the southeastern portion, is most vulnerable to storm surge inundation. Both municipalities face danger from storm surge associated with the passage of a hurricane.

The storm surge zones data was generated using the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model. SLOSH is a computerized model run by the National Weather Service to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes. The model creates its storm surge zones by analyzing the pressure, size, forward speed, track, and wind data from a hurricane. The method used for this data was a "worst case scenario" for the entire Slosh basin.

Map 5-2: SLOSH Model Storm Surge



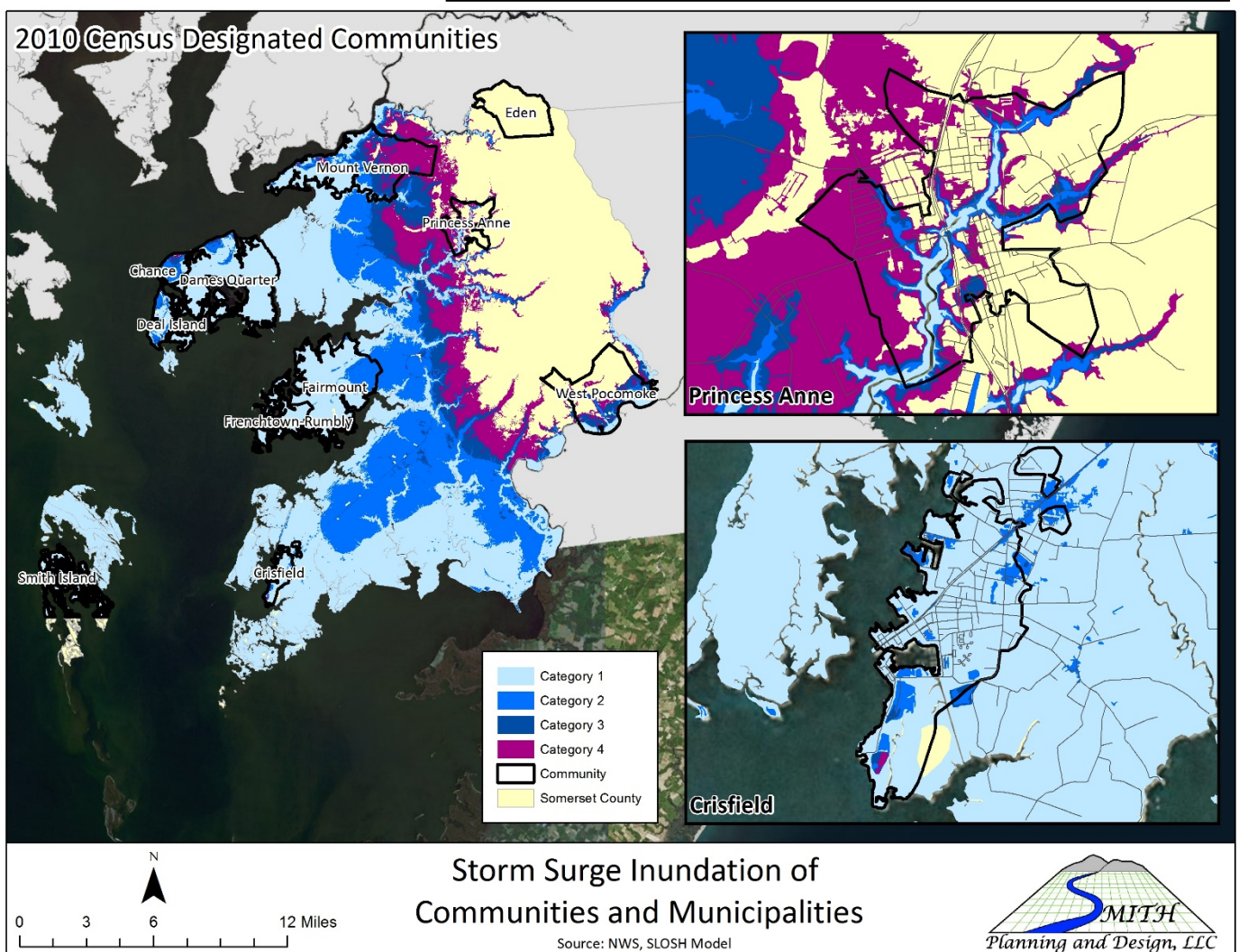
MUNICIPAL PERSPECTIVE

As with other weather phenomenon, Somerset County municipalities share the same concerns as the county. The town of Crisfield faces more danger from flooding associated with the passage of a hurricane because of its location in the storm surge area, but the community of Princess Anne is not completely immune to storm surge since low lying sections of the town are within the storm surge area as shown on Map 5-3 below. However, Crisfield was most affected by the passage of Hurricane Isabel and Hurricane Sandy due to its location just off Tangier Sound and its near sea level elevation and location. Communities from the 2010 Census are also displayed on Map 5-3, due to the limited amount of incorporated areas in the county. All communities in the county except for Eden would be impacted by storm surge.

Vulnerability to Category 1 Storm Surge:

The communities in the county that would be most impacted by a Category 1 hurricane (the most likely to occur) are Chance, Deal Island, Frenchtown-Rumbly, Crisfield, Smith Island, Dames Quarter, Fairmount, and Mount Vernon.

Map 5-3: SLOSH Model Storm Surge of Communities



CRITICAL & PUBLIC FACILITIES AT-RISK

Critical and/or public facilities have been assessed for hurricane storm surge inundation vulnerability. The County contains eighty-two (82) critical and/or public facilities within one or more hurricane storm surge inundation areas. The City of Crisfield contains twenty (20) facilities, while Princess Anne contains thirteen (13) critical and/or public facilities within one or more hurricane storm surge inundation areas.

Table 5-4: Critical & Public Facilities within Storm Surge Areas

Critical & Public Facilities within Storm Surge Areas			
Location	Facility Type	Facility Name	Storm Surge Category
County	Transportation	Bridge @ N. Ocean Highway/Kings Creek	1
County	Transportation	Bridge @ S. Ocean Highway/Kings Creek	1
County	Transportation	Bridge @ Old Princess Anne Rd/Kings Creek	1
County	Miscellaneous	Ewell P.O.	1
County	Miscellaneous	Eddie Evans Ball Field	1
County	Miscellaneous	Deal Island/Last Chance Marina	1
County	Miscellaneous	Tylerton P.O.	1
County	Utility	Telephone	1
County	Transportation	Bridge @ Rumbley Road/Teague Creek	1
County	Transportation	Bridge @ Stewart Neck Road/Jones Creek	1
County	Utility	Smith Island Incinerator	1
County	Miscellaneous	Wenona Marina	1
County	Transportation	Bridge @ Hanes Point Road/Scotts Cove	1
County	Transportation	Bridge @ Sign Post Road/Back Creek	1
County	Miscellaneous	Rumbley Marina	1
County	Miscellaneous	Upper Fairmount P.O.	1
County	Utility	Pumping Station	1
County	Utility	Well House	1
County	Utility	Halls Creek Road WTP	1
County	Utility	Well House	1
County	Utility	Well House	1
County	Utility	WWTP	1
County	Miscellaneous	Raccoon Point Rec. Area	1
County	Miscellaneous	Smith Island Cultural Center	1
County	Miscellaneous	Smith Island Library	1
County	Miscellaneous	Rehoboth Boat Ramp	1
County	Miscellaneous	Tylerton Wharf	1
County	Transportation	Fairmount Heliport	1
County	Utility	Chance Transfer Station	1
County	Miscellaneous	Tylerton Marina	1
County	Miscellaneous	Dames Quarter Dock & Ramp	1
County	Utility	Tylerton Transfer Station	1
County	Miscellaneous	Coulbourn Creek Boat Ramp	1
County	Transportation	Bridge @ Bryan Hall Road/Marumsco Creek	1
County	Utility	Telecom Tower	1

Location	Facility Type	Facility Name	Storm Surge Category
County	Miscellaneous	Ewell Ramp/Wharf	1
County	Transportation	Bridge @ Ape Hole Road/Little Ape Hole Creek	1
County	Transportation	Bridge @ Coventry Parish Road/Rehobeth Branch	1
County	Transportation	Smith Island Heliport	1
County	Utility	Pumping Station	1
County	Utility	WWTP	1
County	Miscellaneous	Fairmount Academy	1
County	Transportation	Bridge @ Marsh Road/Shanks Creek	1
County	Transportation	Bridge @ Smith Island Road/Ewell	1
County	Utility	Ewell WWTP	1
County	Miscellaneous	Deal Island WMA (3)	1
County	Miscellaneous	St. Peters Creek Marina	1
County	Transportation	Bridge @ Lq Powell Road/East Creek	1
County	Miscellaneous	Rhodes Point Dock	1
County	Miscellaneous	Rumbly Point Boat Ramp	1
County	Transportation	Bridge @ Marumscro Road/Marumscro Creek	1
County	Transportation	Bridge @ Whitehaven Ferry Road/Waukaki Creek	1
County	Miscellaneous	Shelltown Boat Ramp	1
County	Government	Great Hope Golf Course	2
County	Miscellaneous	Deal Island P.O.	2
County	Miscellaneous	Marion Station P.O.	2
County	Utility	Communication	2
County	Utility	Marion 911 Tower	2
County	Utility	Telecom Verizon Tower	2
County	Utility	Telecom Verizon Tower	2
County	Utility	Telephone	2
County	Utility	Verizon Telephone	2
County	Utility	Pumping Station	2
County	Miscellaneous	Upper Hill Playground	2
County	Utility	Well House	2
County	Miscellaneous	Burgess Early Am. Museum	2
County	Government	Dog Shelter	3
County	Transportation	Bridge @ Cathell Road/Passerdyke Creek	3
County	Utility	Crisfield Transfer Station	3
County	Utility	Marion Electric Substation	3
County	Government	Cat Shelter	4
County	Government	Centralized Athletic Facility	4
County	Government	Health Dept. Main Office	4
County	Government	Mosquito Control	4
County	Government	Recreation & Parks Complex	4
County	Government	Roads & Waterways Complex	4
County	Miscellaneous	Westover P.O.	4
County	Utility	Pumping Station	4

Location	Facility Type	Facility Name	Storm Surge Category
County	Utility	Pumping Station	4
County	Utility	Somerset Co. Landfill	4
County	Utility	Water Tower	4
County	Utility	Westover Transfer Station	4
Crisfield	Government	Coast Guard	1
Crisfield	Utility	Well House	1
Crisfield	Utility	Water Tower	1
Crisfield	Miscellaneous	Janes Island Boat Ramp	1
Crisfield	Miscellaneous	Somers Cove	1
Crisfield	Utility	WWTP	1
Crisfield	Utility	Telephone & Wireless Tower	1
Crisfield	Utility	Pumping Station	1
Crisfield	Utility	Pumping Station	1
Crisfield	Miscellaneous	Jenkins Creek Dock & Boat Ramp	1
Crisfield	Miscellaneous	American Legion	1
Crisfield	Government	City Hall	1
Crisfield	Miscellaneous	Crisfield P.O.	1
Crisfield	Miscellaneous	City Dock	1
Crisfield	Transportation	Crisfield Airport	1
Crisfield	Miscellaneous	Glen Ward Ballfield	1
Crisfield	Utility	Telephone	1
Crisfield	Miscellaneous	Crisfield Library	1
Crisfield	Transportation	McCready Health Heliport	1
Crisfield	Utility	Crisfield Electric Substation	2
Princess Anne	Utility	Communication	1
Princess Anne	Miscellaneous	Mt. Vernon Park	1
Princess Anne	Government	Tourism Center	2
Princess Anne	Utility	Communication	2
Princess Anne	Utility	Well House	2
Princess Anne	Miscellaneous	Manokin River Park	2
Princess Anne	Utility	Mt. Vernon Transfer Station	3
Princess Anne	Transportation	Rr Crossing @ Dr. William P Hytche Blvd	4
Princess Anne	Utility	Princess Anne WWTP	4
Princess Anne	Utility	Pumping Station	4
Princess Anne	Utility	Pumping Station	4
Princess Anne	Utility	Telephone	4
Princess Anne	Utility	Well House	4

Source: 2017 Somerset County Critical and Public Database

ESSENTIAL FACILITIES AT-RISK

Essential facilities are those facilities that must continue to operate for a community to effectively respond to, and recover from, a hazard incident. Essential facilities include: Emergency Operation Center(s), Fire and Rescue Stations, Police, Schools, and Medical facilities.

In most cases, hurricanes that have historically impacted Somerset County are a Category 1 Hurricane or Tropical Storm. Essential facilities most likely to be impacted by a hurricane and/or tropical storm are those facilities located in the storm surge category 1 inundation area. As shown on the table below, five (5) essential facilities within the unincorporated areas of the County, six (6) facilities within the City of Crisfield, and one (1) facility within Princess Anne are located within the storm surge category 1 inundation area, with a combined tax improvement value of \$16,932,900 dollars.

Table 5-5: Essential Facilities within Storm Surge Areas

Essential Facilities within Storm Surge Areas				
Location	Facility Type	Facility Name	Storm Surge Category	Improvement Value
County	Fire	Fairmount Fire Dept.	1	\$492,500
County	Fire	Ewell Fire Dept.	1	\$349,500
County	School	Ewell E.S.	1	\$230,000
County	School	Macedonia School	1	\$39,600
County	Fire	Tylerton Fire Dept.	1	\$85,000
County	Fire	Deal Island/Chance Fire Dept.	2	\$124,000
County	School	Deal Island	2	\$881,500
County	School	Marion Sarah Peyton Alt. School	2	\$944,100
County	School	Somerset Community Services	2	\$1,724,000
County	Fire	Marion Fire Dept.	3	\$290,600
County	School	J.M. Tawes Tech and Career	3	\$16,850,800
County	School	Somerset Intermediate School	3	-
County	EOC	Back up EOC	4	\$1,718,000
County	Medical	Behavioral Health MDH	4	\$1,718,000
County	Police	Eastern Correctional Facility	4	\$95,000,000
Crisfield	School	Woodson E.S.	1	-
Crisfield	Medical	Crisfield Clinic	1	\$121,200
Crisfield	Fire	Crisfield Fire Dept.	1	\$264,100
Crisfield	Police	Crisfield Police	1	\$152,600
Crisfield	Medical	Crisfield Pharmacy	1	\$42,600
Crisfield	Medical	McCready Memorial Hospital	1	\$14,953,800
Crisfield	Medical	Marion Pharmacy	2	\$156,900
Crisfield	Fire	Lower Somerset Ambulance Squad	2	\$117,900
Crisfield	Police	DNR Police	2	\$75,300
Crisfield	School	Crisfield H.S.	2	\$4,007,900
Princess Anne	Fire	Mt. Vernon Fire Dept.	1	\$202,000
Princess Anne	Police	UMES Police	2	-
Princess Anne	Police	Princess Anne Police	3	\$227,300
Princess Anne	Medical	Lower Shore Immediate Care LLC	4	\$1,280,400
Total Value:				\$142,049,600

Source: 2017 Somerset County Critical and Public Database and Improvement Values from 2013 Maryland Property Value.

MITIGATION EFFORTS

In addition to the new floodplain ordinance referenced in Chapter 4: Flood, the County's Building Code contains requirements for wind loading of new structures and has tie down requirements for mobile homes. The County also participates in the Chesapeake Bay Critical Area, with the purpose of establishing a Resource Protection Program for the bay and its tributaries and encouraging more environmentally sensitive development in areas near the shoreline. This law created a statewide Critical Area Commission to oversee the development and implementation of local land use programs directed towards the Critical Area. The Critical Area law provides for a 100-foot Buffer from the shoreline. This Buffer is measured 100 feet inland from mean high water, the landward extent of tidal wetlands, and the edge of tributary streams. The Buffer also refers to areas that have been expanded beyond 100 feet to include hydric soils.

CHAPTER 6: SHORELINE EROSION & SEA LEVEL RISE

PROFILE

On Maryland's Eastern Shore, particularly on the Chesapeake Bay side, storm surge is exacerbated by the rising sea level and 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 one foot or so every century. As such, this rise in sea level will certainly affect the relative height of future storm surge events.

The report entitled *A Sea Level Rise Response Strategy for the State of Maryland* stated that 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, which occurs from large amounts of groundwater being excessively withdrawn from aquifers in the region, and post-glacial crust movement are contributing factors 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 about 5.7 million pounds of nitrogen and 4.2 million pounds of phosphorus.

Characteristics of shoreline erosion in Maryland reflects a unique combination of natural and man-made conditions affecting the State's shorelines. The natural factors influencing erosion rates include: soil composition, weather, topography, water depth, fetch and surface and groundwater conditions. Regarding man-made structures, over 1,000 miles of man-made structures have been incorporated into Maryland's shorelines. The preferred method for erosion control is Living Shorelines; this is a method that provides habitat while offering shoreline protection. However, when necessary other man-made methods are utilized, such as: wooden bulkheads, stone revetment, beach replenishment and segmented breakwaters.

"Living shorelines are the result of applying erosion control measures that include a suite of techniques which can be used to minimize coastal erosion and maintain coastal process. Techniques may include the use of fiber coir logs, sills, groins, breakwaters or other natural components used in combination with sand, other natural materials and/or marsh plantings. These techniques are used to protect, restore, enhance or create natural shoreline habitat."

Source: Maryland Department of Natural Resources

Information was requested from the U.S. Army Corps of Engineers, Baltimore District and updated shoreline erosion rates were provided by Andrew Roach, Planning Division, presented in Table 6-1 below.

Table 6-1: Rate of Shoreline Erosion

Rate of Shoreline Erosion					
Somerset 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	18.33798	Accretion	+0.5	294
Protected	0	21.4271	Protected	0	978
No Change	0	646.4702	No Change	0	3,851
Slight	-1	93.14462	Slight	-1	1,157
Low	-3	26.24806	Low	-3	182
Moderate	-6	7.275717	Moderate	-6	59
High	-11	0.356062	High	-11	11
Unknown	0 or -1	0	Unknown	0 or -1	65
Total		813.2595	Total		6,597

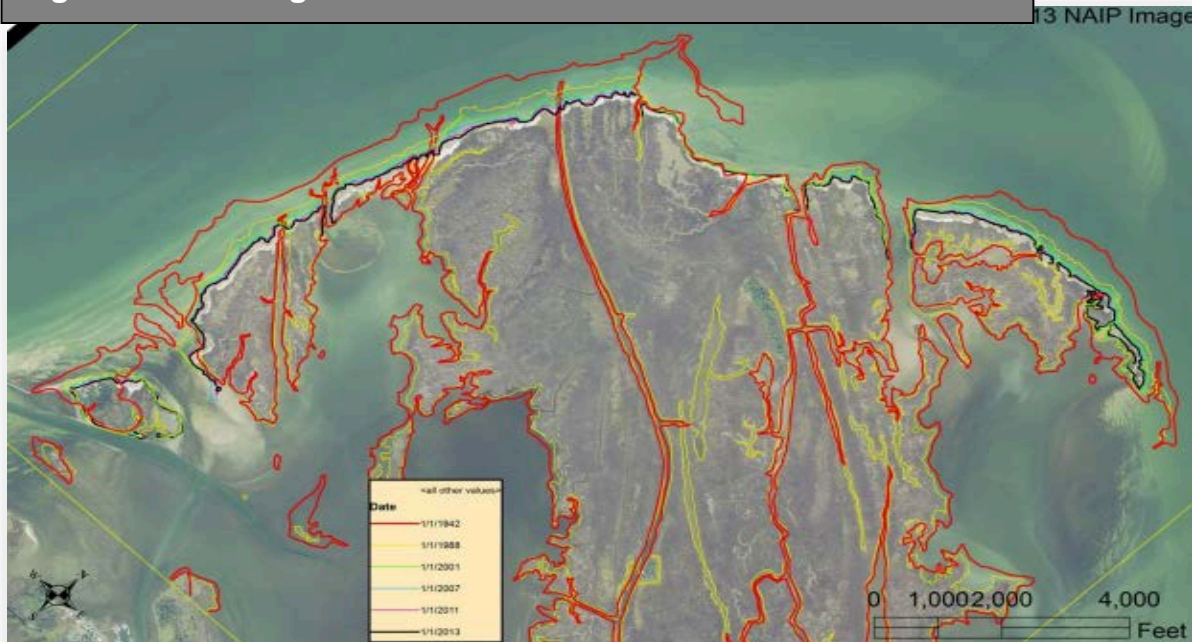
Source: U.S. Army Corps of Engineers, 2016

According to the U.S. Army Corp of Engineers Planning Division, 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.

U.S. Fish & Wildlife Service Project: Fog Point Living Shoreline Stabilization

An example of shoreline erosion and mitigation efforts is a U.S. Fish and Wildlife Service project. In keeping with its mission to manage and protect sensitive habitats across the nation, the U.S. Fish and Wildlife Service initiated efforts to stabilize approximately 21,000 linear feet of shoreline, extending from Swan Island northward to Fog Point, then eastward to Fishing Point. Shoreline positions from 1942 to 2013 are displayed in Figure 6-1 with the 2013 aerial image as the base. The entire project area, except for two small areas in Fog Bay, has lost a large amount of shoreline. The total area lost is about 238 acres. The 1942 shoreline shows extensive sand spits and bars across Channel Gut with two small tidal channels present. Extensive spits occur off Fog Point and Fishing Point whose eastward morphology indicate net littoral sediment movement in that direction. From Fog Point to Swan Island sediment transport southward. By 1988 Channel Gut was very open to tidal flow while the spit off Fog Point was much reduced. Fishing Point spit was reduced and fragmented.

Figure 6-1: Fishing Point Shoreline Positions from 1942 to 2013



Shorelines consisting of very fine or unconsolidated silts and clays, or lighter organic materials, are particularly at risk. The risk is increased when conditions are exacerbated by severe weather, wave energy and soil drainage conditions.

Soil types have an important role in determining how flooding will affect the landscape, and whether erosion will be a significant risk. Soils that possess the K factor, the soil-erodibility factor, greater than 0.35 in the upper two feet of their profiles have an increased potential for erosion. Additionally, the following soil types belong to Group D soils, which 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. The soils highlighted in blue are soils that experience frequent flooding and are subject to the effects of sea level rise.

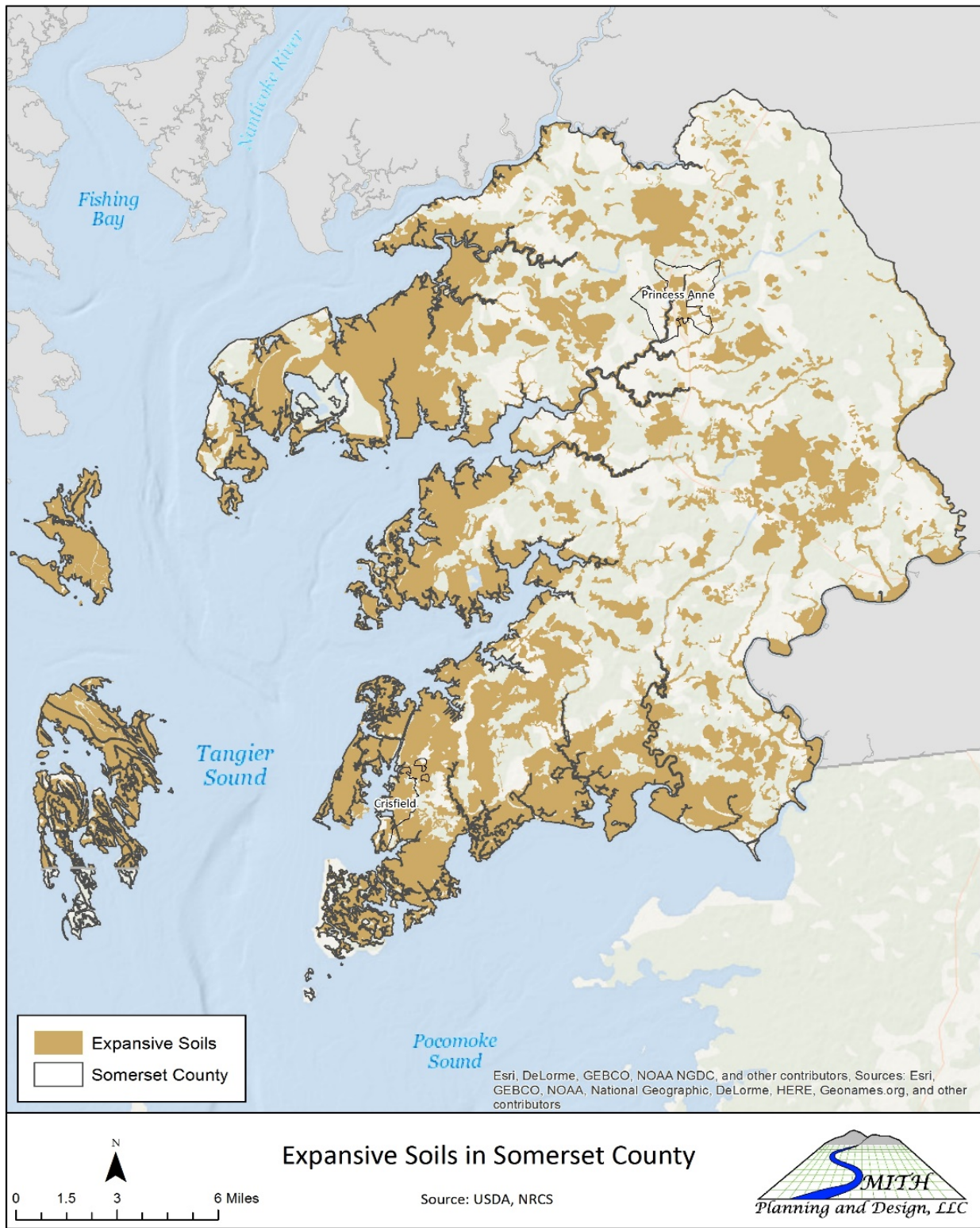
Table 6-2: Expansive Soils

Expansive Soils				
Map Unit Symbol	Map Unit Name	Rating	Acres in County	Percent of County
Be	Beeches	D	687.0	0.2
BX	Boxiron and Broadkill soils, very frequently flooded, tidal	D	112.2	0.0
CRA	Corsica and Fallsington soils, 0 to 2 percent slopes	D	1,682.8	0.5
EmA	Elkton silt loam, 0 to 2 percent slopes	D	818.4	0.2
Ho	Honga peat, very frequently flooded, tidal	D	3,275.9	1.0
LO	Longmarsh and Indiantown soils, frequently flooded	D	2,262.3	0.7
Ma	Manahawkin muck, frequently flooded	D	58.6	0.0
NM	Nanticoke and Mannington soils, very frequently flooded, tidal	D	175.5	0.1
OKA	Othello and Kentuck soils, 0 to 2 percent slopes	D	13,546.4	4.0
OoA	Othello silt loam, loamy substratum, 0 to 2 percent slopes	D	2,868.4	0.9
OtA	Othello silt loam, 0 to 2 percent slopes	D	14,143.5	4.2
Pk	Puckum muck, frequently flooded	D	2,241.8	0.7
SuA	Sunken mucky silt loam, 0 to 2 percent slopes, occasionally flooded, tidal	D	3,327.8	1.0
Ta	Tangier mucky peat, very frequently flooded, tidal	D	5,391.9	1.6
TP	Transquaking and Mispillion soils, very frequently flooded, tidal	D	40,412.8	12.0
UwB	Urban land-Udorthents complex, 0 to 5 percent slopes	D	1,273.0	0.4

Source: 2017 Somerset County Critical and Public Database

The total amount of expansive soils in Somerset County as reported by the USDA, Natural Resources Conservation Service is 92,278.3 acres or 27.5% of the County.

Map 6-1: Expansive Soils in Somerset County



HISTORY

According to the *2008 Somerset County, Maryland Rising Sea Level Guidance*, over the last 50 years, the County has experienced conditions that are now associated with the dynamic nature of coastal regions. Low-lying areas can change in response to the potentially dramatic influence of storms. These changes may be subtle in the short-term, but more obvious when a long-term view is taken. These changes may be caused by erosion and, increasingly, small, but significant, increases in the water level in the Chesapeake Bay. Historical maps of Somerset County reveal these trends. Several Bay-front communities once thriving in the early 1900s were abandoned and several of those areas are now under water.

Aerial photographs indicate loss of marsh lands and visual observations from the ground suggest that woodland areas are showing the signs of stress from rising water levels, more frequent storm events, and intolerance to saline conditions. County farmers, with land near shorelines, report loss of farmland from erosion and loss of productivity as salinity increases due to higher water tables and more frequent coastal flood events. The County's DPW - Roads Division reports that more frequent road flooding is experienced not only during coastal storms, but during above average high tides. These local observations contribute to the growing body of evidence that supports the trend of rising sea levels. This trend is expected to continue soon.

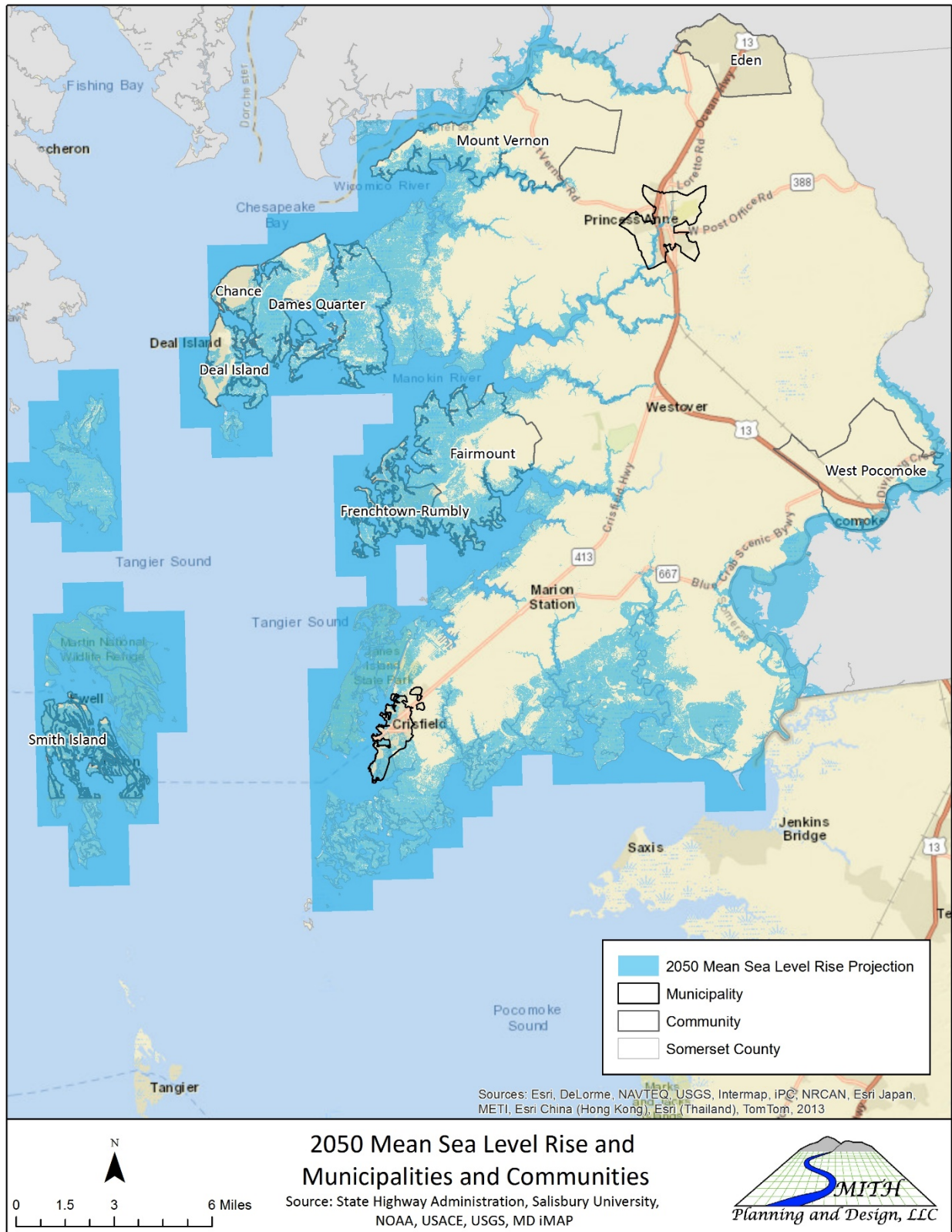
COUNTY PERSPECTIVE

The 2017 HMPC ranked Shoreline Erosion & Sea Level Rise as 'High.' To date, no structures have been affected by shoreline erosion; however, the Maryland Department of Natural Resources conducted a study on how sea level rise might affect the County.

According to the *2008 Rising Sea Level Guidance* for Somerset County, Dames Quarters, Janes Island State Park and Smith Island are predicted to be almost completely under water by 2100 as the Bay's average level goes up nearly one-foot. In addition, the Health Department estimates that over 5,072 homes utilize septic tanks, with 1.5% of these residents requesting replacement systems annually. As shoreline erosion increases causing above average high tides, the number of septic tanks failing will increase. Furthermore, groundwater is Somerset County's sole source for drinking water. Two primary aquifers are utilized for public water and private wells: Manokin Aquifer and Patapsco Aquifer. Increasing sea level rise and shoreline erosion could affect these aquifers by causing intrusion of salt water, therefore limiting the water that can be utilized.

Finally, approximately 67% of the houses in Somerset County were constructed prior to 1979 which is considered the approximate date when the County adopted floodplain maps and began administering the floodplain ordinance. A high percentage of those homes were constructed near the water. Therefore, those structures could be more susceptible to the effects of shoreline erosion. Moreover, within the low-lying areas closer to the shores, the infrastructure located in these areas could be significantly damaged. With shorelines eroding further inland, flooding could also extend further inland and cause damage to roads, bridges, railroads, septic systems, water distribution systems and electric, cable and telephone distribution systems.

Map 6-2: 2050 Mean Sea Leve Rise and Municipalities and Communities



MUNICIPAL PERSPECTIVE

Shoreline erosion effects on the City of Crisfield may be increased in the future. Several areas throughout the City's shorelines are at higher risk for erosion. In areas where development and critical facilities are located, methods for erosion control should be undertaken.

ESSENTIAL FACILITIES

While no structures have been impacted to date by shoreline erosion, essential facilities are at-risk to sea level rise. Essential facilities are those facilities that must continue to operate for a community to effectively respond to, and recover from, a hazard incident. Essential facilities include: Emergency Operation Center(s), Fire and Rescue Stations, Police, Schools, and Medical facilities. As shown on the table below, six (6) essential facilities located within the unincorporated area of the County will be impacted by the 2050 Mean Sea Level Rise. One (1) essential facility located in Crisfield is projected to be impacted, as well. Improvement value of all essential facilities that are projected to be impacted by 2050 Mean Sea Level Rise is \$16,623,800. It is important to keep in mind, 2050 Mean Sea Level Rise does not include high tide flood events, coastal storms and/or hurricanes.

Table 6-3: Essential Facilities within 2050 Mean Sea Level

Location	Facility Type	Facility Name	2050 Mean Sea Level Rise	Improvement Value
County	Fire	Ewell Fire Dept.	Yes	\$349,500
County	Fire	Tylerton Fire Dept.	Yes	\$85,000
County	Fire	Deal Island/Chance Fire Dept.	Yes*	\$124,000
County	Medical	McCready Health	Yes*	\$14,953,800
County	School	Ewell E.S.	Yes	\$230,000
County	School	Deal Island E.S.	Yes*	\$881,500
Crisfield	School	Woodson E.S.	Yes*	-
Total				\$16,623,800

Source: 2017 Somerset County Critical and Public Database

Note: Essential Facilities with an asterisk (*) are not directly impacted by the projected 2050 Mean Sea Level Rise, however, these facilities would be isolated due to surrounding roads being impacted. Improvement Values from 2013 Maryland Property Value.

CRITICAL & PUBLIC FACILITIES

Critical & public facilities are at-risk to sea level rise. Critical & public facilities are important to keep operational during a hazard event because they sometimes provide vital needs to the community. Critical & public facilities include: transportation (e.g. bridges and heliports), government buildings, utilities (e.g. communication towers and electric substations), and miscellaneous facilities (e.g. marinas and public spaces). As shown on the table below, thirty-six (36) critical & public facilities located within the unincorporated area of the County will be impacted by the 2050 Mean Sea Level Rise. One (1) critical & public facility located in Crisfield is projected to be impacted, as well. It is important to keep in mind, 2050 Mean Sea Level Rise does not include high tide flood events, coastal storms and/or hurricanes.

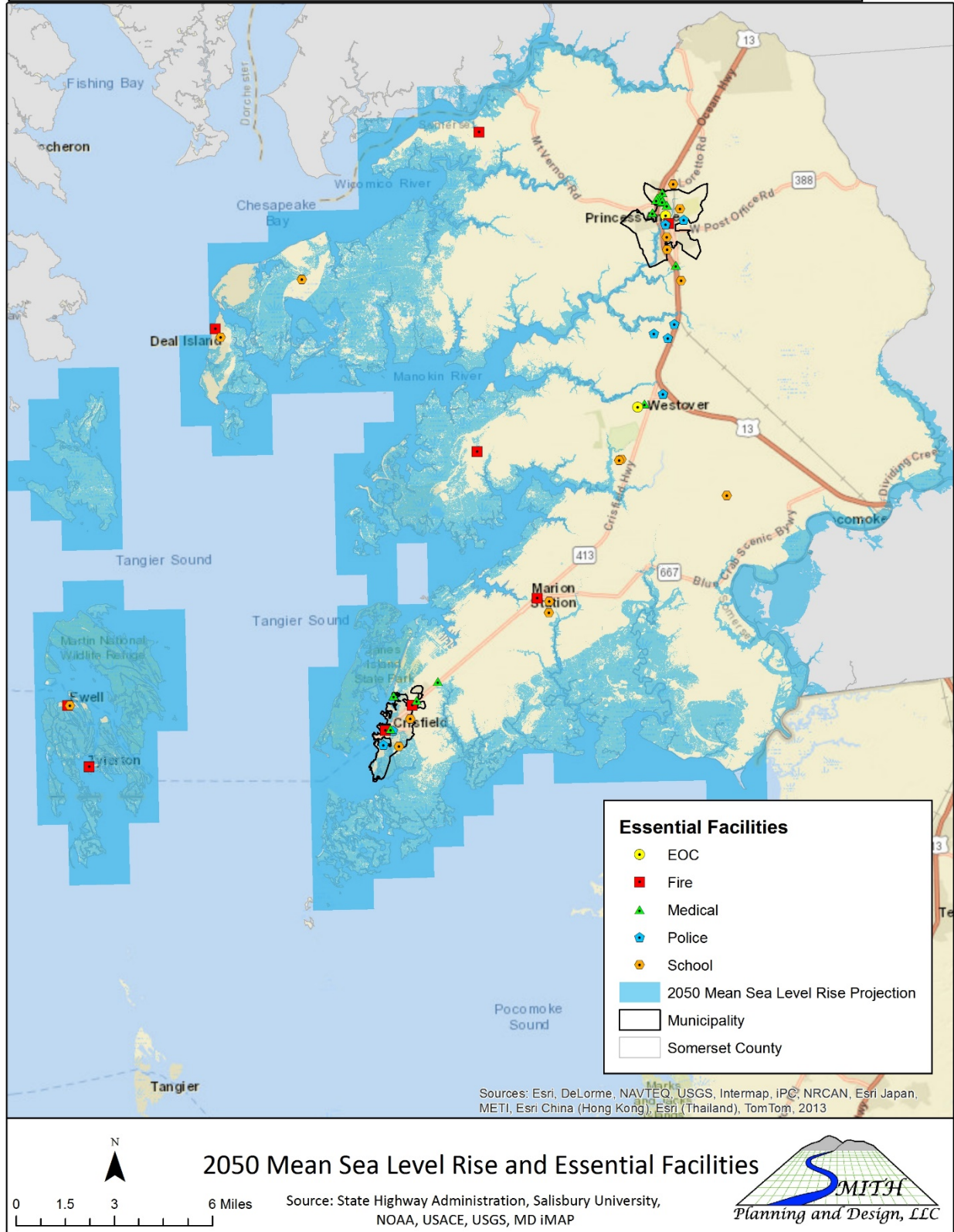
Table 6-4: Critical & Public Facilities within 2050 Mean Sea Level

Critical & Public Facilities within 2050 Mean Sea Level			
Location	Facility Type	Facility Name	2050 Mean Sea Level Rise
County	Miscellaneous	Dames Quarter Dock & Ramp	Yes
County	Miscellaneous	Ewell Ramp/Wharf	Yes
County	Miscellaneous	Rhodes Point Dock	Yes
County	Miscellaneous	Rumbly Point Boat Ramp	Yes
County	Miscellaneous	Smith Island Cultural Center	Yes
County	Miscellaneous	Smith Island Library	Yes
County	Miscellaneous	St. Peters Creek Marina	Yes
County	Miscellaneous	Tylerton Marina	Yes
County	Miscellaneous	Tylerton Wharf	Yes
County	Miscellaneous	Webster Cove Marina	Yes
County	Transportation	Bridge @ Bryan Hall Road/Marumsco Creek	Yes
County	Transportation	Bridge @ Calvary Road/Jenkins Creek	Yes
County	Transportation	Bridge @ Cash Corner Rd/Johnson Creek	Yes
County	Transportation	Bridge @ Coventry Parish Road/Rehobeth Branch	Yes
County	Transportation	Bridge @ Deal Island Road/Upper Thorofare	Yes
County	Transportation	Bridge @ Frenchtown Road/Goose Creek	Yes
County	Transportation	Bridge @ Frenchtown Road/Mine Creek	Yes
County	Transportation	Bridge @ Hall Highway/Trib Little Annemessex River	Yes
County	Transportation	Bridge @ Hanes Point Road/Scotts Cove	Yes
County	Transportation	Bridge @ Lq Powell Road/East Creek	Yes
County	Transportation	Bridge @ Marsh Road/Shanks Creek	Yes
County	Transportation	Bridge @ Marumsco Road/Marumsco Creek	Yes
County	Transportation	Bridge @ Millard Long Road/Back Creek	Yes
County	Transportation	Bridge @ Old Princess Anne Rd/Kings Creek	Yes
County	Transportation	Bridge @ River Road/Big Annemessex River	Yes
County	Transportation	Bridge @ Rumbley Road/Teague Creek	Yes
County	Transportation	Bridge @ Sign Post Road/Back Creek	Yes
County	Transportation	Bridge @ Smith Island Road/Ewell	Yes
County	Transportation	Bridge @ Stewart Neck Road/Jones Creek	Yes
County	Transportation	Bridge @ Stewart Neck Road/Kings Creek	Yes
County	Transportation	Bridge @ Whitehaven Ferry Road/Waukaki Creek	Yes
County	Transportation	Smith Island Heliport	Yes
County	Utility	Ewell WWTP	Yes
County	Utility	Pumping Station	Yes
County	Utility	Tylerton Transfer Station	Yes

Location	Facility Type	Facility Name	2050 Mean Sea Level Rise
County	Utility	WWTP	Yes
Crisfield	Utility	Telephone	Yes

Source: 2017 Somerset County Critical and Public Database

Map 6-3: 2050 Mean Sea Level Rise and Essential Facilities



MITIGATION EFFORTS

Currently, Somerset County utilizes the State Critical Area Law and has adopted a local program, Local Critical Area Program, which requires the first 100-300 feet from tidal wetlands be managed to protect aquatic and shoreline environments from man-made disturbances. The program also states that existing vegetation is to be protected and planting of un-vegetated areas is strongly encouraged.

Additionally, the County's Planning and Zoning Office, the Department of Technical and Community Services provide sources of information as to the Critical Area Law, how it is applicable in Somerset County and how it may affect a given property. The Department has printed brochures and information on the One Hundred Foot Buffer and tree plantings, as well as developing and providing mapping products that depict these areas.

CHAPTER 7: DROUGHT/EXTREME HEAT

PROFILE

DROUGHT

A drought is essentially a deficiency of precipitation over a period of time resulting from a weather pattern that brings no moisture into an area. Droughts may be short term (a few weeks to a month) or long term (several months to several years). A long term drought may be interrupted by occasional precipitation without breaking the drought cycle. The Midwestern states are prone to cyclic long term droughts that last several years. The simplest definition of a drought is “an extended period of dry weather”; there are four different types of drought, which includes:

- *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.

Beginning in 1930, states in the Great Plains suffered a long-term drought that lasted most of the decade and led to the abandonment of farms and ranches on a scale not seen in this country since that time. This same drought affected Maryland in 1930 and early 1931. During the 15 months from December 1929 through February 1931, rainfall was 21 inches below normal for much of the state. Crop losses in 1930 dollars were estimated at \$40 million.

Droughts are measured primarily on the Palmer Index developed by W. C. Palmer in 1965 to measure the departure of moisture from the norm. The index provides measurements of moisture conditions so that comparisons can be made between locations and between time periods in the same location. The index is really a hydrological index rather than a meteorological index because it is based on moisture availability (precipitation, outflow, and storage) over time.

Extreme Heat

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.

HISTORY

DROUGHT

Table 7-1 lists drought events as reported by the National Center for Environmental Information (NCEI) for Somerset County. Data for the County is limited due to the low population of the County and the amount of storm spotters available to report their findings to the NCEI.

Table 7-1: Drought Events

Date	Event Narrative
September 1995	Dry conditions, which began in July, continued into early September before welcome rains began falling. Some water use and outdoor burning restrictions were still in effect. Crops such as soybeans were severely impacted by the drought.
November 1998	A very dry period from July through November resulted in drought-like conditions across much of the Lower Maryland Eastern Shore. This caused significant crop damage and other drought-related problems throughout much of the area. Crop damage was estimated at \$6 million dollars.
No New Events Reported	

Source: NWS, NCEI (NOAA)

Table 7-2: Palmer Drought Severity Index

Value	Condition
+4.0 and above	Extremely Moist
+3.0 to +3.9	Very Moist Spell
+2.0 to +2.9	Unusual Moist Spell
--1.9 to +1.9	Near normal
-2.0 to -2.9	Moderate drought
-3.0 to -3.9	Severe drought
-4.0 or less	Extreme drought

Source: National Climate Prediction Center; NOAA.

A standard measure of drought severity is the Palmer Drought Severity Index (PDSI), shown in Table 7-2.

Table 7-3 Source: 2017 Northeast Regional Climate Center
Note: Based on monthly Palmer Drought Severity Index as computed by the National Centers for Environmental Information. Period of record: January 1895-May 2017.

Table 7-3: Southern Eastern Shore – Climate Division 1 Drought Periods

Drought Periods	Duration	Lowest PDSI
1900-10 to 1901-03	6 months	-3.74 in 1901-02
1914-10 to 1914-11	2 months	-3.12 in 1914-11
1921-09 to 1921-12	4 months	-3.97 in 1921-11
1930-04 to 1931-02	11 months	-6.74 in 1931-02
1941-11 to 1942-02	4 months	-3.47 in 1942-02
1965-11 to 1966-04	6 months	-4.03 in 1965-12
1966-07 to 1967-04	10 months	-4.03 in 1967-01
1985-03 to 1985-04	2 months	-4.16 in 1985-04
1986-06 to 1986-12	7 months	-4.24 in 1986-11
1991-05 to 1991-06	2 months	-3.19 in 1991-05
1994-12 to 1995-04	5 months	-3.84 in 1995-03
1995-08 to 1995-09	2 months	-3.74 in 1995-09
1998-11 to 1999-02	4 months	-3.76 in 1998-12
1999-06 to 1999-08	3 months	-3.52 in 1999-08
2001-12 to 2002-03	4 months	-4.41 in 2002-02
2002-05 to 2002-08	4 months	-4.29 in 2002-08
2007-09 to 2008-03	7 months	-4.03 in 2008-03
2010-07 to 2010-09	3 months	-3.71 in 2010-08
2010-11 to 2011-09	11 months	-4.95 in 2011-07
2011-12 to 2012-07	8 months	-3.94 in 2012-03

According to the National Center for Environmental Information data on Table 7-1, in terms of number of occurrences, a total of 2 drought/extreme heat events affecting Somerset County from 1995 and 2017. Therefore, Somerset County experiences 0.1 drought events per year. The 1998 event was reported to have six million dollars in crop damages. Three counties were considered in the “zones affected” in the NCEI database, Somerset, Wicomico, and Dorchester counties. Out of the three counties, Somerset County has 21% of the farm land area; therefore, the County experienced approximately 1.26 million dollars in crop damages, although this loss estimate cannot be assured. Somerset County was also part of the Drought State of Emergency declared on August 27, 2002 by Governor Parris N. Glendening.

However, the data on Table 7-3 contains additional drought periods that impacted Somerset County starting in the 1900’s. The Northeast Regional Climate Center is partnered with National Centers for Environmental Information, Regional Climate Centers, and Cornell University. Table 7-3 shows the Southern Eastern Shore Climate Division 1 drought periods which includes Somerset County. The table provides data for periods of two or more months with severe or extreme drought. This data collected from the Northeast Regional Climate Center reflects a much more accurate description of previous and ongoing droughts that have affected Somerset County. During the Plan Update, recent droughts affecting the County have occurred in 2008, 2011, and 2012.

Extreme Heat

Table 7-4 lists two extreme heat events as reported by the NCEI for Somerset County. Data for the County is limited due to the low population of the County and the amount of storm spotters available to report their findings to the NCEI.

Table 7-4: Extreme Heat Events

Date	Event Narrative
May 18 to 21, 1996	An early-season four-day heat wave produced record or near record high temperatures across the lower Maryland eastern shore. High temperatures were in the 80s across the region on May 18. Then, on May 19, May 20, and May 21, high temperatures were in the 90s.
2017 Hazard Mitigation Plan Update	
July 21, 2011	An extended period of excessive heat and humidity occurred across most of the Lower Maryland Eastern Shore from July 21st to July 23rd. High temperatures ranged from 96 to 103 degrees during the afternoons, with heat index values ranging from 110 to 119. Overnight lows only fell into the mid-70s to mid-80s.

Source: NWS, NCEI (NOAA)

COUNTY PERSPECTIVE

DROUGHT

As shown in the *2016 Maryland State Hazard Mitigation Plan Update*, Somerset County has a “Medium” ranking for drought. The Somerset County Hazard Mitigation Planning Committee has a slightly higher ranking of “Medium-High”. The committee is also concerned about the effect of long-term drought on the county’s agricultural community. In the *2012 Census of Agriculture*, Somerset County had 286 farms consisting of 65,212 acres or approximately 30 percent of the county’s land area.

As shown in the *Chapter 2: County Profile*, Somerset County normally receives 41 inches of precipitation per year. The primary impact of a prolonged dry period is the effect on the agricultural community. Water supply has also been affected, particularly where ground water or small impoundments are relied on to supply community systems.

Maryland generally experiences average to higher-than-average stream flow. However, it is normal for Maryland to experience drought cycles as well. 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. In 1999, Maryland declared its first Statewide Drought Emergency. In 2000, more wells broke monthly record lows than any other recorded period. In 2002, 72 average monthly low stream flow records were set across Maryland.

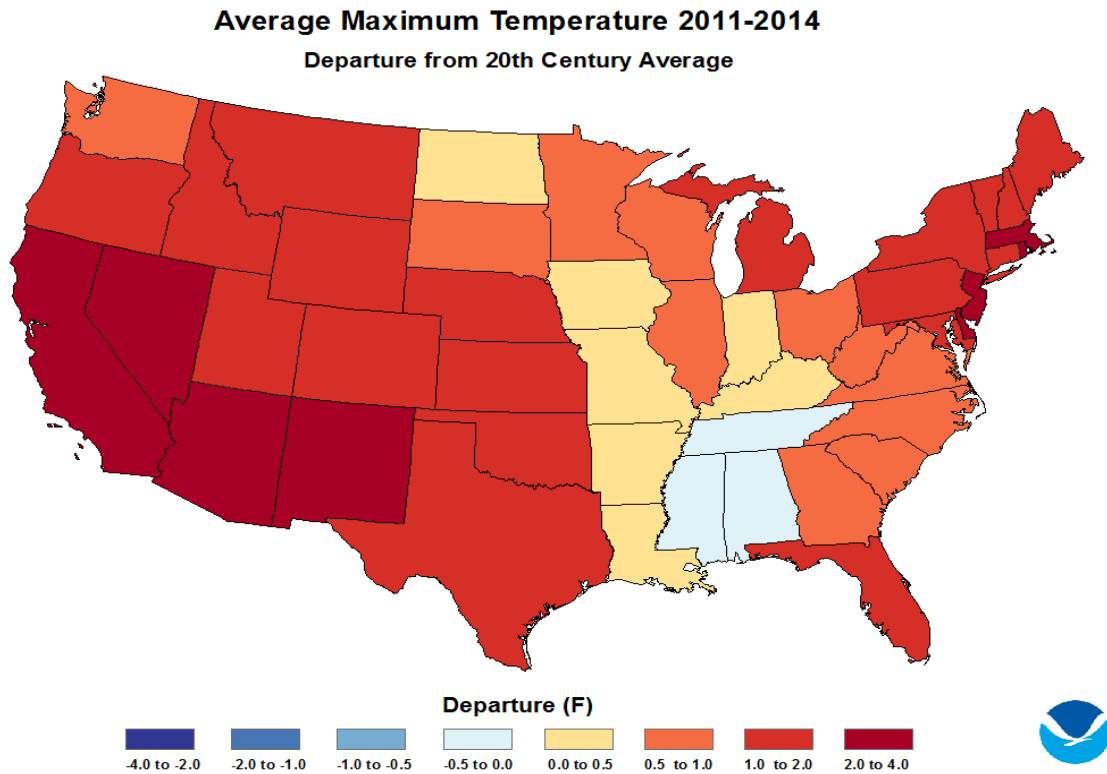
According to the Maryland Department of Environment (MDE) in August 2012, a drought warning was in effect for Eastern Maryland due to groundwater levels and streamflow being below normal on Maryland's Eastern Shore. The Eastern region included Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset and Worcester counties. Monitoring showed that groundwater and rainfall for the region were at "warning" levels and streamflow was at the "emergency" level. Rainfall for the Eastern region in the past six months since Jan. 31, 2012, were on average 6.6 inches below normal, or about 70 percent of normal.

EXTREME HEAT

According to the National Center for Environmental Information (NCEI), in 2015, the contiguous United States (CONUS) average temperature was 54.4°F, 2.4°F above the 20th century average. This was the second warmest year in the 121-year period of record for the CONUS. The warmest year on record was 2012 when the annual average temperature was 55.3°F. This marks the 19th consecutive year that the annual average temperature for the CONUS was above the 20th century average. The last year with a below-average temperature was 1996.

The National Center for Environmental Information (NCEI) data has shown the average maximum temperature for the State of Maryland has been increasing since 1980. As depicted in Figure 7-1, the average maximum temperature between 2011-2014 for Maryland has increased 1.0-2.0 degrees Fahrenheit from the 20th century average.

**Figure: 7-1: Average Maximum Temperature 2011-2014
Departure from 20th Century Average**



Source: NCEI

Decadal Average Temperature Maps

These maps show how the decadal average temperature for each state differs from the 20th century average. First, the average temperature for each state from 1901 to 2000 was calculated using the nClimDiv data set. Next, the average temperature for each state was calculated for each decade (1895-1900, 1901-1910, 1911-1920, ..., 2011-2014). Finally, each state's 20th century average was subtracted from each of its decadal averages. Negative values indicate that a decade is cooler than the long term 20th century average. Positive values indicate that a decade is warmer than the long-term average. This process was done for minimum temperature, average temperature, and maximum temperature.

Source: NCEI

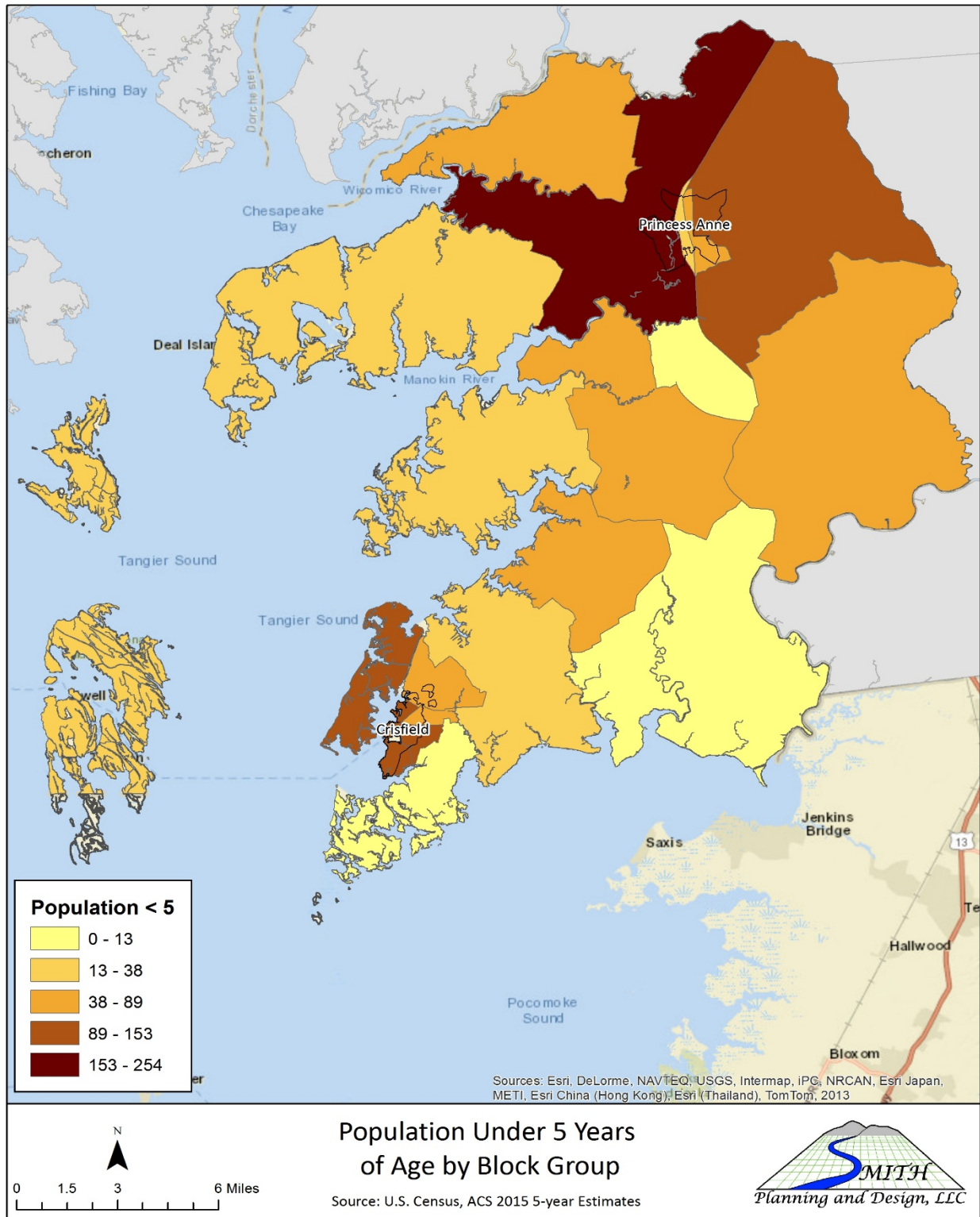
The two age groups most vulnerable to extreme temperatures are the elderly (65 and older) and younger (under age 5) populations. Table 7-5 is from the National Weather Service Forecast Office and shows the possible effects of heat on these higher risk groups. The following maps, Map 7-1 and Map 7-2, depict the highest concentrated areas of these two groups in the County based on the 2015 Census Block Groups. The areas in and around the populations centers of Princess Anne and the City of Crisfield are shown to have the highest concentration of vulnerable populations.

Table 7-5: Heat Disorders

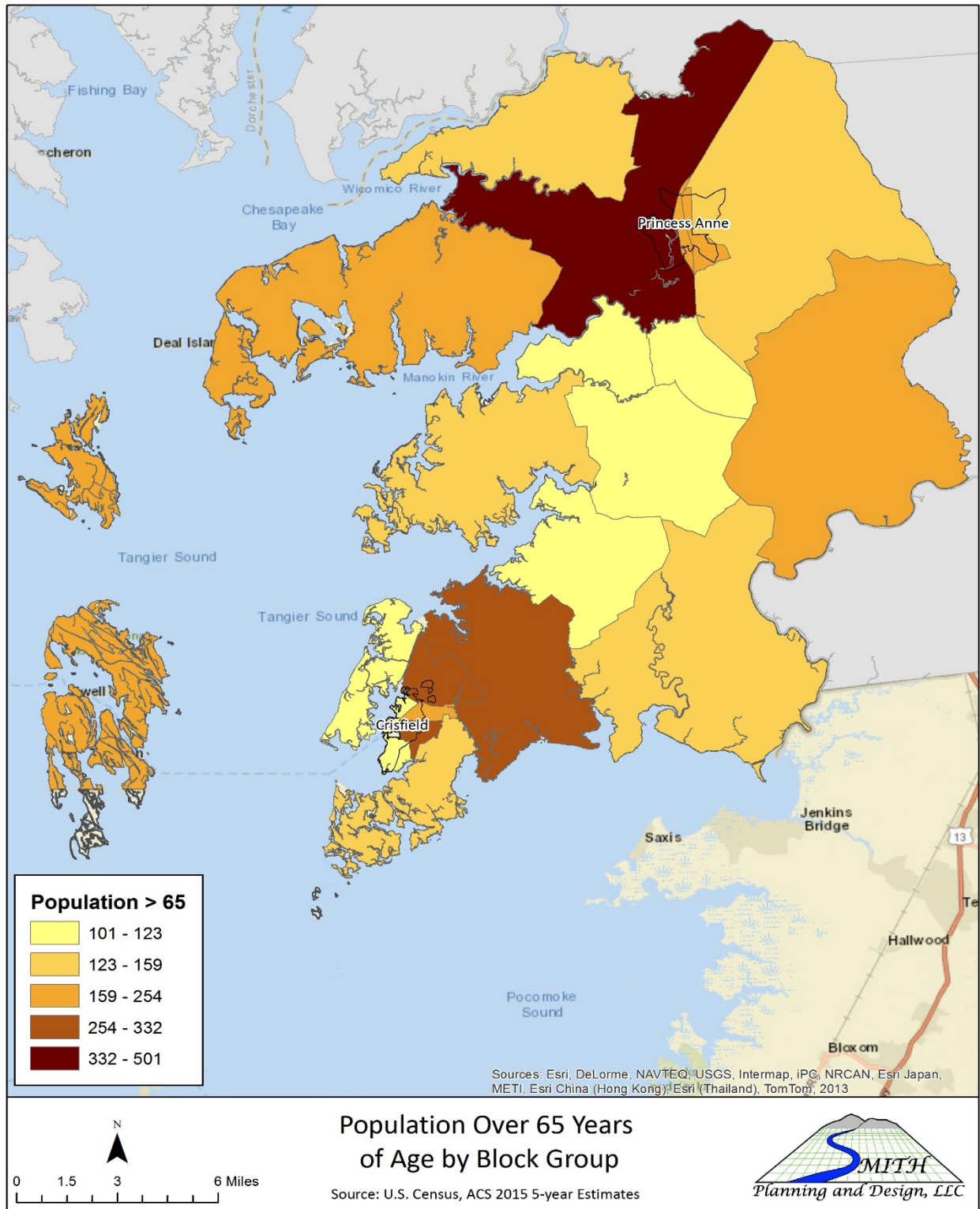
Classification	Heat Index	Possible heat disorders for people in higher risk groups
Extreme Danger	125 or higher	Heatstroke/sunstroke highly likely
Danger	103-124	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
Extreme Caution	90-103	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Caution	80-90	Fatigue possible with prolonged exposure and/or physical activity

Source: NOAA, NWS

Map 7-1: Population Under 5 Years of Age by Block Group



Map 7-2: Population Over 65 Years of Age by Block Group



MUNICIPAL PERSPECTIVE

As noted in the County Perspective, both municipalities in Somerset County rely on ground water for their supply. Since the aquifers underlying the eastern shore have their recharge areas primarily to the west of the Chesapeake Bay, localized drought conditions have little effect on the water supply. However, long term draw-down of these aquifers combined with drought on the western shore could adversely affect water supply on the eastern shore. As shown in Maps 7-1 and 7-2, both municipalities have the highest rates of children under the age of 5, which is expected due to these areas being the most developed in the county. Although Princess Anne has a larger population of persons over age 65 compared to that of Crisfield, both are considered vulnerable areas.

MITIGATION EFFORTS

Although not specifically aimed at drought mitigation, Somerset County Health Department – Environmental Health, has a Ground Water Management Program designed to protect groundwater supplies from contamination by septic systems and other pollutants. There are no impoundments used for water supply in Somerset County; residents rely exclusively on groundwater for water supply. According to the *2010 Somerset County Water Resource Element*, *Somerset County currently has no policy for ensuring compliance with the Maryland Water Conservation Plumbing Fixtures Act (MWCPFA), which requires that new plumbing fixtures sold or installed as part of new construction are designed to conserve water.* The County could benefit greatly from such a policy in a region that is in the early stages of water resource inadequacy, including the inadequate supply of water for the areas surrounding the Eastern Correctional Institution (ECI) area, as well as Smith Island.

MDE establishes well head protection areas around major potable water sources, for example those used by the Sanitary Commission. The *2008 County Water & Sewer Plan* provides details on specific locations of water sources and land use policies as they relate to water resources. This information is contained within the *2010 Somerset County Water Resources Element* of the Comprehensive Plan.

In terms of extended extreme heat conditions, the County opens cooling centers, as appropriate. According to the Somerset County Health Department website, Summer Heat Preparedness includes educating citizens of the county on how to mitigate impacts from extreme heat.



Source: www.somersethealth.org

Information below is found on the Somerset County Health Departments website at: <https://somersethealth.org/>.

- Plan to have plenty of fluids on hand to keep your family well hydrated
- Replace filters in air conditioning units and have serviced if needed
- Install ceiling fans to help circulate air conditioned “cooled air” to save on electric consumption
- Ensure you can pull shades to keep rooms cooler during extreme daytime heat
- Prepare for power outages:
 - stock up on bottled water supply
 - check battery supply
 - place gallon bags of water in freezer to help keep food frozen longer during power outages
- Know your county’s plans for cooled spaces during extreme heat waves in case you lose air conditioning capability
- Wear lightweight, light-colored, and loose-fitting clothing
- Schedule outdoor events for early morning or evening and avoid sun exposure in midday
- Check on neighbors and ensure they too have plans for “staying cool”
- Visit www.playgroundsafety.org sponsored by USDA Forest Service website for outdoor safety tips
- Visit the www.cdc.gov website to learn more about signs and symptoms of heat exhaustion and heat stroke

CHAPTER 8: THUNDERSTORM

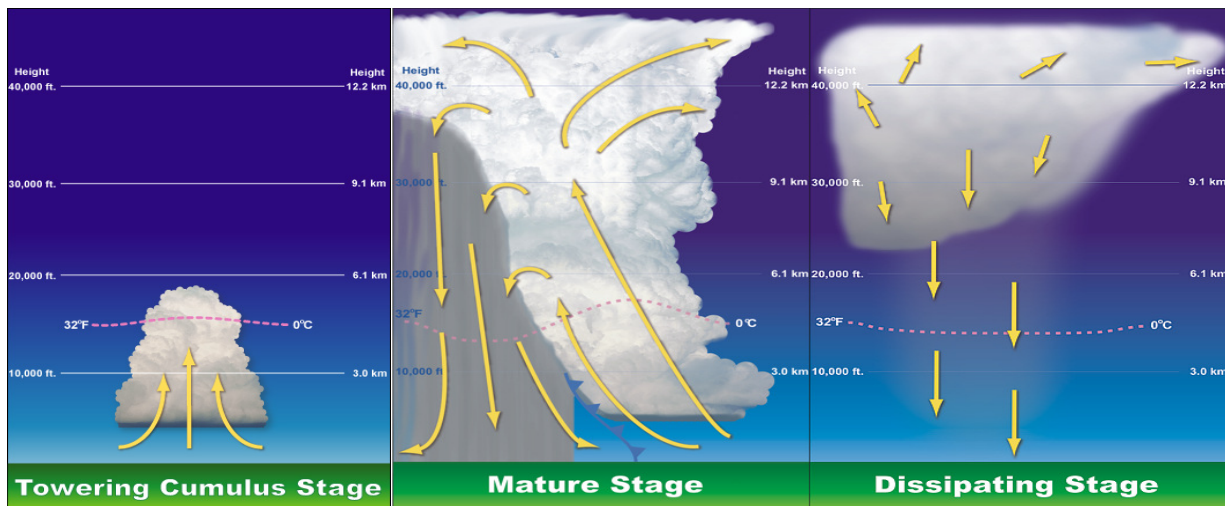
PROFILE

THUNDERSTORM

Thunderstorms are usually high intensity storms of short duration originating in a warm moist air mass that either is 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 to 30 minutes. Lightning, high winds, and occasionally tornadoes are associated with thunderstorms.

When wind speeds exceed 58 mph, thunderstorms are considered severe. A downburst or sudden descent of cold air during a severe thunderstorm can result in straight line winds up to 134 mph. One of the most extreme hazards from thunderstorms is a lightning strike. Lightning has been known to strike up to 6-10 miles from the storm in an area of clear sky. It is estimated that more than 30,000,000 points on the ground in the continental 48 states are hit by lightning in a single year.

Figure 8-1: Thunderstorm Life Cycle



Lightning Strikes

Lightning strikes are defined as sudden and violent discharges of electricity from within a thunderstorm due to a difference in electrical charges and represent a flow of electrical current from cloud-to-cloud or cloud-to-ground. Nationally, lightning strikes cause extensive damage to buildings and structures, kills or injures people and livestock, starts untold numbers of forest fires and wildfires, and disrupts electromagnetic transmissions. Lightning strikes are extremely dangerous during dry lightning storms because people remain outside due to the lack of precipitation; however, lightning is still present during the storm. Lightning strikes usually occur

as a result of the thunderstorms that move through the area during the summer months. Peak months for lightning strikes are between May and September.

Hail

Hail is a form of solid precipitation that mostly consists of water and has been measured between 0.20 inches to 5.9 inches in diameter. The larger hail stones come from severe thunderstorms and can occur within two miles of the parent thunderstorm.

Thunderstorms provide the strong, upward motion of air and lower heights for freezing from which hail is formed. The hail stones are suspended in the air by the strong upward motion of air until the weight of the hail overcomes the updraft and falls to the ground. The velocity at which hail falls to the ground is dependent on several factors: size of the stone, friction in the air, motion of the wind, collisions

with other precipitation, and the melting factor. A hail stone measured at 0.39 inches falls at a rate of 20 mph while a larger stone, 3.1 inches in diameter, falls at a rate of 110 mph.

Figure 8-2: Thunderstorms Containing Hail Can Exhibit a Characteristic Green Coloration



HISTORY

Thunderstorm

NOAA's definition for thunderstorm is 'a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder.' Sixty-one thunderstorm events were reported for Somerset County between 1995 and 2017, however only those events with property damage are listed in Table 8-1.

Table 8-1: Thunderstorm Events

Location	Date	Event Narrative	Property Damage
Smith Island	November 11, 1995	Ninety-one mph wind reported at Crisfield. Seventy-five mph wind reported at Smith Island. Several moorings damaged in Smith Island. Numerous trees and power lines and three homes damaged in Crisfield. Trees and power lines down other parts of county as well.	\$50,000
Crisfield	May 4, 1996	Several trees downed. Downed trees blocked roads and caused some damage to a few homes.	\$15,000
Kingston	May 4, 1996	6 unoccupied mobile homes were shifted or damaged. One of them was demolished.	\$75,000

Location	Date	Event Narrative	Property Damage
Crisfield	June 24, 1996	Several trees uprooted.	\$2,000
Countywide	June 26, 1997	Trees down throughout the county.	\$3,000
Princess Anne	June 16, 1998	Numerous trees down on Route 13.	\$3,000
Fairmount	June 26, 1998	Large tree down blocking both lanes of Route 361.	\$2,000
Crisfield	July 22, 1999	Numerous trees down in the Deal Island area.	\$2,000
Crisfield	July 10, 2000	A tree was blown down at a residence on Maryland Street.	\$1,000
Oriole	May 22, 2001	Large trees down.	\$2,000
Mount Vernon	May 13, 2002	Numerous trees down. Also, damage to trailers and homes.	\$10,000
Crisfield	August 16, 2003	Numerous trees down or uprooted. Some roofs blown off and windows blown out.	\$100,000
Princess Anne	August 26, 2003	Trees down.	\$2,000
Deal Island	July 14, 2004	Trees down.	\$2,000
Crisfield	July 14, 2004	Trees and power lines down. Widespread power outages reported.	\$2,000
Princess Anne	July 4, 2006	Trees and power lines down.	\$2,000
Princess Anne	July 5, 2006	Trees and downed power lines on Route 13.	\$2,000
Marumsc	June 8, 2007	Numerous large tree branches were downed.	\$1,000
Marion	March 5, 2008	Six large trees were snapped in half. Shingles were blown off roof of house.	\$2,000
Westover	March 5, 2008	A chicken house was blown down. Two tractor trailers were overturned, and a shed was blown away.	\$5,000
Ewell	July 27, 2008	Trees were downed on Smith Island.	\$1,000
Crisfield	July 27, 2008	Scattered severe thunderstorms in advance of a cold front produced damaging winds across portions of the Lower Maryland Eastern Shore. Partial building collapse due to thunderstorm wind gust.	\$3,000
Marumsc	July 27, 2008	Numerous trees and power lines were downed.	\$2,000
Kingston	July 27, 2008	Several trees and power lines were downed countywide.	\$2,000
Crisfield	July 1, 2009	Numerous trees and power lines were downed.	\$2,000
Hopewell	July 1, 2009	Trees and power lines were downed.	\$2,000
Kingston	July 1, 2009	Trees and power lines were downed.	\$2,000
Chance	July 26, 2009	Trees and power lines were downed.	\$2,000
Kingston	July 26, 2009	Trees were downed at numerous locations throughout the county	\$2,000
Wenona	August 5, 2010	Wind gust of 58 knots (67 mph) was measured at Deal Island CWOP site.	\$1,000
Princess Anne	August 5, 2010	Trees and power lines were downed on Warwick Lane.	\$2,000
Rehobeth	August 12, 2010	Trees were downed at the intersection of Rehobeth Road and Coventry Road. Power outages were reported.	\$2,000

Location	Date	Event Narrative	Property Damage
Upper Fairmount	April 5, 2011	A tree was downed on a house.	\$2,000
Westover	April 5, 2011	Trees were downed.	\$2,000
Manokin	April 5, 2011	Trees and power lines were downed in the Upper Fairmont and Manokin areas.	\$2,000
Upper Fairmount	April 16, 2011	Large tree was downed and blocking a roadway.	\$1,000
Princess Anne	April 16, 2011	Large tree was downed and blocking a roadway.	\$1,000
2017 Hazard Mitigation Plan Update			
Crisfield	June 29, 2012	Numerous trees were downed.	\$5,000
Westover	June 13, 2012	A downed tree was blocking US Route 13 near Landon Station.	\$1,000
Deal Is	June 28, 2013	Wind gust of 52 knots (60 mph) was reported.	\$2,000
Eden	June 28, 2013	Trees were downed in Eden. One tree was downed on power lines.	\$2,000
Eden	June 28, 2013	Several trees were downed.	\$2,000
Crisfield	June 18, 2015	Wind gust of 50 knots was measured at Crisfield.	\$1,000
Princess Anne	June 23, 2015	Large tree was downed along Ocean Highway northeast of Princess Anne.	\$1,000
Crisfield	August 4, 2015	Several trees were downed.	\$2,000
Hopewell	August 4, 2015	Numerous trees were downed between Crisfield and Marion.	\$2,000
Princess Anne	June 21, 2016	Trees were downed.	\$2,000
Kings Creek	June 21, 2016	Large tree was downed on Princess Anne Road.	\$1,000
Crisfield	July 1, 2016	Numerous trees and power lines were downed around Crisfield. A 73 mph wind gust was reported from the Crisfield Weatherflow platform located a couple miles west of town.	\$2,000
Marion	July 28, 2016	Phone and power lines were downed.	\$2,000

SOURCE: NWS, NCEI (NOAA)

Utilizing the thunderstorm data that has caused property damage, the probability of the County experiencing a thunderstorm event that could cause property damage is 0.44 events per year.

Lightning Strikes

NOAA defines lightning strikes as ‘visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.’

One lightning event reported occurred in Mount Vernon on 12 August 2010. Lightning struck the Mount Vernon Fire Department building causing loss of power and communications.

Damage to the structure was reported at \$3,000.00. Most recently, a lightning strike occurred in Eden on 21 August 2016. Lightning struck a house and caused \$5,000 in damages.

Hail

According to NOAA, hail is a 'showery precipitation in the form of irregular pellets or balls of ice that are more than 5 millimeters in diameter and fall from a cumulonimbus cloud.'

Table 8-2: Hail Events

Location	Date	Event Narrative	Magnitude (inches)
Somerset	June 24, 1992	No Report	1.75
Somerset	June 24, 1992	No Report	1.75
Westover	May 1, 1997	No Report	1.75
Princess Anne	June 16, 1998	No Report	1.75
Princess Anne	April 9, 1999	No Report	1.25
Crisfield	May 24, 1999	No Report	0.75
Princess Anne	April 21, 2000	0.75 inch hail reported at Princess Anne	0.75
Manokin	April 21, 2000	1.00 inch diameter hail reported at Manokin.	1.00
Princess Anne	May 22, 2001	No Report	0.75
Crisfield	June 12, 2007	Quarter size hail fell at Crisfield Marina. Scattered thunderstorms produced large hail over southern Maryland.	1.00
Loretto	June 4, 2008	Nickel to quarter size hail was reported just north of Princess Anne. Scattered severe thunderstorms produced damaging winds and large hail across portions of the Lower Maryland Eastern Shore.	1.00
Princess Anne	June 4, 2008	Quarter size hail was reported in Princess Anne. Scattered severe thunderstorms produced damaging winds and large hail across portions of the Lower Maryland Eastern Shore.	1.00
Princess Anne	June 19, 2008	Nickel size hail was reported. Isolated severe thunderstorm produced large hail across portions of the Lower Maryland Eastern Shore.	0.88
Crisfield	August 2, 2008	Penny size hail was reported at Crisfield marina. Isolated severe thunderstorm in advance of a cold front produced large hail across portions of the Lower Maryland Eastern Shore.	0.75
Crisfield	August 2, 2008	Nickel size hail was covering the ground. Isolated severe thunderstorm in advance of a cold front produced large hail across portions of the Lower Maryland Eastern Shore.	0.88
Crisfield	June 2, 2009	Nickel size hail was reported at Crisfield Marina. Isolated severe thunderstorm well in advance of a cold front produced large hail in Somerset County on the Lower Maryland Eastern Shore.	0.88
No New Events Reported			

SOURCE: NWS, NCEI (NOAA)

NCEI has listed a total of 16 hail events affecting Somerset County from 1992-2017. Therefore, the probability for the County of experiencing a hail event is 0.62 events per year.

COUNTY PERSPECTIVE

The *2016 Maryland State Hazard Mitigation Plan* and the 2017 HMPC has ranked Somerset County as a 'Medium' risk for thunderstorms. Somerset County is affected primarily by thunderstorm activity through the interaction of warm and cool air masses along frontal systems. Thunderstorms are more common in the spring when frontal zones are passing over the county from west to east and during the summer months when warm, moist air is lifted over the eastern shore by differential heating of the land and surrounding water. Intense thunderstorms can result in rapid runoff, particularly in the headwaters of small stream basins.

MUNICIPAL PERSPECTIVE

The municipalities in Somerset County face the same threat from thunderstorms as the county. In some cases, inadequate stormwater management facilities in older developed areas contributes to damage from flash flooding in low lying residential areas downslope from new construction.

CRITICAL & PUBLIC FACILITIES AT-RISK

Regarding critical and public facilities at-risk, communication towers are especially vulnerable to lightning. According to IWCE's Urgent Communications, the consequences of a loss are not simply related to the cost of replacing the equipment, but also to the loss of service. When contemplating protection against these losses, the site's transmission lines are a critical consideration, as they provide direct conductive paths from the top of the tower to the equipment below. A communication tower may be hit by lightning at its highest point, the antenna, however this will not only "fry" the antenna but, without surge protection, can travel into the very expensive base station equipment housed in the equipment building. Surge events are not only caused by hits to towers or antennas. At base transceiver station (BTS) sites, lightning strikes within a few hundred yards of a tower are just as dangerous as direct hits, as they may induce high-energy electromagnetic fields onto the feeder lines. Therefore, it is necessary to design a system that protects the electronic equipment from a surge on the feeder lines, regardless of the source.

Critical and/or public facilities, specifically communication towers, have been assessed for vulnerability to lightning events. A total of eight (8) communication towers are within the unincorporated areas of the county. The Town of Princess Anne contains eleven (11) communication towers, while two (2) are located within the City of Crisfield.

Table 8-3: Critical and Public Facilities At-Risk

Critical and Public Facilities At-Risk			
Location	Facility Type	Facility Name	Address
County	Utility	Verizon Telephone	10157 Deal Island Road
County	Utility	Telephone	20884 Caleb Jones Road
County	Utility	Marion 911 Tower	25873 Hudson Corner Road
County	Utility	Communication	28927 Irene Whittington Road
County	Utility	Telecom Tower	31330 Eden Allen Road
County	Utility	Telecom Verizon Tower	5718 Tullis Corner Road
County	Utility	Telephone	5722 Tulls Corner Road
County	Utility	Telecom Verizon Tower	Kingston Lane
Crisfield	Utility	Telephone	Charlotte Avenue
Crisfield	Utility	Telephone & Wireless Tower	N. Of Potomac St @ Myrtle Street
Princess Anne	Utility	Telephone	11732 Church St
Princess Anne	Utility	Telecom Verizon Tower	11916 Somerset Ave
Princess Anne	Utility	Telecom Tower	12611 Recycle Dr.
Princess Anne	Utility	Communication	27440 Mt Vernon Road
Princess Anne	Utility	Communication	28490 Deal Island Road
Princess Anne	Utility	State Police Telecom Tower	30581 Perry Road
Princess Anne	Utility	Telecom Verizon Tower	30880 W Post Office Road
Princess Anne	Utility	Telecom Tower	30939 McCormick Swamp Road
Princess Anne	Utility	Telecom Tower	31305 Peggy Neck Road
Princess Anne	Utility	Telecom Tower	9600 Arden Station Road
Princess Anne	Utility	Telephone	Old Westover Marion Road

Source: 2017 Somerset County Critical and Public Database

MITIGATION EFFORTS

As mentioned in the Flood Profile, the County enforces its Floodplain Ordinance in mapped floodplain areas which are prone to stormwater runoff and requires a setback from un-mapped streams. In addition, the Stormwater Management Ordinance requires storage and release of runoff at predetermined rates in newly developing areas.

Additionally, impacts to communication towers are problematic especially during a hazard event; however, actions were implemented to address and mitigate the issue from reoccurring. The twenty-one (21) communication towers listed above should be assessed for proper grounding and surge protection. A proper grounded transmission system and surge protection should be installed to ensure service is not interrupted during a lightning event. Proper grounding and surge protection are small investments compared to the system replacement cost following a lightning strike. This has been completed for the Somerset County Department of Emergency Services, 9-1-1 communications center.

CHAPTER 9: TORNADO AND HIGH WIND

PROFILE

TORNADO

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 associated tornadoes develop in warm, moist air in advance of strong eastward moving cold fronts in late winter and early spring. Tornadoes can also occur along a “dryline” which separates very warm, moist air to the east from hot, dry air to the west. Both scenarios are common in the Central Plains. Under the right temperature and moisture conditions, intense thunderstorms can produce tornadoes in areas of differential heating such as occurs on the Eastern Shore.

Tornadoes can occur in every state, although the mid-west states have by far the greatest potential for this type of event. The most recent significant tornado in Maryland to cause substantial damage occurred in Charles County-LaPlata vicinity in 2002. According to the National Center for Environmental Information (NCEI) database, July is the peak month for tornado activity in Maryland. The NCEI also reported three-hundred and sixty-one (361) tornadoes have occurred in Maryland between 1950 and February 2017. Counties west of the Chesapeake Bay generally experience a higher frequency of tornadoes than those on the Eastern Shore. However, the most significant in Maryland occurred in Queen Anne’s County in August 2017.

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, which are available at <http://www.spc.noaa.gov/efscale/ef-scale.html>.

Table 9-1: 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	158-206	162-209	3	136-165
4	207-260	210-261	4	166-200
5	261-318	262-317	5	Over 200

Source: NOAA

HIGH WIND

There are three basic types of damaging high wind events that affect Maryland: synoptic-scale winds, tropical storm winds and thunderstorm winds. Synoptic-scale or large-scale winds are high winds that occur typically with cold frontal passages or Nor'easters, and are uncommon in Maryland. The National Weather Service considers a thunderstorm to be severe only if it produces wind gusts of 58 mph or higher.

"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. The majority of wind events in Maryland occur in June and July. High winds generated from coastal storm events cause a significant amount of damage on Maryland's Eastern Shore.

HISTORY

TORNADO

Tornado events as reported by the National Center for Environmental Information (NCEI) for Somerset County are listed in the table below.

Table 9-2: Tornado Events

Location	Date	Event Narrative	Magnitude	Width	Property Damage
Crisfield	September 8, 1981	No report.	F1	60 Yards	\$25,000
Deal Island	January 6, 2002	A small tornado tracked from Deal Island northeast to Chance in Somerset county. One mobile home was destroyed and another one was moved off its foundation. Also, several sailboats were knocked over and some pine trees were snapped in half.	F0	100 Yards	\$20,000
Shelltown	May 12, 2002	Numerous trees down. Mobile home destroyed.	F1	100 Yards	\$20,000
Crisfield	July 14, 2003	Waterspout that moved just onshore over a marsh, then dissipated. No damage occurred.	F0	50 Yards	\$0
Marion	July 5, 2006	F0 tornado damaged trees and tossed around lawn furniture.	F0	25 Yards	\$3,000
No New Events Reported					

Source: NWS, NCEI (NOAA)

In terms of number of occurrences, the NWS, NCEI listed a total of 5 tornado events affecting Somerset County from 1981-2017. Therefore, Somerset County experiences 0.14 tornado events per year. Total estimated property damage from these 5 tornados is \$68,000 with two F1 and three F0 tornados occurring in the last 35 years.

HIGH WIND

High wind events as reported by the National Center for Environmental Information NCEI for Somerset County are listed in the table below.

Table 9-3: High Wind Events

Date	Event Narrative	Property Damage
September 1, 2006	The remnants of Ernesto along the Mid Atlantic coast combined with strong high pressure produced very strong winds across the Lower Maryland Eastern Shore. Sustained winds in mph ranged from the lower 40s to near 50 with maximum gusts ranging from the mid 50s to as high as the mid 70s. Some higher sustained winds included 70 mph (61 knots) at Smith Island. The high winds caused numerous downed trees and power outages, along with significant structural damage.	\$5 Million
May 11, 2008	High winds from strong low pressure downed trees and powerlines, and caused some structural damage.	\$25,000
2017 Hazard Mitigation Plan Update		
October 29, 2012	The very strong winds downed trees, produced minor structural damage, and caused scattered power outages.	\$10,000

Source: NWS, NCEI (NOAA)

These high wind events are just part of the wind events that can be obtained from the NCEI. Wind data is also available in *Chapter 5: Hurricane* and *Chapter 7: Thunderstorm* of this Plan.

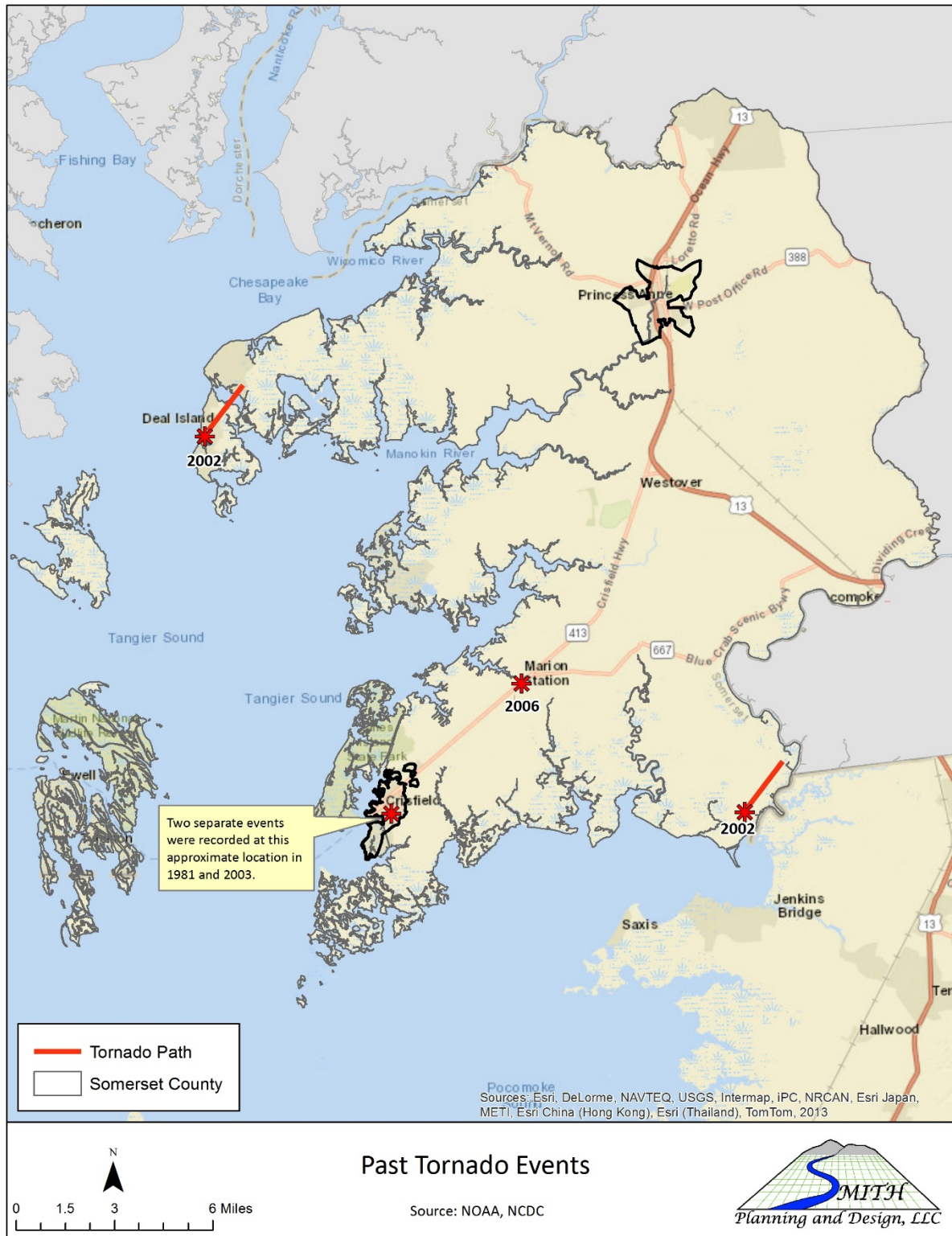
COUNTY PERSPECTIVE

TORNADO

As shown in the *2016 Maryland State Hazard Mitigation Plan Update*, Somerset County has a composite tornado risk of “Medium-Low”. The Hazard Mitigation Planning Committee agrees with this ranking. Between 1981 and 2017 there were 5 reported touchdowns of a tornado in Somerset County as shown on Map 9-1.

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. July is the peak month for activity in Maryland.

Map 9-1: Past Tornado Locations



HIGH WIND

As shown in the 2016 Maryland State Hazard Mitigation Plan Update, Somerset County has a composite high wind risk of “Medium-High”. The Hazard Mitigation Planning Committee ranked this hazard as “Medium-High”, as well. Figures 9-1 and 9-2 were produced using data from climate maps available from NOAA and show annual mean wind speed and annual mean events with wind gusts over 50 miles per hour across the United States with a focus on Somerset County.

Figure 9-1: Average Wind Speed

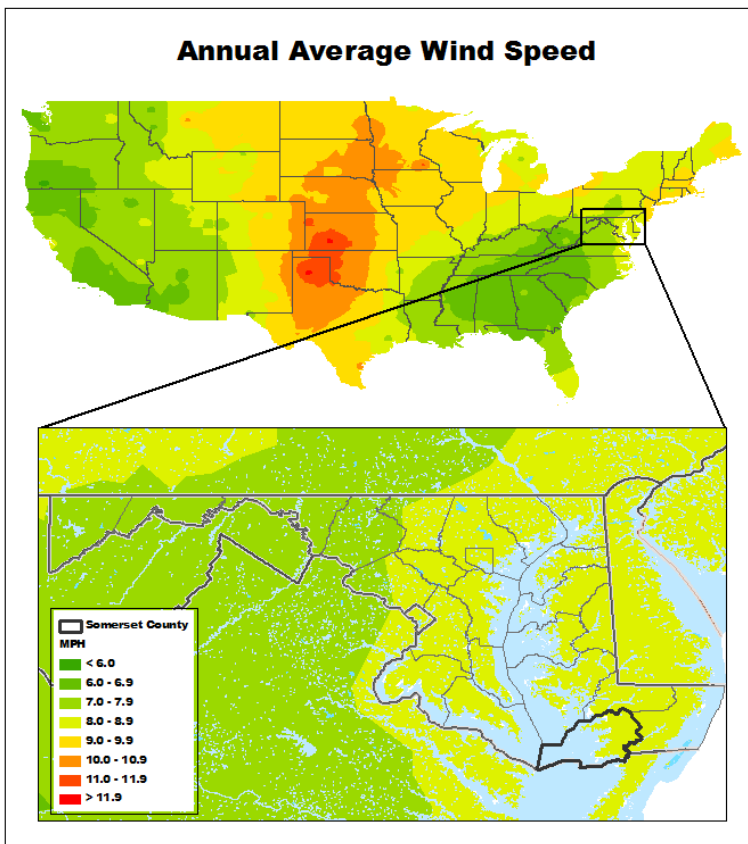
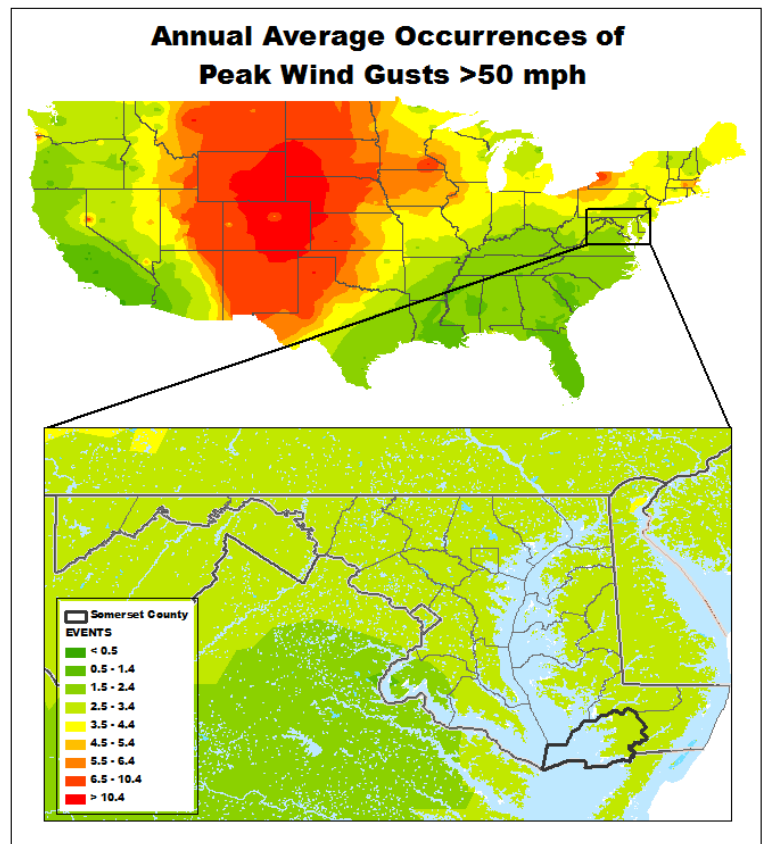
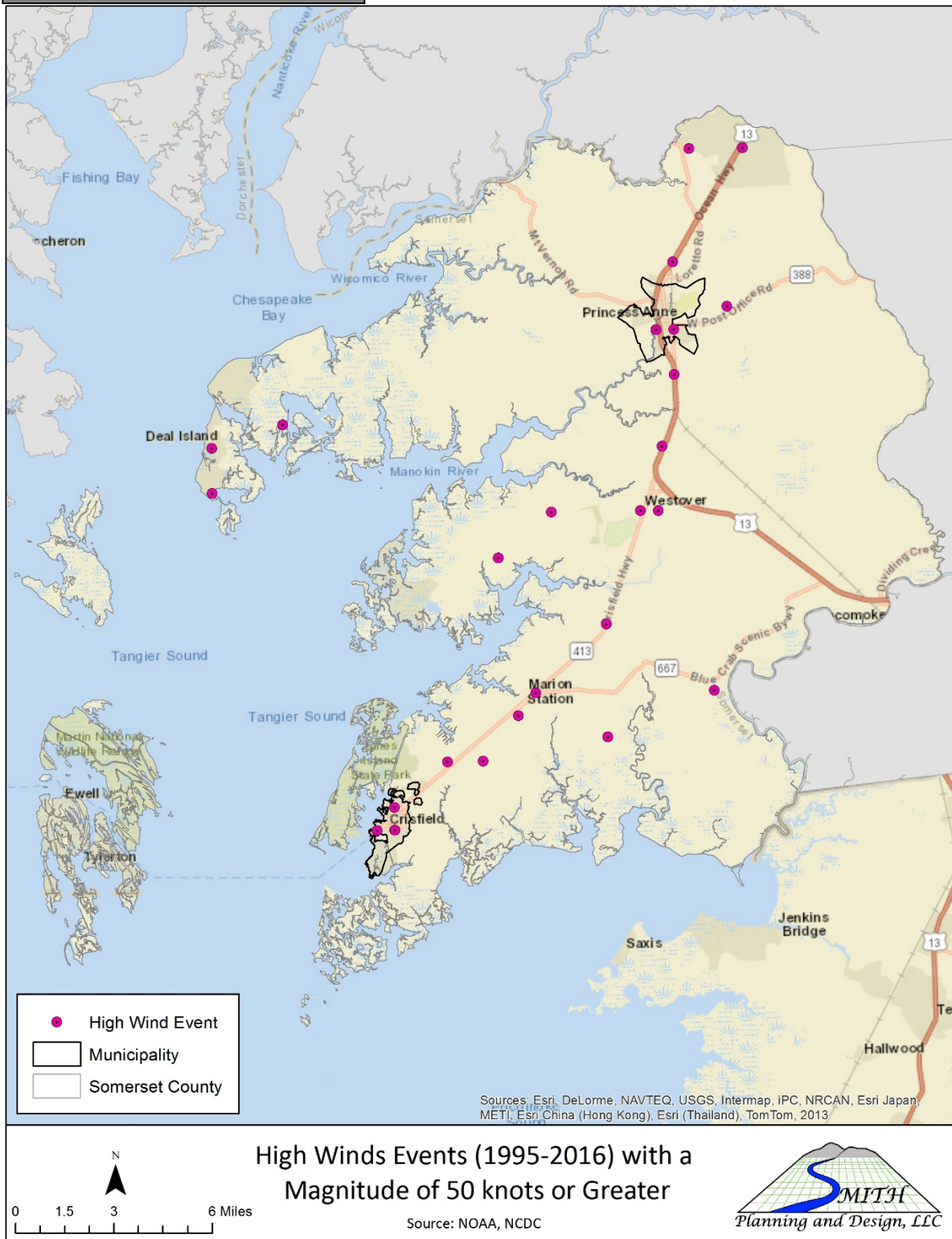


Figure 9-2: Average Peak Wind >50 mph



Map 9-2 depicts high wind locations that have occurred in the County and their magnitude in knots as reported by NOAA; some events did not have an associated magnitude with them. As depicted on the map, several high wind events have occurred within the City of Crisfield and the Town of Princess Anne.

Map 9-2: Past Wind Events



MUNICIPAL PERSPECTIVE

As is the case with most weather events, all areas of the County share similar concerns. However, the municipality of Crisfield has been affected by two recorded tornados and a wind gust event of 79 knots (90 mph). Smith Island and Deal Island also have a slightly higher chance, comparatively, of being impacted by high winds due to the limited amount of neighboring land masses and surrounding vegetation. Due to their protruding positions in the Chesapeake Bay, Crisfield, Deal Island, Frenchtown, Rumbley, and Smith Island would take the initial impact of storm systems traveling up the east coast, such is the case with many hurricanes and tropical storms.

ESSENTIAL FACILITIES

Essential facilities constructed prior to the current building codes are at-risk to tornado or high wind events. Essential facilities are those facilities that must continue to operate for a community to effectively respond to, and recover from, a hazard incident. Essential facilities include: Emergency Operation Center(s), Fire and Rescue Stations, Police, Schools, and Medical facilities. As shown on the table below, five (5) essential facilities located within the unincorporated areas of the County were constructed in 1967 or prior. Four (4) essential facilities located in Crisfield are at-risk to high wind impacts, while seven (7) essential facilities are within the Town of Princess Anne. Improvement value of all essential facilities that could be impacted by high wind events is \$80,543,800. It is important to keep in mind, high wind events in this chapter do not include high wind from hurricane or thunderstorm events.

Table 9-4: Essential Facilities Constructed 1967 & Prior

Essential Facilities Constructed 1967 & Prior				
Location	Facility Type	Facility Name	Year Built	Improvement Value
County	Fire	Marion Fire Dept.	1948	\$290,600
County	Medical	Behavioral Health MDH	1950	\$1,718,000
County	Fire	Deal Island/Chance Fire Dept.	1954	\$124,000
County	School	Marion Sarah Peyton Alt. School	1957	\$944,100
County	Fire	Ewell Fire Dept.	1957	\$349,500
Crisfield	Police	Crisfield Police	1900	\$152,600
Crisfield	Medical	Crisfield Pharmacy	1928	\$42,600
Crisfield	School	Crisfield H.S.	1960	\$4,007,900
Crisfield	Fire	Crisfield Fire Dept.	1961	\$264,100
Princess Anne	Police	Princess Anne Police	1857	\$227,300
Princess Anne	School	U. of MD Eastern Shore	1886	\$68,000,000
Princess Anne	Fire	Mt. Vernon Fire Dept.	1920	\$202,000
Princess Anne	EOC	EOC	1950	\$863,800
Princess Anne	School	Princess Anne E.S.	1958	\$1,981,600
Princess Anne	School	Greenwood E.S.	1961	\$1,114,700
Princess Anne	Medical	McCready Health	1963	\$261,000
Total Value:				\$80,543,800
<i>Source: Somerset County 2017 Critical & Public Facilities Database and Improvement Values from 2013 Maryland Property View</i>				

MITIGATION EFFORTS

While mitigating tornado and high wind damage is difficult, Somerset County does have a state mandated Building Code which includes wind loading requirements and tie-down requirements for mobile homes.

Essential Facilities that were built prior to 1967 may be more susceptible to wind damage. These facilities should be evaluated for wind load and vulnerability, and retrofitted accordingly to mitigate wind damage. The fifteen (15) essential facilities identified in Table 9-4 should be assessed and retrofitted to meet the design wind speeds of 120 mph within the Somerset County Building Code.

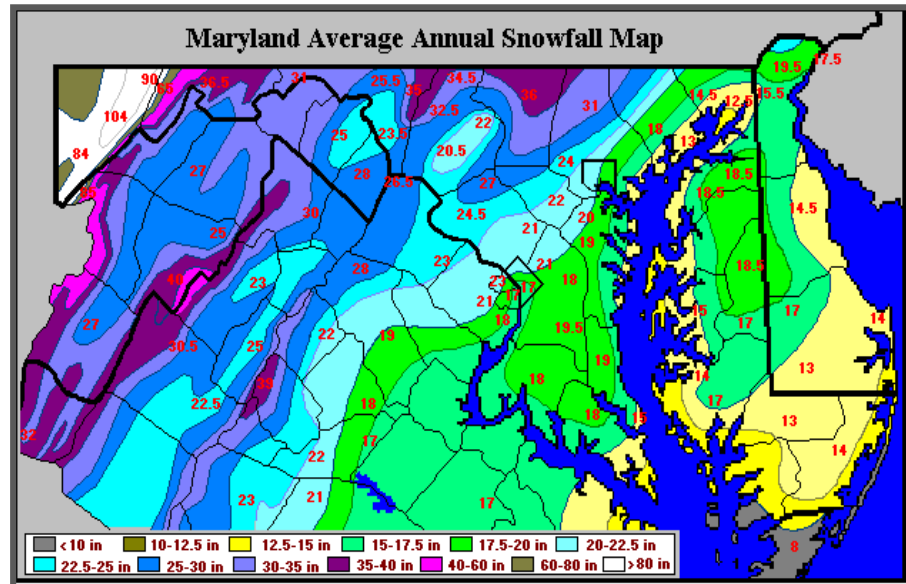
Additionally, high wind speeds impact infrastructure, specifically communications and utilities. Mass power outages due to tornado or high wind events also affect facilities and utilities. In addition, downed trees and power lines on roadways negatively impact the communities' ability to quickly return to normal operations following a high wind event. Therefore, maintenance such as tree trimming should be prioritized in order to avoid disruption to essential facilities and other utilities.

CHAPTER 10: WINTER STORM

PROFILE

The typical winter storm in Maryland usually brings heavy snowfall (6+ inches), sleet or freezing rain accompanied by cold temperatures and occasionally high winds. A storm usually starts as a mid-latitude depression in the central U.S. and moves north and east between the Appalachians and the east coast. Depending on the speed at which these storms travel and the air mass temperature, heavy amounts of snow, sleet, freezing rain or some combination will be the result. Typically, a winter storm will last for 24 – 48 hours and move out of the area into New England. Then, depending on the controlling air mass, temperatures will continue to be cold and the snow or ice will linger for days or sometimes weeks, or conversely, the temperature will warm quickly and the snow or ice will melt in a short time. According to Maryland Average Snowfall, Figure 10-1, portions of western Maryland average 104 inches of snowfall annually, while the central portions of Maryland average 22 inches annually. The eastern shore however, receives on average 15 inches of snowfall annually.

Figure 10-1: Maryland Average Snowfall



Source: National Weather Service

Note: This is the most recent version of this map. All yellow shown on this map indicates an average snowfall range of 12.5-15in.

HISTORY

While each winter season brings with it the possibility of major snow and ice storms, some winter storms do stand out for their severity and duration. Storms that stand out include the winter storm of 1979 that dropped more than two feet of snow on the eastern shore in Ocean City, an ice storm in February 1994 that resulted in widespread power outages, the Presidents Day storm in 2003 that resulted in more than 8 inches of snow in Princess Anne and more recently, the February 2010 snow storm that produced between 10 and 20 inches of snow across the County. In terms of cold weather, 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 of time.

NOAA defines winter storms as 'conditions that are favorable for hazardous winter weather conditions including heavy snow, blizzard conditions or significant accumulations of freezing rain or sleet.' A total of 60 events between 1993 and 2017 have been recorded in the NCEI

Table 10-1: Winter Storm Events

database, therefore, Somerset County experiences 2.4 winter storm events per year.

Date	Event	Event Narrative
February 12, 1993	Winter Weather	A weak cold front moved east through the area and brought a mixture of winter weather to the region. Most places received rain, freezing rain, sleet, and snow. Numerous traffic accidents occurred across the state. Many school systems were closed or delayed Friday morning.
January 6 to 8, 1996	Winter Storm	A major winter storm (popularly known as the "Blizzard of '96") affected much of the mid-Atlantic region during the weekend of January 6-8, 1996. The storm dumped up to 2 feet of snow on Dorchester county...with somewhat lower amounts in Wicomico and Somerset counties.
February 2 to 4, 1996	Winter Storm	A winter storm tracked northeast from the gulf coast states to off the Virginia coast. It spread heavy snow across the lower Maryland eastern shore from early Friday morning into Sunday afternoon. Snow amounts generally ranged from 12 to 24.
February 16 to 17, 1996	Winter Storm	A storm spread heavy snow across the lower Maryland eastern shore.
March 1 to 2, 1996	Winter Storm	A low pressure area tracked northeast from the gulf of Mexico to off the north Carolina coast. It spread light snow across the lower Maryland eastern shore from Friday evening through Saturday morning.
March 7 to 8, 1996	Winter Storm	A low pressure area developed over the Carolinas then tracked northeast off the North Carolina and Virginia coast. It spread light snow across the lower Maryland eastern shore from Thursday night through Friday morning.
February 8 to 9, 1997	Winter Storm	Low pressure tracked from the Gulf Coast States to off the North Carolina coast during Friday, February 7th and Saturday, February 8th. It spread 1.5 to 2 inches of snow across Somerset, Wicomico, and Worcester counties.
December 23 to 25, 1998	Ice Storm	Heavy ice accumulations on trees and power lines caused numerous power outages across the region. Many accidents occurred due to slippery road conditions, especially bridges and overpasses. Many secondary roads were impassable due to fallen tree limbs and in a few cases, whole trees.
March 9 to 10, 1999	Winter Storm	The combination of a weakening storm over the Ohio Valley, and a developing storm off the South Carolina coast produced 2 to 6 inches of snow across portions of the Lower Maryland Eastern Shore Tuesday afternoon into early morning Wednesday. Princess Anne in Somerset county received 4 inches of snow.
January 20, 2000	Winter Storm	Four to six inches of snow fell across the area as an area of low pressure passed to the south of the region. The heaviest totals were recorded in Somerset and northern Wicomico counties. Snow briefly fell heavily during the early morning hours, creating hazardous driving conditions on area highways.
January 25, 2000	Winter Storm	A significant winter storm affected southern Maryland with six to nine inches of snow and freezing rain. Precipitation fell as a mixture of snow, sleet, and freezing rain during the morning hours, and then changed to all snow by late afternoon. Somerset county picked up 6 inches.

Date	Event	Event Narrative
February 12, 2000	Winter Storm	A low pressure system moving east from the Ohio valley spread mainly light snow, sleet, and freezing rain across the lower Maryland eastern shore. Total accumulations ranged from 1 to 2 inches.
February 22, 2001	Winter Storm	A winter storm produced 3 to 6 inches of snow across the Lower Maryland Eastern Shore. Some specific snow totals included: North of Princess Anne in Somerset county 5". Schools were dismissed early on the day of the storm, and most, if not all schools in the area were closed the following day due to slippery road conditions.
January 3, 2002	Winter Weather	A winter storm produced 3 to 6 inches of snow across the Lower Maryland Eastern Shore. Some specific higher snow totals included: Crisfield in Somerset county 6.0". Many schools in the area were closed Thursday, January 3rd and Friday, January 4th due to very slippery road conditions.
December 4 to 5, 2002	Winter Storm	A winter storm produced 2 to 5 inches of snow along with less than 1/4 inch of ice across portions of the Lower Maryland Eastern Shore. Some specific snow totals included: Princess Anne in Somerset county 3". Most, if not all schools in the area, were closed Thursday, December 5th and Friday, December 6th due to very slippery road conditions.
January 15, 2003	Winter Weather/Mix	A weak winter storm produced around one half (0.5) inch of snow across portions of the Lower Maryland Eastern Shore. A specific snow total in Princess Anne in Somerset county was 0.5".
January 16 to 17, 2003	Winter Storm	A winter storm produced 3 to 5 inches of snow across the Lower Maryland Eastern Shore. Some specific higher snow totals included: Princess Anne in Somerset county 5". Most, if not all schools in the area, were closed Friday, January 17th due to very slippery road conditions.
February 15 to 17, 2003	Winter Storm	A winter storm produced 4 to as much as 15 inches of snow, along with some ice, across the Lower Maryland Eastern Shore. Most, if not all schools in the area, were closed Monday, February 17th due to very slippery road conditions.
February 26 to 28, 2003	Winter Storm	A winter storm produced 1 to as much as 7 inches of snow, along with some sleet and freezing rain, across the Lower Maryland Eastern Shore. Most, if not all schools in the area, were closed Thursday, February 27th due to very slippery road conditions.
January 25 to 26, 2004	Winter Storm	Two to four inches of snow and sleet fell across portions of the Lower Maryland Eastern Shore. Some higher amounts included: Princess Anne in Somerset county 4.3". The snow and sleet produced very slippery roadways, which resulted in numerous accidents and school closings for a few days.
February 17 to 18, 2004	Winter Weather/Mix	One half inch to two inches of snow fell across portions of the Lower Maryland Eastern Shore. The snow produced slippery roadways, which resulted in a few accidents.
December 19 to 20, 2004	Winter Weather/Mix	One half inch, to as much as two inches of snow fell across the Lower Maryland Eastern Shore. The snow produced slippery roadways, which resulted in several accidents. Amounts reported included Princess Anne in Somerset county 1.5".
December 26, 2004	Winter Storm	A winter storm produced one to four inches of snow across portions of the Lower Maryland Eastern Shore. The highest amounts were reported at Shelltown in Somerset county 4.5", Crisfield in Somerset county 4", Princess Anne in Somerset county 3".

Date	Event	Event Narrative
January 19, 2005	Winter Weather/Mix	One half inch to one and one half inches of snow fell across the Lower Maryland Eastern Shore.
January 22, 2005	Winter Weather/Mix	A mixture of snow, sleet and freezing rain produced one half inch to two inches of snow, and around 1/8 of an inch of ice across portions of the Lower Maryland Eastern Shore. The highest snow amounts were reported in Deal Island in Somerset county 1.8", and Princess Anne in Somerset county 1".
January 30, 2005	Winter Weather/Mix	A mixture of snow, sleet and freezing rain produced one half inch to two inches of snow, and around 1/8 of an inch of ice across the Lower Maryland Eastern Shore.
February 24, 2005	Winter Weather/Mix	One to three inches of snow fell across the Lower Maryland Eastern Shore. The highest snow amounts were reported in Deal Island in Somerset county 2.3".
March 8, 2005	Winter Weather/Mix	One half inch to one inch of snow fell across portions of the Lower Maryland Eastern Shore. The snow produced a few slick roadways.
December 5 to 6, 2005	Winter Storm	A winter storm produced three to as much as six inches of snow and sleet across portions of the Lower Maryland Eastern Shore. The snow caused hazardous driving conditions, which resulted in numerous accidents. Somerset county reported 3-5".
February 12, 2006	Winter Weather	A winter storm produced one to three inches of snow across portions of the Lower Maryland Eastern Shore. Princess Anne in Somerset county reported 1", and Westover in Somerset county 1".
January 21, 2007	Winter Weather	A weak upper air disturbance produced one half inch to one inch of snow across portions of the Lower Maryland Eastern Shore on Sunday, January 21st.
March 7, 2007	Winter Weather	One to three inches of snow were produced across portions of the Lower Maryland Eastern Shore.
January 27, 2009	Winter Weather	Snowfall amounts between one half inch and one inch occurred across portions of the county.
March 1 to 2, 2009	Winter Weather	Snowfall amounts were generally between one half inch and three inches across the county.
January 30 to 31, 2010	Winter Storm	Snowfall amounts were generally between six and eleven inches across the county. Crisfield reported 11.0 inches of snow. Princess Anne reported 9.5 inches of snow.
February 5 to 6, 2010	Winter Storm	Snowfall amounts were generally between ten and twenty inches across the county.
December 16, 2010	Winter Weather	Snowfall amounts were generally between one inch and three inches across the county.
December 25 to 27, 2010	Winter Storm	Snowfall amounts were generally between four and seven inches across the county.
March 27, 2011	Winter Weather	Snowfall amounts were generally between one and two inches across the county.
2017 Hazard Mitigation Plan Update		
February 11 to February 12, 2012	Winter Weather	Snowfall amounts were generally between one and two inches across the county. Princess Anne reported 2.0 inches of snow. Crisfield reported 1.0 inch of snow.
February 19 to February 20, 2012	Winter Weather	Snowfall amounts were generally between one and two inches across the county.
January 17 to January 18, 2013	Winter Weather	Snowfall amounts were generally between one and two inches across the county. Venton reported 1.5 inches of snow.

Date	Event	Event Narrative
January 24, 2013	Winter Weather	Snowfall amounts were generally between one and three inches across the county. There was, however, a narrow band straddling the Virginia/Maryland line, where up to 4 inches of snow fell. Princess Anne reported 2.5 inches of snow.
January 25, 2013	Winter Weather	Snowfall amounts were generally between one and two inches across the county. Princess Anne reported 1.8 inches of snow.
January 2 to January 3, 2014	Winter Weather	Snowfall amounts were generally between two inches and three and a half inches across the county. Oriole reported 3.5 inches of snow and Princess Anne reported 1.9 inches and 3.5 inches of snow.
January 21 to January 22, 2014	Winter Weather	Snowfall amounts were generally between one inch and three inches across the county. Princess Anne reported 3.0 inches of snowfall. Crisfield reported 1.0 inches of snowfall.
January 28 to January 29, 2014	Winter Storm	Snowfall reports of 4.5 inches and 4.3 inches of snow were reported 4 miles west southwest and 2 miles south southwest of Princess Anne.
March 3, 2014	Winter Storm	Snowfall amounts were generally between three inches and five inches across the county. Westover reported 3.0 inches of snowfall.
March 16 to March 17, 2014	Winter Weather	Snowfall of 3.4 inches occurred 4 miles west-southwest of Princess Anne and snowfall of 3.2 inches occurred in 2 miles south-southwest of Princess Anne.
March 25, 2014	Winter Weather	A snowfall report of 3.5 inches occurred 2 miles south of Princess Anne.
February 16 to February 17, 2015	Winter Storm	Snowfall amounts were generally between four inches and seven inches across the county. Crisfield reported 6.0 inches of snow.
February 26, 2015	Winter Storm	Snowfall amounts were generally between three inches and eight inches across the county. Westover reported 8.0 inches of snow. Princess Anne and Marion reported 6.5 inches of snow. Crisfield reported 6.0 inches of snow.
March 1, 2015	Winter Weather	Ice accumulations ranged from a trace to .10 inch.
March 5, 2015	Winter Weather	Snowfall amounts were generally between one inch and four inches across the county. Princess Anne (4 WSW) reported 3.7 inches of snow. Princess Anne reported 1.8 inches of snow.
January 22 to January 23, 2016	Winter Storm	Snowfall totals were generally between 3 inches and 8 inches across the county.
February 15, 2016	Winter Storm	Snowfall totals were generally between 3 inches and 5 inches across the county. Princess Anne reported 5.1 inches of snow.
March 3 to March 4, 2016	Winter Storm	Snowfall totals were generally between 4 inches and 7 inches across the county. Princess Anne reported 6.7 inches of snow.
April 5 to April 6, 2016	Frost/Freeze	Freezing temperatures between 25 and 28 degrees occurred. The average duration was around 10 hours. Widespread damage to fruit trees and bushes was noted across the county. Winter wheat, barley, and hay grasses were also damaged.
April 10, 2016	Frost/Freeze	Freezing temperatures between 28 and 30 degrees occurred. The average duration was around 4 hours. Widespread damage to fruit trees and bushes was noted across the county. Winter wheat, barley, and hay grasses were also damaged.

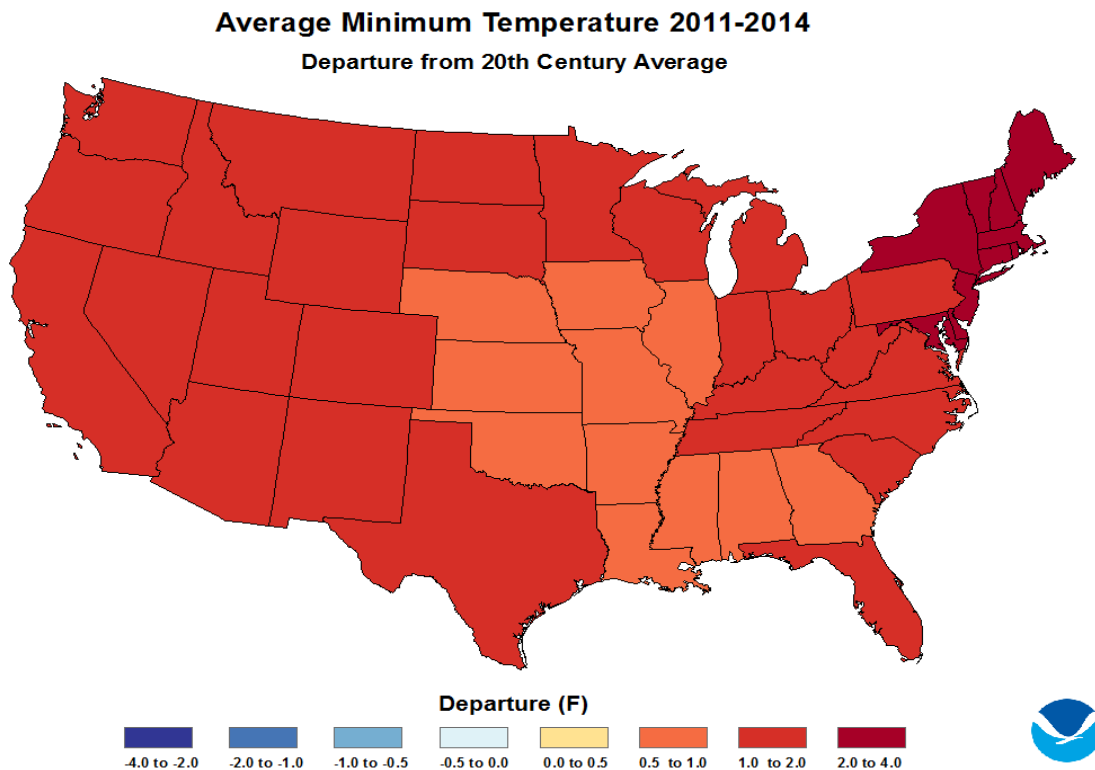
Date	Event	Event Narrative
January 1, 2017	Heavy Snow	Snowfall totals were generally between 8 inches and 11 inches across the county. Strong north winds affected the area, producing some blowing snow and reduced visibilities. Princess Anne reported 10.5 inches of snow.

SOURCE: NWS, NCEI (NOAA)

COUNTY PERSPECTIVE

Due to the normally warmer temperatures and low snowfall amounts, the 2016 *Maryland Hazard Mitigation Plan Update* ranked winter storms as 'Medium' for Somerset County. The HMPC agreed and assessed winter storms as a 'Medium' risk. The National Center for Environmental Information (NCEI) data has shown the average minimum temperature for the State of Maryland has been increasing since 1980. As depicted in Figure 10-2, the average minimum temperature between 2011-2014 for Maryland has increased 2.0-4.0 degrees Fahrenheit from the 20th century average.

**Figure 10-2: Average Minimum Temperature 2011-2014
Departure from 20th Century Average**



According to the NCEI data a significant winter storm occurs twice a year and depending on the amount of precipitation, the County could be at a higher risk. Significant snow storms can be hazardous to the County considering essential services, such as emergency services, and critical facilities could be disrupted. Additionally, inadequate snow removal equipment could exacerbate the effects of snow events in the County, particularly severe winter storm events.

Furthermore, residential structures built prior to 1950, are highly vulnerability to the effects of winter storms. This is due to the lack of building codes in effect at the time they were built, the type of construction utilized and the potential state of disrepair/lack of maintenance of these structures. Even though the average snowfall is between 10-15 inches, depending on the stability of these structures, the slightest snow-load could cause considerable damage to the structure.

Finally, as discussed in *Chapter 2: County Profile*, the non-English speaking segment of the population has increased in the past twenty years. The English language barrier adds an isolation factor when power outages occur during severe storms. This causes a challenge for proper information dissemination to all segments of the County's population. Therefore, public awareness should accommodate both English and non-English speaking communities. Public outreach campaigns to target non-English speaking communities should be conducted periodically.

MUNICIPAL PERSPECTIVE

Winter storms in Somerset County are normally widespread and affect the municipalities in much the same way as they do the County in general. There are occasions when ice or snow may be heavier in one part of the County, but for the most part the towns are similar to the County in terms of winter storm effects.

Figure 10-3: 30 January 2010 Snow Storm



The largest snow storm recorded for the municipalities occurred on 30 January 2010. The City of Crisfield reported 11 inches of snow, while the Town of Princess Anne received 9.5 inches. Heavy snowfall such as this can be detrimental to these areas by immobilizing emergency vehicles or closing evacuation routes. Even areas that normally experience mild winters can be hit with a major snowstorm or extreme cold, which can result in closed highways, flooding, storm surge, downed power lines and hypothermia.

ESSENTIAL FACILITIES

Vulnerability to the effects of winter storms on buildings depends on the age of the building (and the building code in effect or lack of building code at the time of construction), type of construction, and condition of the structure (how well it has been maintained). Facilities with flat roofs may be considered vulnerable, as well. Low slope roofs retain snow more so than pitched roofs. However, roof pitches as low as 10 degrees have been observed to shed snow.

Therefore, essential facilities constructed prior to the current building codes that also have flat roofs are at-risk to winter storm events. Essential facilities are those facilities that must continue to operate for a community to effectively respond to, and recover from, a hazard incident.

Essential facilities include: Emergency Operation Center(s), Fire and Rescue Stations, Police, Schools, and Medical facilities. As shown on the table below, six (6) essential facilities located within the unincorporated areas of the County were constructed in 1967 or prior may be at a higher risk. Three (3) essential facilities located in Crisfield are at-risk to winter storm impacts, while five (5) essential facilities are within the Town of Princess Anne. Improvement value of all essential facilities that could be impacted by a winter storm event is \$81,091,300.

Table 10-2: Essential Facilities Constructed Prior to 1967 by Roof Design

Essential Facilities Constructed Prior to 1967 by Roof Design				
Location	Facility Type	Facility Name	Flat Roof	Improvement Value
County	Fire	Marion Fire Dept.	Yes	\$290,600
County	School	Marion Sarah Peyton Alt. School	Yes	\$944,100
County	Medical	Behavioral Health DHMH	No	\$1,718,000
County	Fire	Deal Island/Chance Fire Dept.	No	\$124,000
County	Fire	Ewell Fire Dept.	No	\$349,500
Crisfield	School	Crisfield H.S.	Yes	\$4,007,900
Crisfield	Fire	Crisfield Fire Dept.	Yes	\$264,100
Crisfield	Medical	Crisfield Pharmacy	Yes	\$42,600
Crisfield	Police	Crisfield Police	No	\$152,600
Princess Anne	EOC	EOC	Yes	\$863,800
Princess Anne	School	Princess Anne E.S.	Yes	\$1,981,600
Princess Anne	School	Greenwood E.S.	Yes	\$1,114,700
Princess Anne	Medical	McCready Health	Yes	\$261,000
Princess Anne	Police	Princess Anne Police	No	\$227,300
Princess Anne	Fire	Mt. Vernon Fire Dept.	No	\$202,000
Princess Anne	School	U. of MD Eastern Shore	*Yes	\$68,000,000
Total Value:				\$80,543,800
<i>*The campus is a mixture of structures with flat and sloped roofs.</i>				

SOURCE: SOMERSET COUNTY 2017 CRITICAL & PUBLIC FACILITIES DATABASE AND IMPROVEMENT VALUES FROM 2013 MARYLAND PROPERTY VIEW.

MITIGATION EFFORTS

The State Highway Administration and the County DPW – Roads Division, as well as the City of Crisfield and the Town of Princess Anne, have dealt with the occasional winter storm for many

years and are trained and equipped to do so. The County's Department of Emergency Services and the local police, fire and rescue departments are also trained to deal with winter storms and the types of situations that result from these storms.

According to FEMA, most buildings are not at risk of snow-induced failure. Often, attempting to remove snow from a roof is more hazardous than beneficial, posing a risk to both personnel and the roofing structure. However, snow accumulation more than building design conditions may result in more than a temporary loss of electrical power and road closures. Buildings may be vulnerable to structural failure and possible collapse if basic preventative steps are not taken in advance of a snow event. The County's Building Code contains snow-loading and wind-load requirements for new structures.

Essential facilities listed in Table 10-2 above should access and ensure proper maintenance is enforced to mitigate winter storm related issues. Disruption may be avoided through mitigation strategies and action implementation.

CHAPTER 11: WILDFIRE

PROFILE

A wildfire is defined as any large fire that spreads rapidly and is difficult to extinguish. In the United States, more than 2,000,000 acres burn each year because of wildfire. Since 1960, more than 6,000,000 acres have been consumed during eight fire seasons, with more than 8,000,000 acres in 2000, and nearly 7,000,000 acres in 2002. Estimated fire suppression costs for federal agencies topped \$1 billion in 2000 and \$1.6 billion in 2002. Most of the acreage involved and the accompanying suppression efforts are in the western states on land managed by the U.S. Forest Service, the Bureau of Land Management, the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service and the National Park Service. Unfortunately, in recent years, more private property has been affected by wildfires as urban development encroaches on forest and range land.

Wildfires in the state are more limited in extent, with more than 95% burning one acre or less. However, in 1947 more than 5,000 acres burned in Anne Arundel and Baltimore counties and in 2002 one fire burned over 2,000 acres in Somerset County. Occasionally brush fires threaten urban development where homes are built near forest or brush covered land. As more former agriculture land reverts to brush, this problem will become more prevalent.

Wildfires are fueled by natural cover, including trees, brush, grasses, and crops. Available fuel, topography, and weather provide the conditions that encourage wildfires to spread. Wildfires pose serious threats to human safety and property in rural and suburban areas. They can destroy crops, timber resources, recreation areas, and habitat for wildlife. Wildfires are a growing problem in the wildland/urban interface of the eastern United States, including Maryland.

Climatic and meteorological conditions that influence wildfires include solar insolation, atmospheric humidity, and precipitation, all of which determine the moisture content of wood and leaf litter. Dry spells, heat, low humidity, and wind increase the susceptibility of vegetation to fire. Natural and human agents can be responsible for igniting wildfires. Natural agents include lightning, sparks generated by rocks rolling down a slope, friction produced by branches rubbing together in the wind, and spontaneous combustion. Most wildfires in Maryland are caused by humans, such as arson and accidents from equipment operations.

HISTORY

Data for this hazard includes the number of wildfires and acres burned in Somerset County as reported by the Maryland DNR Forest Service and is detailed in Table 11-1.

Table 11-1: Wildfire Events

Year	Number of Wildfires	Acres Burned
1988	38	281.3
1989	7	204.0
1990	36	191.7
1991	48	397.1
1992	36	442.3
1993	55	308.0
1994	84	123.1

Year	Number of Wildfires	Acres Burned
1995	93	461.6
1996	18	21.0
1997	28	103.6
1998	33	65.8
1999	15	91.9
2000	10	15.6
2001	20	127.6
2002	41	2,038.2
2003	1	1.0
2004	9	52.6
2005	13	38.1
2006	14	80.0
2007	24	110.0
2008	16	62.9
2009	12	49.8
2010	10	132.1
2011	8	93.9
2012	9	159.9
2013	5	3.7
2014	1	1.0
2015	16	290.1
2016	2	3.1
Total	702	5,951.0
Average	24.2	205.2

Source: Maryland DNR Forest Service

In terms of number of occurrences, the Maryland Forest Service listed a total of 702 wildfire events affecting Somerset County from 1988-2016. Therefore, Somerset County experiences 24.2 wildfire events per year. In 2002, the County experienced a very large fire that consumed more than 2,000 acres in a wetland area. As shown in the table above, the number of fires and the acres burned per year has decreased slightly over the years in Somerset County. There are several explanations for the decrease in wildfires, including wildfire awareness in the county, loss of forestland due to development and agriculture, and an increase in response time by fire departments. According to the *2016 Maryland State Hazard Mitigation Plan Update*, Somerset County has suffered a total of \$116,544 in damages from wildfires between 1998 and 2016.

In addition, Fire Department Data for this hazard includes the number of total incidents and acres burned in Somerset County as reported and responded by Fire Departments detailed in Table 11-2.

Table 11-2: Fire Department Responses

Year	Total Incidents	Acres Burned
2000	54	-
2001	121	1
2002	136	75
2003	14	4
2004	26	67
2005	20	2
2006	16	0
2007	101	101
2008	45	27

Year	Total Incidents	Acres Burned
2009	69	19
2010	82	62
2011	91	142
2012	75	20
2013	36	7
2014	50	2
2015	69	27
Total	1,005	556
Average	62.81	32.7

Source: Maryland DNR Forest Service

COUNTY PERSPECTIVE

As shown in the 2016 Maryland State Hazard Mitigation Plan Update, Somerset County has a “Medium” ranking for wildfire. The Somerset County Hazard Mitigation Planning Committee agrees with this ranking. Wildfires have forced school closings, disrupted telephone services by burning fiber optic cables, damaged railroads and other infrastructure, and adversely affected tourism, outdoor recreation, and hunting.

Table 11-3 illustrates the findings from the 2010 Maryland Land Use/Land Cover Survey. All agriculture, development, barren lands, and forested areas were grouped together to show the relationship between forested areas and development.

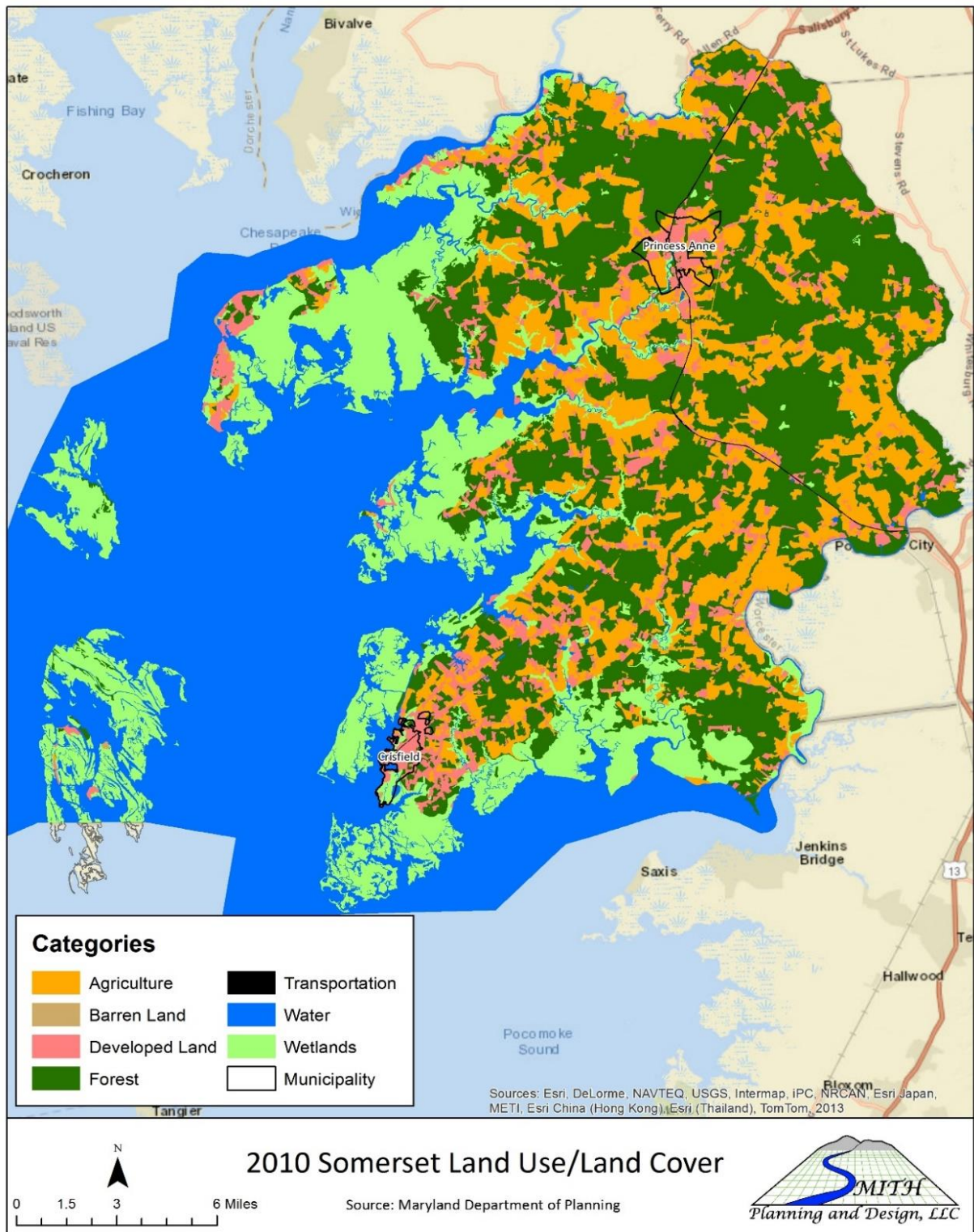
Table 11-3: Land Use in Acres

Land Use/Land Cover	Area in Acres	Percent of County (Land Area)
Very Low Density Residential	6,413	3
Low Density Residential	7,650	4
Medium Density Residential	1,465	<1
High Density Residential	337	<1
Commercial	654	<1
Industrial	484	<1
Other Developed Lands/ Institutional/Transportation	1,771	<1
Total Developed Lands	18,773	9
Agriculture	49,693	24
Forest	82,822	40
Extractive/Barren Lands	128	<1
Wetland	55,572	27
Total Resource Lands	188,215	91
Total Land Area	206,988	100

Source: 2010 Maryland Land Use/Land Cover Survey

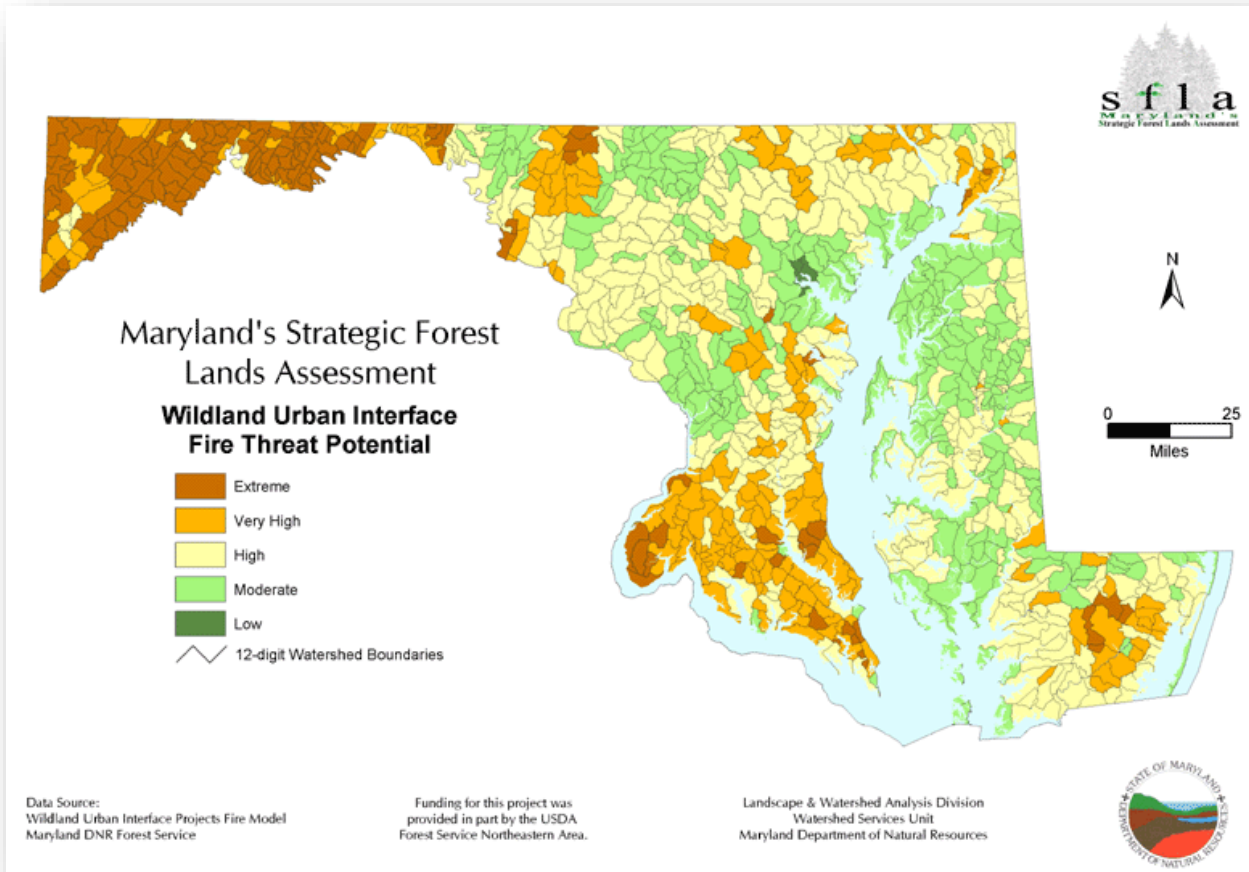
Map 11-1 was produced using data from the 2010 Maryland Land Use/Land Cover Survey by the Maryland Department of Planning. All communities and municipalities in Somerset County are near or adjacent to forest land, wetlands or agricultural land. As urban development extends into these forest or brush covered lands the possibility of wild fire in urban areas increases as it does throughout the county. Therefore, most areas having a high risk of wildfire in the County are on the bordering/outlying area of developments where the wildland/urban interface exists.

Map 11-1: Land Use/Land Cover



Maryland's strategic forest lands assessment is conducted by the Maryland Department of Natural Resources with financial assistance from the United States Department of Agriculture Forest Service and is composed of many types of vulnerability studies applying to the forests of Maryland. Figure 11-1, depicted below, shows one of the studies conducted on wildland/urban interface fire threat potential. Somerset County is shown to be in the moderate to very high Wildland Urban Interface Fire Threat Potential.

Figure 11-1: Wildland Urban Interface Fire Threat

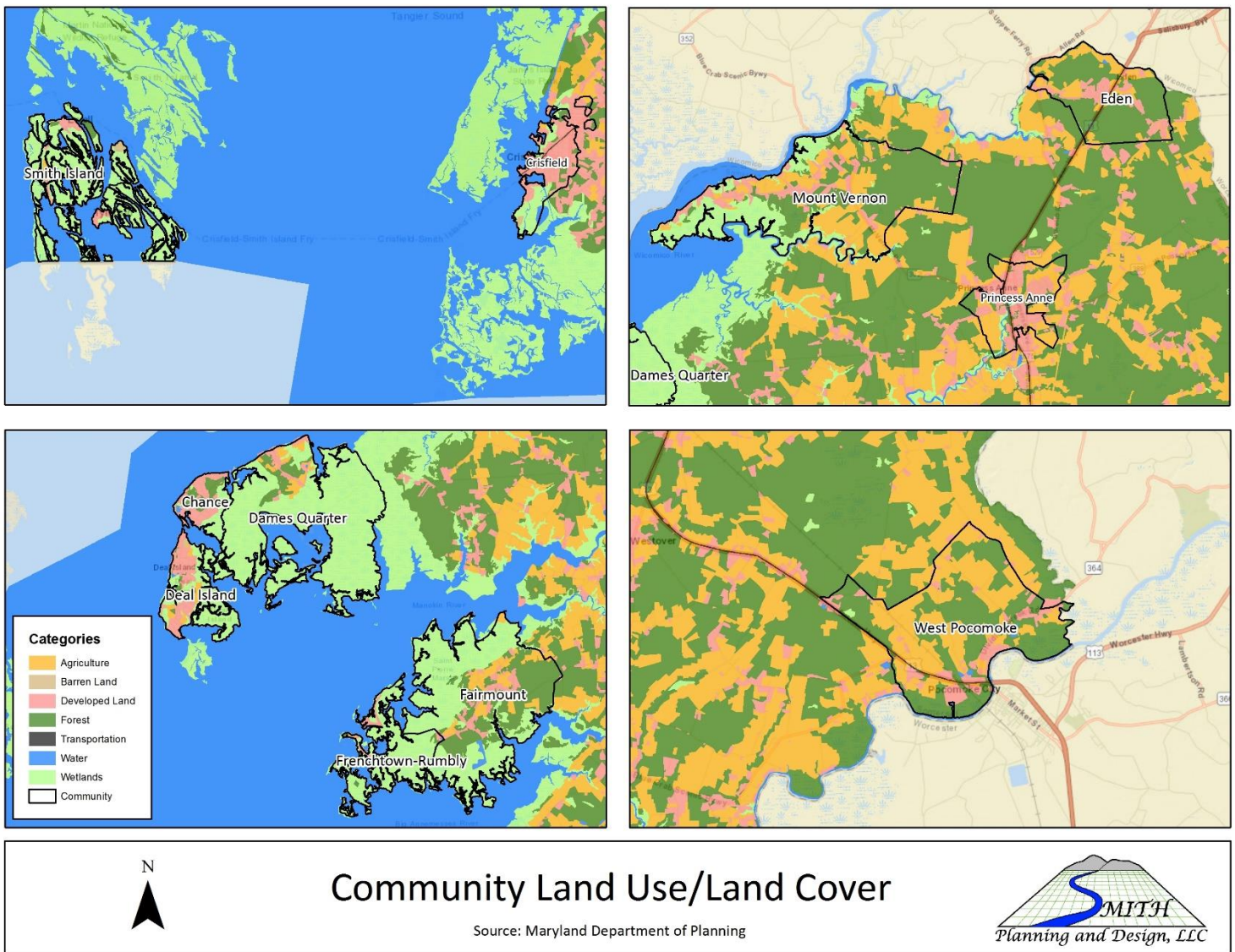


Source: Maryland DNR Forest Service

MUNICIPAL PERSPECTIVE

As shown throughout the mapping in this chapter, especially Map 11-2 on the following page, there are areas in Somerset County that are at higher wildfire risk. These areas include the municipality of Princess Anne and the communities of Eden and West Pocomoke. These areas are at higher risk due to the large tracts of forestland surrounding and encompassing them. The areas in the western part of the County such as Deal Island, Smith Island, Dames Quarter, Mount Vernon, Fairmount, Frenchtown-Rumbly, and the municipality of Crisfield are at a lower wildfire risk due to the large amounts of wetlands located in this area of the county.

Map 11-2: Community Land Use/Land Cover



Areas indicating developed land interfacing with forested land is most prominent in Edén and West Pocomoke as shown on Map 11-2. There are no Essential Facilities located near either of these areas.

MITIGATION EFFORTS

As noted previously, the Maryland Department of Natural Resources is the lead agency in forest fire suppression in the State. Through the years, this agency has developed working relationships with Somerset County agencies including Emergency Services to coordinate resources in order to suppress and control wildfires. Local volunteer fire companies, police and the Sheriff's office assist with fire suppression and traffic control in fire situations.

CHAPTER 12: HAZMAT

PROFILE

A hazardous material may be defined as a substance or material, which, due to its chemical, physical or biological nature, poses a threat to life, health, or property if released from a confined setting. A release may occur by spilling, leaking, emitting toxic vapors, or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. Several common HazMats include materials that are explosive, flammable or combustible, poisonous or radioactive. Related combustible HazMats include oxidizers and reactive materials, while toxins produced by etiological (biological) agents are types of poison that can cause disease.

The release of HazMats while in transit is of great concern to the U.S. Department of Transportation. While most hazardous materials are stored and used at fixed sites, these materials are usually produced elsewhere and shipped to the fixed facility by rail car, truck, or onboard ships or barges. While these vehicles are identified by signs denoting the hazard, the possibility of release is present at any time. Hazardous materials are constantly being moved in Maryland on interstate highways and the rail system.

HISTORY

As part of the update process, information was obtained from the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration's, Office of Hazardous Materials Safety. According to the information obtained, there were two HazMat Transportation Incidents affecting Somerset County from September 1993 to August 9, 2017. Utilizing this data, based upon the reported data, an average of 0.08 incidents per year occur in Somerset County.

Table 12-1: Transportation HazMat Incidents

Date	Location	Mode of Transportation	Carrier	Amount of Damages	Commodity	Quantity Released
9/9/1993	Princess Anne	Highway	Robinson Chemical Co. Inc.	\$60	Hypochlorite solutions with 16 percent or more available chlorine	7 LGA
1/10/2012	Princess Anne	Highway	DM&O CORP	\$182,100	Kerosene	700 LGA
No New Events Reported						

Source: U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration's, Office of Hazardous Materials Safety, 2017

As listed in the table above, the most recent major HazMat Transportation incident happened on January 10, 2012. Hazardous materials transported by the DM & O CORP were dispersed causing \$182,100 in damage.

COUNTY PERSPECTIVE

HazMats transported through Somerset County travel on Route 13 and the Delmarva Central rail line. Due to the potential impact from a HazMat incident, the 2017 HMPC has ranked this hazard as a 'Medium' risk.

Regarding hazardous materials fixed site facilities, Somerset County Emergency Services maintains records for each site and the materials stored. These sites include several industrial and commercial establishments in Princess Anne and Crisfield within the County and adjacent jurisdictions, as appropriate, and several sites in the eastern part of the county.

Table 12-2: Somerset County Hazardous Materials Sites

Facility	Street Address	Material	Fire District
Calpine Mid-Atlantic, LLC aka Crisfield Energy	4079 Crisfield Highway Crisfield, MD 21817	Diesel Fuel, Ethylene Glycol, Lead Acid Batteries Shell Caprinus Lube Oil	Crisfield
CATO, Inc. aka Eden Quick Stop	31680 Eden Allen Road Eden, MD 21822	Gasoline, Diesel Fuel, Kerosene	Princess Anne
CATO, Inc. aka Goose Creek	9010 Ocean Highway Westover, MD 21871	Gasoline	Princess Anne
CATO, Inc. aka Goose Creek	30293 Mt. Vernon Road Princess Anne, MD 21853	Gasoline, Diesel Fuel, Kerosene	Princess Anne
Chesapeake Utilities Corp aka Sharp Energy	U.S. 13 and Linden Avenue Princess Anne, MD 21853	Propane	Princess Anne
Chesapeake Utilities Corp. Aka Sharp Energy	30353 Linden Ave Princess Anne, MD 21853	Methane, Propane	Princess Anne
Chesapeake Utilities Corp. Aka Sharp Energy	10480 Somerset Avenue Princess Anne, MD 21853	Propane	Princess Anne
Chesapeake Utilities Corp. Aka Sharp Energy	33239 Costen Road Pocomoke City, MD 21851	Propane	Pocomoke City
City of Crisfield	104 7 th Street Crisfield, MD. 21817	Chlorine, sulfur	Crisfield
Cobb-Vatress Inc. Research Farm 15	11587 Pine Pole Road Princess Anne, MD 21853	Propane	Princess Anne
Cobb-Vatress Inc. Research Farm 17	11587 & 11742 Pine Pole Rd Princess Anne, MD 21853	Propane	Princess Anne
Crop Production Services, Inc.	7311 Ocean Highway Pocomoke MD 21851	Various Chemicals	Pocomoke City
Eastern Shore Forest Products	33677 Costen Road Pocomoke City, MD 21851	Gasoline, Oil, Kero.	Pocomoke City
Goose Creek Marina	25763 Rumbley Road Westover, MD 21871	Gasoline, Diesel Fuel, Propane	Fairmount
McCreedy Foundation, Inc.	201 Hall Highway Crisfield, MD 21817	Diesel Fuel, Propane	Crisfield
MD-DNR Somers Cove Marina	715 Broadway Crisfield, MD 21817	Diesel Fuel, Gasoline	Crisfield
MES ECI Power Plant	30420 Revells Neck Road Westover MD 21871	Diesel Fuel, Nitrogen Cryogenic Liquid	Princess Anne
MES ECI WWTP	30209 Perry Road Westover, MD 21871	Chlorine, sulfuric acid	Princess Anne

Facility	Street Address	Material	Fire District
MFRI	12148 John Wilson Lane Princess Anne, MD 21853	Propane	Princess Anne
Mountaineer Farms Princess Anne Hatchery	30700 King Miller Road Princess Anne, MD 21853	Propane, Formaldehyde, Diesel Fuel	Princess Anne
Mrohs Gas, Inc	4471 Crisfield Highway Crisfield, MD 21817	Propane	Crisfield
Mrohs Gas, Inc	31706 Windswept Drive Eden, MD 21822	Propane	Princess Anne
Mrohs Gas, Inc Somerset Grain	11560 Progress Lane Princess Anne, MD 21853	Propane	Princess Anne
Perdue Farms Inc. Westover Hatchery Farm 10	9891 Old Princess Anne Rd Westover, MD 21871	Propane	Princess Anne
Perdue Farms Inc. Westover Breeder Farm 8	9917 Old Princess Anne Rd Westover, MD 21871	Propane	Princess Anne
Sherwin Williams Company aka Rubberset	26466 Silver Lane Crisfield, MD 21817	Diesel, Epoxy Resin-Psbset Lead Acid Batteries- Sulfuric Acid	Crisfield
Somerset County Sanitary	30353 Linden Avenue Princess Anne, MD 21853	Chlorine, Sulfuric Acid	Princess Anne
Southern Maryland Oil/DBA the Wills Group Inc aka The Dash In	8910 Crisfield Highway Westover, MD 21871	Gasoline, Kerosene, Diesel Fuel, Propane	Princess Anne
Sysco	33239 Costen Road Pocomoke City, MD 21851	Ammonia, Sulfuric Acid, Diesel fuel, Lead Acid Batteries	Pocomoke City
Tawes Brothers Oil Company, Inc.	102 North Tenth Street Crisfield, MD 21817	Kerosene, Gasoline, Diesel Fuel	Crisfield
Tyson Foods, Inc.	30607 Revells Neck Road Princess Anne, MD 21853	Propane, Diesel, Chemicals	Princess Anne
USCG Station Crisfield	810 Norris Harbor Drive Crisfield, MD 21817	Gasoline, Diesel Fuel, Propane, Oil waste tank	Crisfield
Verizon	61 Richardson Avenue Crisfield, MD 21817	Lead Acid Batteries	Crisfield
Verizon	5722 Tulls Corner Road Marion, MD 21838	Lead Acid Batteries	Marion

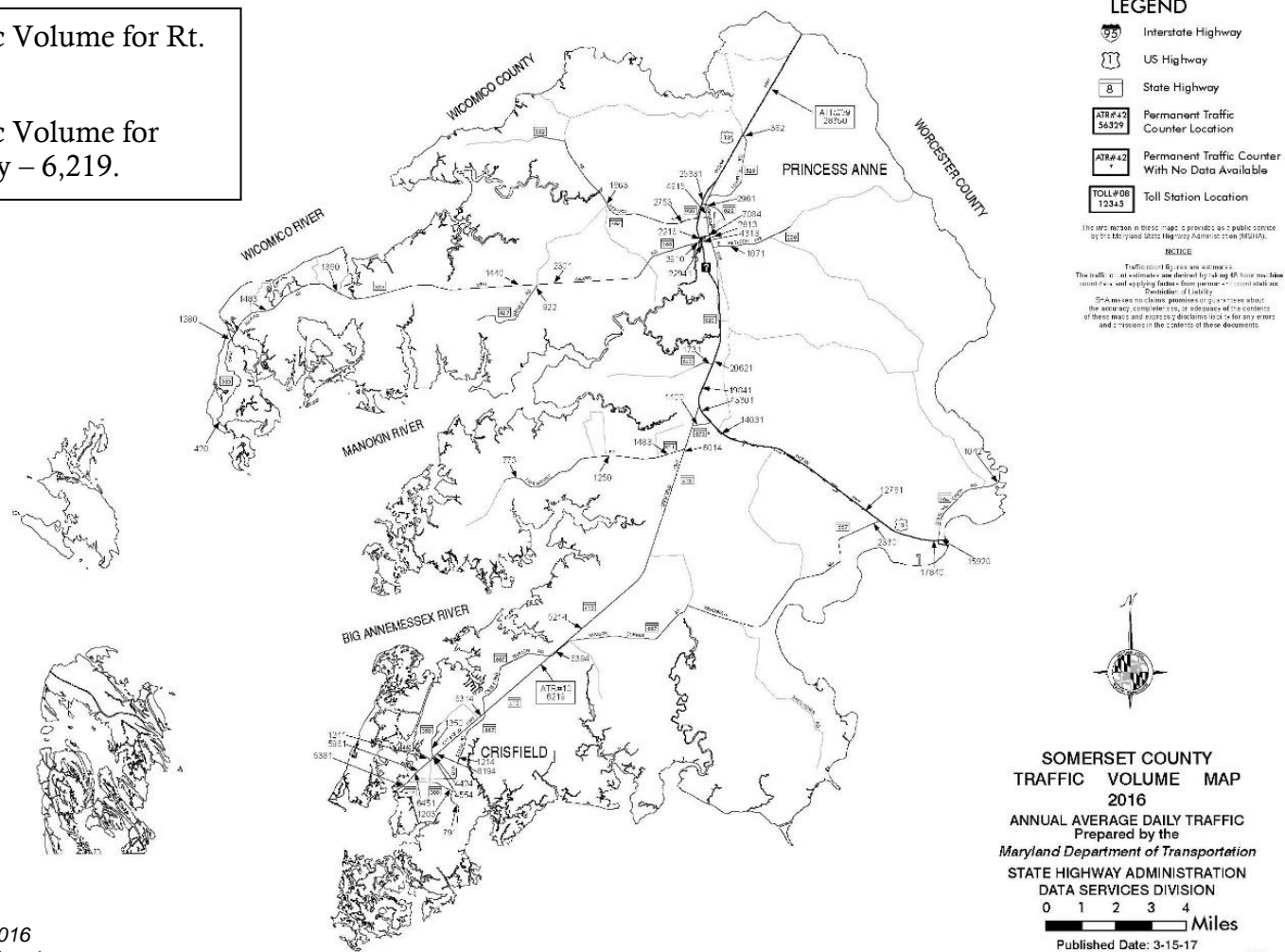
Source: Somerset County Department of Emergency Services

Nineteen of the thirty-four facilities listed are located within the Town of Princess Anne's Fire District. Hazardous materials transported to these locations utilize Route 13 or the Delmarva Central rail line. According to Figure 12-1, an annual average of 28,350 vehicles travel Route 13 daily. Considering the amount of traffic traveling on Route 13 and the location of fixed site facilities within the Princess Anne Fire District, this area is at a greater risk for a HazMat incident.

Figure 12-1: 2016 Traffic Volume Map for Somerset County

2016 ATR Traffic Volume for Rt. 13 – 28,350.

2016 ATR Traffic Volume for Crisfield Highway – 6,219.



Source: Maryland State Highway Administration 2016 Traffic Volume Maps by County

MUNICIPAL PERSPECTIVE

Princess Anne is vulnerable to both transportation related and fixed site HazMat incidents. Route 13, which is a major connecting highway between the northeast U.S. and the Tidewater area in Virginia, travels through the Town. Delmarva Central rail line, which runs parallel to Route 13, also travels through the Town of Princess Anne, increasing the vulnerability.

Considering both highway and rail transportation are utilized for delivering materials to the 19 fixed HazMat sites within Princess Anne's Fire District, residents and businesses located along these routes are highly susceptible if a HazMat incident were to occur. Additionally, the UMES campus and Eastern Correctional Facility are vulnerable due to their location adjacent to the Delmarva Central rail line and Route 13.

Figure 12-2: 2016 Traffic Volume Map for Princess Anne

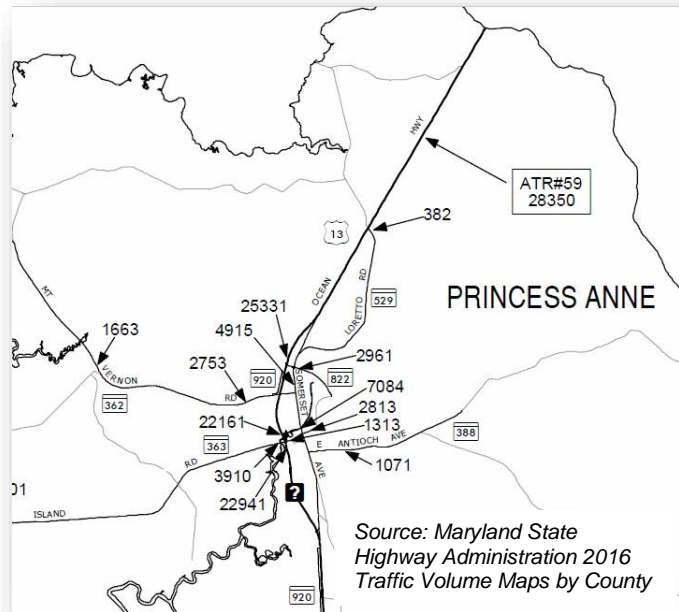
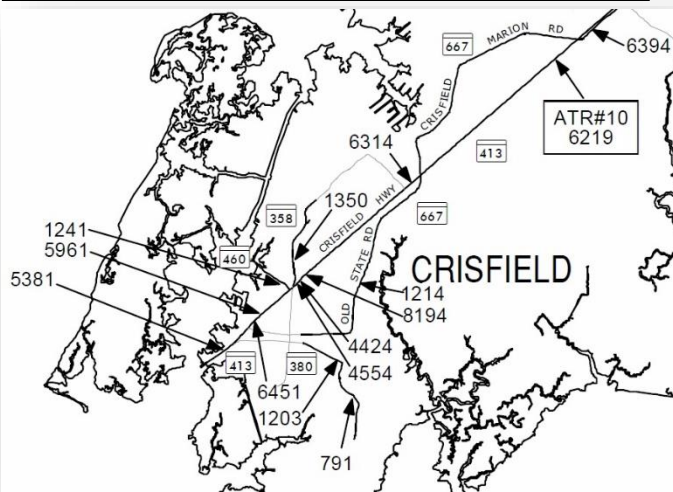


Figure 12-3: 2016 Traffic Volume Map for Crisfield



In reviewing Figure 12-2 and 12-3, approximately 28,350 vehicles are traveling through Princess Anne annually, while 6,219 travels through the City of Crisfield annually. Crisfield does not have the high volume of traffic as Princess Anne experiences however, 9 fixed HazMat sites is located within the City's Fire District. One of the fixed site facilities are located on 7th Street, which is only accessible by utilizing Crisfield Highway. Therefore, HazMats transported to these facilities are traveling through the center of Crisfield, increasing the City's vulnerability for a HazMat incident.

MITIGATION EFFORTS

The County has mutual aid agreements with Wicomico and Worcester Counties. In the event of a HazMat incident occurring in the northern portion of the county, Wicomico County's HazMat Technicians would respond. However, if the event occurs in the southern portion, Worcester County's HazMat Technicians respond. In addition, the Crisfield Coast Guard Station, which has a Mass Casualty trailer, will respond to an incident if needed.

Furthermore, the State of Maryland has HazMat capabilities through the Department of the Environment (MDE), the Department of Transportation (DOT) and the Maryland Department of Health (MDH). These agencies are all on-call through the Maryland Emergency Management Agency (MEMA).

All County Fire and EMS personnel are required to have HazMat awareness training. Training for all new recruits is conducted at the Maryland Fire and Rescue Institute (MFRI). The Maryland Fire and Rescue Institute is located in Princess Anne which serves a critical need in HazMat training for local first responders.

CHAPTER 13: MAJOR TRANSPORTATION ACCIDENT

PROFILE

In the context of this document, transportation refers to modes of mass transportation including airplanes, railways and roadways. Major causes of airline crashes are pilot error, mechanical failure and weather. Derailment is by far the leading cause of rail accidents followed by rail-highway crossing incidents.

HISTORY

Airplane

Airplane accidents in Somerset County are reported by the National Transportation Safety Board. Table 13-1 details the relevant historical data that applies to airplane accidents in the county.

Table 13-1: Airplane Accidents

Date	Location	Make / Model	Event Severity
July 26, 1965	Princess Anne	Cessna 172	Non-fatal
August 15, 1966	Princess Anne	Cessna 140	Non-fatal
August 23, 1988	Princess Anne	Piper PA 25-235	Non-fatal
July 4, 1994	Princess Anne	Cessna 172N	Non-fatal
February 6, 1995	Fairmont	Grumman G-164	Non-fatal
June 12, 2003	Crisfield	Cessna 210L	Non-fatal
July 17, 2010	Crisfield	Cessna 182	Non-fatal
2017 Hazard Mitigation Plan Update			
October 2, 2011	Ewell	TEMCO GC-1B	Fatal (1)

Source: National Transportation Safety Board

In terms of number of occurrences, the National Transportation Safety Board listed a total of 8 airplane accidents affecting Somerset County from 1965-2016. Therefore, Somerset County experiences 0.15 airplane accidents per year. Only one fatal accident has been reported in Ewell, Maryland.

Railway

Railway accidents that occur in the County are reported by the Federal Railroad Administration Office Safety Analysis. Table 13-2 details the relevant historical data that applies to railway accidents in the county.

Table 13-2: Railway Incidents

Year(s)	Highway-Railway Incidents
1975-1979	2
1980-1984	1
1985-1989	0
1990-1994	0
1995-1999	0
2000-2004	0
2005-2010	1
2011-2016	1
Total	5

Source: Federal Railroad Administration Office Safety Analysis

In terms of number of occurrences, the Federal Railroad Administration Office Safety Analysis listed a total of 5 highway-railway incidents, these incidents occur at railroad crossings, affecting Somerset County from 1975-2016. Therefore, Somerset County experiences 0.12 highway-railway incidents per year. Two injuries were reported.

Highway

Traffic accidents that occurred throughout the County are reported by the Maryland Highway Safety Office. The tables below detail the traffic crashes in Somerset County by several different categories.

Table 13-3: Total Traffic Crashes

Type of Crash	2011	2012	2013	2014	2015	5 yr Average	%
Fatal Crashes	1	4	3	1	2	2	0.8
Injury Crashes	97	108	120	105	101	106	36.3
Property Damage Crashes	148	159	170	211	231	184	62.9
Total Crashes	246	271	293	317	334	292	100.0
Total of All Fatalities	1	4	3	1	2	2	
Total Number Injured	137	168	186	177	164	166	

Source: Maryland Highway Safety Office, December 2016

In terms of number of occurrences, the Maryland Highway Safety Office listed a total of 1,461 traffic crashes affecting Somerset County from 2011-2015. Therefore, Somerset County experiences an average of 292 traffic crash incidents per year. In addition, a total of 11 fatalities and 832 injuries were also reported during 2011-2015.

Table 13-4: Traffic Crashes by Month

Month	2011	2012	2013	2014	2015	5 yr Average	%
January	19	28	35	28	25	27	9.2
February	25	17	19	12	28	20	6.9
March	23	26	34	27	25	27	9.2
April	23	24	28	28	26	26	8.8
May	25	17	20	29	33	25	8.5
June	15	28	22	25	19	22	7.5
July	22	30	22	31	23	26	8.8
August	22	13	21	34	24	23	7.8
September	11	21	28	27	37	25	8.5
October	26	22	21	23	36	26	8.8
November	24	17	23	32	32	26	8.8
December	11	28	20	21	26	21	7.3
Total	246	271	293	317	334	292	100.0

Source: Maryland Highway Safety Office, December 2016

Table 13-5: Traffic Crashes by Day of the Week

Day	2011	2012	2013	2014	2015	5 yr Average	%
Monday	36	23	35	45	31	34	11.6
Tuesday	33	33	40	41	56	41	13.9
Wednesday	38	53	44	45	59	48	16.4
Thursday	26	33	43	40	40	36	12.5
Friday	37	50	50	52	55	49	16.7
Saturday	44	53	39	57	49	48	16.6
Sunday	32	26	42	37	44	36	12.4
Total	246	271	293	317	334	292	100.0

Source: Maryland Highway Safety Office, December 2016

Table 13-6: Traffic Crashes by Time of Day

Time of Day	5 yr Average	%
12:00 Midnight	8	2.8
1:00	10	3.4
2:00	8	2.7
3:00	7	2.3
4:00	6	1.9
5:00	6	2.0
6:00	9	3.1
7:00	13	4.3
8:00	13	4.4
9:00	13	4.6
10:00	11	3.7

Time of Day	5 yr Average	%
11:00	16	5.5
12:00 Noon	14	4.9
1:00	17	5.8
2:00	16	5.5
3:00	20	6.9
4:00	18	6.3
5:00	17	5.9
6:00	13	4.3
7:00	14	4.9
8:00	12	4.0
9:00	9	3.1
10:00	11	3.9
11:00	9	3.2
Unknown	1	0.3
Total	292	100.0

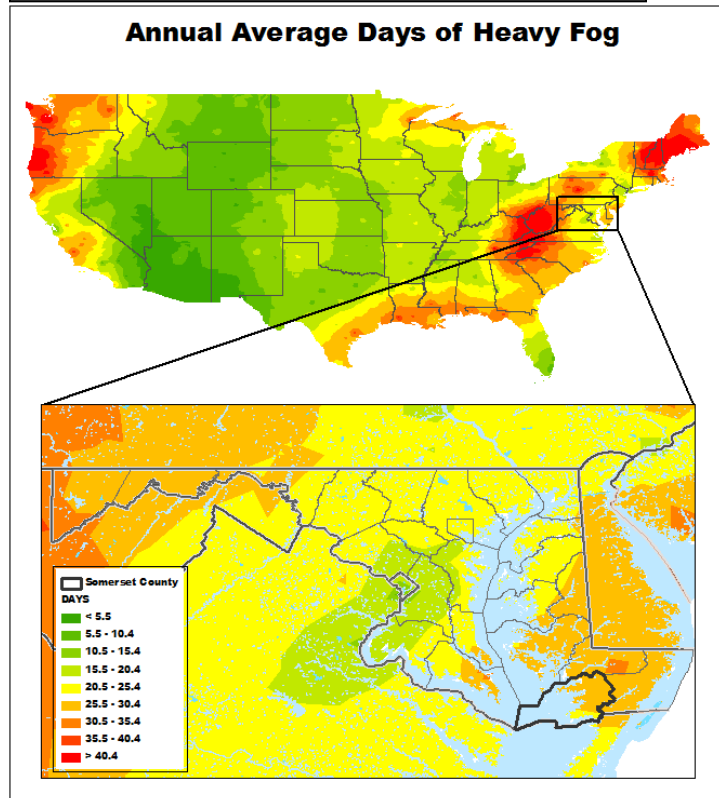
Source: Maryland Highway Safety Office, December 2016

As shown on Tables 13-4 through 13-6, more traffic crashes occurred in Somerset County during the fall/winter months, on the weekends, and in the afternoon. This is most likely due to higher traffic levels occurring during these times and days with less than favorable road conditions occurring during the winter months.

COUNTY PERSPECTIVE

Transportation is not ranked in the 2016 *State of Maryland Hazard Mitigation Plan Update*. The 2017 Hazard Mitigation Planning Committee ranked a major transportation accident as a “Medium” risk. Major transportation accidents include airplane, train, and car/truck traffic. In terms of airplane accidents, this level of risk is low due primarily to the limited number of flights into and out of the Crisfield-Somerset County Airport, and railway accidents are limited to the amount of traffic on the Delmarva Central railway line. Fog can also be a problem for motorists in the County. Map 13-1 was produced using data from climate maps available from NOAA and shows the annual average days of heavy fog across the United States with a focus on Somerset County. Somerset County typically experiences 25.5 to 30.4 average annual days of heavy fog conditions.

Map 13-1: Average Annual Days of Fog



MUNICIPAL PERSPECTIVE

The town of Princess Anne, as well as the UMES campus, are at risk for a major transportation rail accident due to its location with the Delmarva Central rail line. Crisfield is near the site of the Crisfield Municipal Airport.

MITIGATION EFFORTS

Both the Crisfield-Somerset Airport and the Delmarva Central line meet current safety standards set respectively by the FAA and the Railroad Safety Board. According to the Maryland State Highway Administration, the Office of Traffic and Safety (OTS) plays a major role in assuring that State highways operate safely and efficiently and provides a wide range of traffic engineering, traffic operations, and traffic safety support to SHA's Districts and other units that enable them to carry out their highway responsibilities. In addition,

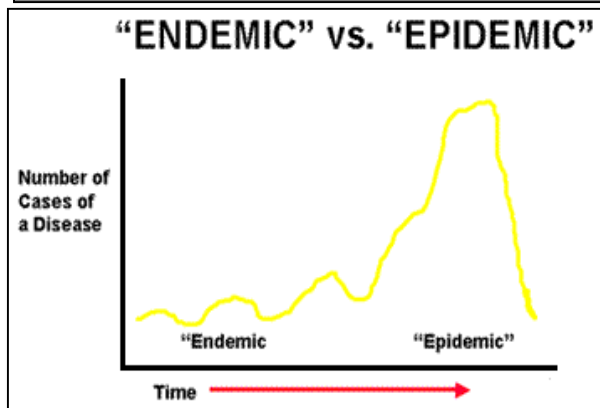
CHAPTER 14: EPIDEMIC

EPIDEMIC

PROFILE

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 Somerset County.

Figure 14-1: Endemic Vs. Epidemic



Source: health.mo.gov

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. Figure 14-1 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.

The Maryland Department of Health (MDH) maintains counts for 86 diseases, conditions, outbreaks, and unusual manifestations as reported by health care providers and 43 diseases notifiable by laboratories in Maryland. The surveillance and reporting of these diseases is the responsibility of the local health department, which investigates and completes reporting both electronically and manually as per MDH regulations. Example of notifiable diseases include measles, Hepatitis B, AIDS, salmonellosis, giardiasis, malaria, Lyme disease and rabies.

Processes followed for day to day surveillance and reporting of diseases establishes the baseline for public health response in a large-scale outbreak of a disease. One of the greatest potentials for an epidemic to occur is the emergence of an infectious disease that has newly appeared in a population or that has been known for some time but is rapidly increasing in incidence or geographic range which is referred to as an Emerging Infectious Disease. Two examples of emerging infectious diseases that have posed a real threat for Maryland are the Ebola Virus and the Zika Virus. Both of these emerging diseases were related to travelers bringing the disease to Maryland. For this reason, preparedness efforts in Maryland were critical in mitigating the spread of emerging diseases. Likewise, mitigation and preparedness is key in the current Opioid Crisis response in Somerset County. While opioid use is not an infectious illness, the increased rates of opioid use have created numerous public health concerns

including an increase in overdose deaths and a potential for increase in rates of HIV, Hepatitis C, etc. Zika disease and the opioid epidemic will be discussed more in the chapter to illustrate their potential as an epidemic and the mitigation strategies that are used to combat them.

HISTORY

The Maryland Department of Health routinely collects statistics on reportable illnesses. Table 14-1 provides an example of routine incidence of infections. An increase in the incidence rates triggers a public health response.

Table 14-1: Reported Conditions for Somerset County

REPORTED CONDITIONS						
CONDITION	2010	2011	2012	2013	2014	2015*
ANIMAL BITES	79	62	46	72	62	54
CAMPYLOBACTERIOSIS	0	3	4	1	3	1
CHLAMYDIA	199	191	146	152	150	188
CRYPTOSPORIDIOSIS	0	0	0	0	0	1
EHRlichiosis	0	3	0	1	1	2
GIARDIASIS	0	1	2	0	0	0
GONORRHEA	48	47	38	26	46	38
H. INFLUENZAE - INVASIVE DISEASE	0	0	0	0	1	0
HEPATITIS B (ACUTE-SYMPTOMATIC)	0	0	1	0	1	0
HEPATITIS C (ACUTE-SYMPTOMATIC)	0	2	0	3	0	0
LEGIONELLOSIS	0	0	0	0	1	0
LYME DISEASE	2	6	9	11	6	5
MALARIA	0	0	1	0	0	0
MENINGITIS, ASEPTIC	4	3	7	1	1	3
MYCOBACTERIOSIS, OTHER THAN TB & LEPROSY	7	4	2	6	4	3
PERTUSSIS	0	0	2	1	3	0
PNEUMONIA – HOSPITALIZED HEALTHCARE WORKER	0	1	0	0	0	0
RABIES - ANIMAL	8	13	7	1	15	5
SALMONELLOSIS - OTHER THAN TYPHOID FEVER	12	13	8	8	15	12
SEPTICEMIA IN NEWBORNS	0	0	1	0	0	0
SHIGA TOXIN PRODUCING E. COLI (STEC)	0	0	0	0	1	0
STREP GROUP B - INVASIVE DISEASE	5	4	1	6	3	4
STREP PNEUMONIAE – INVASIVE DISEASE	3	0	2	6	2	1
SYPHILIS – PRIMARY AND SECONDARY	1	3	0	0	1	2
TUBERCULOSIS	2	0	0	0	0	1
VIBRIOSIS (NON-CHOLERA)	0	1	2	1	1	3

Data sources: Maryland's NEDSS, and PRISM databases.

*Data is current as of January 13, 2017. These are active databases and counts may vary slightly over time, as well as differ slightly from counts published by the Centers for Disease Control and Prevention (CDC). HIV/AIDS data are not included here but available at <http://phpa.dhmd.maryland.gov/OIDEOR/CHSE/Pages/statistics.aspx>.

Additional information on reported conditions for Maryland have been obtained at the request of the Hazard Mitigation Planning Committee (HMPC) members. According to the CDC, an estimated 2,168 adults and adolescents were diagnosed with HIV in Maryland and Maryland was ranked 7th in the number of HIV diagnoses in the country. In addition, Maryland ranks 5th in rates of primary and secondary syphilis, 20th in chlamydia infections and 21st in gonorrheal infections among the 50 states. Incidence of Hepatitis A&B are the lowest recorded rates due to the availability of safe and effective vaccines. However, there is no vaccine for Hepatitis C virus and chronic Hepatitis B virus. Furthermore, the Hepatitis C virus account for more than 50% of new cases of chronic liver disease. In Maryland, between 2009 and 2013:

- Reported rates of acute hepatitis A decreased by 38%;
- Reported rates of acute hepatitis B decreased by 46%; and,
- Reported rates of acute hepatitis C increased by 125%.

Further information is available to the public on the Somerset County Health Department's website. The website provides not only health related topics, but also information on how to prepare and prevent various types of disasters. The Somerset County Department of Emergency Service's website also provides information on disaster mitigation, preparedness and recovery.

Finally, during the 2017 Plan Update, the Hazard Mitigation Planning Committee put particular emphasis on both the Zika virus and opioid crisis. By doing so, the epidemic local risk rating increased from "Medium-Low" to "High" in 2017. As such, both have been profiled and information on mitigation and preparedness efforts have been included in this plan chapter.

ZIKA VIRUS

PROFILE

The Zika virus is an arboviral infection that is spread primarily through the bite of certain species of infected *Aedes* mosquitoes, and it can also be sexually transmitted. Zika virus has been identified as an illness that causes multiple birth defects including microcephaly, which is defined as abnormal smallness of the head, a congenital condition associated with incomplete brain development. There is no identified vaccine or medication that can be taken to prevent Zika infection. As a result, mitigation strategies include the prevention methods listed in the *Prevention* section.



In 2016, Governor Larry Hogan declared a week in April as “Zika Awareness Week” to urge people to stay informed. Particular emphasis was placed on information about how to avoid the Zika Virus.

HISTORY

According to Figure 14-2, below, the Eastern Shore has been affected by the Zika virus in the recent past, particularly from 2015-2016. As of June 28, 2017, the number of Zika cases on the Eastern Shore, and throughout the entire state, has dropped dramatically.

Figure 14-2: Confirmed and Probable Cases of Zika – 2015-2017

Confirmed and Probable Cases of Zika Virus Disease and Infection - Maryland, 2015-2017 (as of June 28, 2017)		
Region	No. of Zika Cases, 2015-2016	No. of Zika Cases, 2017
Baltimore Metropolitan (Anne Arundel County, Baltimore City, Baltimore County, Carroll County, Harford County, Howard County)	58	9
Eastern Shore (Caroline County, Cecil County, Dorchester County, Kent County, Queen Anne's County, Somerset County, Talbot County, Wicomico County, Worcester County)	9	1
National Capital (Frederick County, Montgomery County, Prince George's County)	96	24
Southern (Calvert County, Charles County, St. Mary's County)	4	0
Western (Allegany County, Garrett County, Washington County)	4	0
TOTAL	171	34

Source: Maryland Department of Mental Health & Hygiene, 2017

PREVENTION

Multiple agencies collaborated to create the prevention strategies to limit the spread of Zika infection throughout all communities. The primary goal of the Maryland Department of Agriculture Mosquito Control Program is to prevent mosquito-borne diseases in humans, pets and domestic livestock. Different mosquitoes can carry and transmit different diseases, and the methods for combating one species can differ from how the department combats another. Managing mosquito populations across the state generally requires the department to undertake several tasks.

- *Monitor and test mosquitoes for diseases that pose a threat to public health*
These efforts determine whether a threat exists and give a good idea of how big the threat is. This information helps staff decide how to combat a threat.
- *Reduce mosquito breeding grounds*
- *Larval mosquito control*

The primary goal of Maryland Department of Health is reducing Zika transmission in humans through education on transmission precautions to include the following:

- Educate public on safe sexual practices as Zika is spread through sexual activity;
- Educate public on safe-travel practices to areas where Zika is endemic;
- Wear appropriate clothing that will prevent mosquito bites;
- Dump water from containers around home; and,
- Distribute Zika awareness kits that included condoms, educational flyers, insect repellent, screen repair kits.

Additional information about the Zika virus can be found at the Maryland Department of Agriculture's website, especially FAQs, at: <http://mda.maryland.gov/plants-pests/Pages/Zika.aspx> or contact the Somerset County Health Department.

Figure 14-3: Zika Prevention Billboard



Source: Somerset County HMPC

OPIOID EPIDEMIC

PROFILE

According to recent data from the CDC, two distinct but inter-connected trends are driving the opioid overdose epidemic in the United States:

1. A 15-year increase in deaths from opioid overdoses; and,
2. A recent surge in illicit opioid overdose, driven mainly by heroin and illegally-made fentanyl.

HISTORY

Prescription Opioid Overdose

According to the Johns Hopkins Bloomberg School of Public Health, an estimated one in five patients with non-cancer pain or pain-related diagnoses are prescribed opioids in office-based settings. Between 2007 and 2012, the rate of opioid prescriptions increased steadily among specialists more likely to manage acute and chronic pain. Prescription rates are highest among pain medicine, surgery, and physical medicine or rehabilitation; however, primary care providers account for about half of the dispensed opioid pain relievers.



According to the CDC, both opioid prescription drug sales and overdose deaths involving prescription opioids have quadrupled since 1999 without a concurrent increase in the amount of pain reported by Americans. Today, at least half of all opioid overdose deaths in the United States involve a prescription opioid.

Illicit Opioid Overdose

Maryland mirrors national data in that opioid overdose is driving increases in overall drug- and alcohol-related overdose. Historically, Baltimore City has driven the number of heroin-related overdose deaths in the State; today, that is no longer the case.



Between 2008 and 2014, four of six jurisdictions with the highest heroin-related emergency room department admission rates were predominantly rural counties.

Between 2008 and 2013, the proportion of all heroin-related substance use disorder treatment admissions attributed to rural and suburban counties rose from 11 percent to 24 percent and 25 percent to 28 percent, respectively, while the proportion of admission for Baltimore City residents fell from 64 percent to 48 percent.

Additional Risk

Overdose is not the only risk related to prescription opioids: misuse, abuse, and opioid use disorder (addiction) are also potential dangers.

According to the Centers for Disease Control and Prevention, almost two million Americans abused or were dependent upon prescription opioids in 2014. As many as one in four people who receive prescription opioids long-term for non-cancer pain in primary care settings struggle with addiction.

There is also indication that prescription opioid abuse is a major risk factor in heroin use. In many cases, heroin is cheaper and more widely available than prescription opioids. The use of fentanyl--a substance 100 times more potent than morphine and 50 times more potent than heroin--is also increasingly added as a cutting agent or being sold as a standalone drug, in place of heroin.

PREVENTION

In March of 2017 Governor Larry Hogan, declared a state of emergency for the opioid epidemic EXECUTIVE ORDER 01.01.2017.02. Emergency Management and Emergency Services attended the Local Drug Action Committee LDAC and the fatality review committee meetings to get background and education on Somerset County's response to the opioid epidemic. Following the declaration Emergency Management and Emergency Services participated in numerous statewide conference calls and met with the local health officer to discuss command and control of the Opioid Intervention Team (OIT).

An Opioid Intervention Team (OIT) was formed with Somerset County Health (Chair) as the lead with Emergency Management (OIT Leader) coordinating resources. This team is locally known as SCOUT – Somerset County Opioid United Team. The team includes partners from Somerset County Emergency Management, Somerset County Emergency Services, Somerset County Administration, Somerset County Health, Law Enforcement, Emergency Medical Services, Board of Education, State's Attorney, Pharmacies, and Health Care Providers, (physicians and hospitals). The SCOUT team meets monthly to discuss the opioid epidemic, intervention, prevention, and enforcement efforts in the county.

A senior policy group was also formed consisting of Somerset County Emergency Management (team leader), Somerset County Emergency Services, Somerset County Administration, Somerset County Health, Law Enforcement, Emergency Medical Services, Board of Education, State's Attorney, Corrections (the detention center), and Department of Human Services. This group meets quarterly to discuss and oversee the direction of the SCOUT team.

Through the SCOUT team, projects were discussed and prioritized for grant paperwork addressing the opioid epidemic. Projects include outreach, education, prevention and enforcement initiatives.

Additionally, the Town of Princess Anne's Police Department, who serves on the SCOUT team, developed a drug awareness program. The program is presented annually at the Princess Anne Elementary School. Also, the Princess Anne's Police Chief has developed a video discussing the Good Samaritan Law protecting individuals that call in overdoses from arrest.

The City of Crisfield's Police Department, also part of the SCOUT team, has created a drug tips form for suspected illegal drug activity to make anonymous reports through local businesses. Meetings are scheduled to discuss how citizens can assist local police with the opioid epidemic and help present an awareness campaign to local citizens.

Moreover, the citizens of Crisfield have established a group to address the opioid epidemic. A meeting was held and was well attended by Emergency Management, Health, Law Enforcement, City Council, recovering addicts, addicts' family and friends, McCready Hospital, citizens, and faith based groups. The group is working on ways to assist addicts find the help they need.

MITIGATION EFFORTS

In light of Governor Hogan's declaration of a State of Emergency in March 2017, Somerset County formed an Opioid Intervention Team, SCOUT. Emergency Management and Emergency Services have conducted outreach and education efforts at:

- Field Day,
- The County Fair,
- Public Meetings,
- Halloween Parade,
- Night Out,
- Churches,
- Social Media, Print Media, and other venues as they become available.

Somerset County will be going purple in support of Opioid Addiction Awareness as this response continues. Together with law enforcement we are planning a take back prescription drug social media campaign. Painted Recovery Rocks have been placed throughout the county bringing awareness to the crisis and recovery. Recovered rocks that are returned to us are exchanged for a purple tee complementing our opioid awareness campaign.

Additional mitigation efforts include the following.

Expanding Access to Treatment

1. *Department of Health will continue to identify and encourage healthcare professionals to provide treatment options to individuals with addiction and substance abuse conditions.*
2. *Expanding Access to Training for Certified Peer Recovery Specialists*

Figure 14-4: Painted Recovery Rocks



Source: Somerset County Emergency Services

The Maryland Department of Health needs to provide Addiction/Peer Recovery trainers to teach coaching modules to enable our trainees to meet Maryland's Certified Peer Recovery Specialist credentialing requirements.

3. *Providing Recovery Support Specialists to Assist Pregnant Women with Substance Use Disorders*

The Maryland Department of Health should provide a recovery support specialist program to work with women during pregnancy and continuing care for mother and child after delivery and throughout withdrawal should the child be born addicted.

4. *Transitioning Inmates to Outpatient Addictions Aftercare and Community Providers*

The Somerset County Detention Center and Eastern Shore Psychological Services create a transition process allowing inmates leaving incarceration with known substance use disorders to be engaged with community resource providers (faith-based organizations, peer support, and outpatient treatment programs) prior to release.

Boosting Overdose Prevention Efforts

1. *Expand Online Overdose Education and Naloxone Training throughout the County.*

Escalating Law Enforcement Options

1. *Enacting a Maryland Racketeer Influenced and Corrupt Organization Statute*

Enact legislation to amend existing Maryland law to better model it after the federal Racketeer Influenced and Corrupt Organization Act (RICO) to aid in the prosecution of, and provide civil penalties for, drug trafficking as part of an ongoing criminal enterprise.

2. *Creating a Criminal Penalty for Distribution of Heroin or Fentanyl Resulting in Fatal or Nonfatal Overdose*

Enact legislation creating a crime for the direct or indirect distribution of heroin or fentanyl, the use of which is a contributing cause in the nonfatal overdose or death of another.

3. *Creating a Multi-Jurisdictional Maryland State Police Heroin Investigation Unit*

Create a multi-jurisdictional Maryland State Police Heroin Investigation Unit.

4. *Enhancing Interdiction of Drug-Laden Parcels*

The Maryland State Police negotiate the inclusion of inspectors from various parcel services into existing State Police parcel interdiction units as task force members.

5. *Strengthening Counter-Smuggling Efforts in Correctional Facilities*

The Department of Public Safety and Correctional Services and local detention centers examine current Front Entry Search policy and procedures to determine whether they

align with national best practices and, if necessary, modify them in order to assist in eliminating the introduction of contraband into all correctional facilities.

Reentry and Alternatives to Incarceration

1. Establishing a Day Reporting Center Pilot Program to Integrate Treatment into Offender Supervision

The Department of Public Safety and Correctional Services and the Governor's Office of Crime Control and Prevention collaborate with the Maryland Judiciary to establish a day reporting center pilot program.

2. Implementing a Swift and Certain Sanctions Grid for Probation and Parole

Enact legislation developing a swift and certain sanctions grid for nonviolent offenders released on probation and parole whose offenses relate to their substance use disorder.

3. Institutionalizing a Substance Use Goal into the Maryland Safe Streets Initiative

The Governor's Office of Crime Control and Prevention should incorporate a new goal into Safe Streets that will allow the local Safe Streets coalition to address the issue of violent crime related to drug trafficking, substance use and addiction, with a focus on heroin and opioids. It also recommends establishing peer recovery specialists within the Safe Streets model.

4. Establishing a Recovery Unit at Correctional Facilities

The Department of Public Safety and Correctional Services should establish a pilot Recovery Unit at Eastern Correctional Institution to house offenders who are engaged in drug addiction programs and are truly invested in recovery.

5. Studying the Collateral Consequences of Maryland Laws and Regulations on Employment of Ex-Offenders

The Governor's Office of Crime Control and Prevention should conduct a study of Maryland laws and regulations that establish a "Collateral Consequence," particularly unnecessary barriers to employment of ex-offenders.

Promoting Educational Tools for Youth, Parents, and School Officials

1. Creating a User-Friendly Educational Campaign on School Websites

The Maryland State Department of Education assist local school boards in the development and promotion of a drug education and information segment on school websites for parents, educators and students.

2. Training for School Faculty and Staff on Signs of Student Addiction

The Maryland State Department of Education assist school staff, including teachers, school resource officers, coaches, athletic directors, and guidance counselors, to receive training on the disease of addiction and signs that a student is abusing heroin or

prescription opioids with a focus on early intervention and training on the signs and symptoms of gateway drug use and behaviors; developing programs, training and techniques to terminate the path toward addiction.

3. Promoting Evidence-Based Prevention Strategies that Develop Refusal Skills

The Maryland State Department of Education promote evidence-based programs to help students resist peer pressure while maintaining self-respect.

Improving State Support Services

1. Implementing Comprehensive Heroin and Opioid Abuse Screening at the Department of Juvenile Services and the Department of Human Resources

The Department of Juvenile Services develop a questionnaire that will be specifically designed to guide Department of Juvenile Services staff in a productive discussion with the youth and parent regarding opiates, including heroin, fentanyl, and prescription opioids, and other drugs. Similarly, the Department of Human Resources implement a comprehensive screening tool to identify clients and families affected by heroin and opioid use.

2. Establishing the Maryland Center of Excellence for Prevention and Treatment under the Behavioral Health Advisory Council

A Center of Excellence for Prevention and Treatment and Opioid Operations Command Center (OCCC) be established under the Behavioral Health Advisory Council and housed in an academic setting. The Center would serve as the main body to provide critical oversight, a unifying strategy, and accountability for all prevention and treatment programming across the State. It would also serve as a source of independent information, data analysis, and evaluation of the effectiveness and coordination of prevention and treatment programming in Maryland; and to provide oversight such that programming is fully accountable across all agencies in accordance with metrics, outcome measures, standards of care, and performance evaluation.

Chapter 15: Earthquake

PROFILE

An earthquake is ground shaking caused by a sudden movement of rock in the earth's crust. Such movements occur along faults, which are thin zones of crushed rock separating blocks of crust. When one block suddenly slips and moves relative to the other along a fault, the energy released creates vibrations called seismic waves that radiate up through the crust to the earth's surface, causing the ground to shake.

Earthquakes are measured by their Mercalli magnitude and their intensity. The following table describes both measurements.

Table 15-1: Earthquake Magnitude and Intensity

Earthquake Magnitude and Intensity				
Magnitude	Description	Mercalli Intensity	Average earthquake effects	Average frequency of occurrence (estimated)
1.0–1.9	Micro	I	Microearthquakes, not felt, or felt rarely. Recorded by seismographs.	Continual/several million per year
2.0–2.9	Minor	I to II	Felt slightly by some people. No damage to buildings.	Over one million per year
3.0–3.9		III to IV	Often felt by people, but very rarely causes damage. Shaking of indoor objects can be noticeable.	Over 100,000 per year
4.0–4.9	Light	IV to VI	Noticeable shaking of indoor objects and rattling noises. Felt by most people in the affected area. Slightly felt outside. Generally, causes none to minimal damage. Moderate to significant damage very unlikely. Some objects may fall off shelves or be knocked over.	10,000 to 15,000 per year
5.0–5.9	Moderate	VI to VII	Can cause damage of varying severity to poorly constructed buildings. At most, none to slight damage to all other buildings. Felt by everyone.	1,000 to 1,500 per year
6.0–6.9	Strong	VIII to X	Damage to a moderate number of well-built structures in populated areas. Earthquake-resistant structures survive with slight to moderate damage. Poorly designed structures	100 to 150 per year

Earthquake Magnitude and Intensity				
Magnitude	Description	Mercalli Intensity	Average earthquake effects	Average frequency of occurrence (estimated)
			receive moderate to severe damage. Felt in wider areas; up to hundreds of miles/kilometers from the epicenter. Strong to violent shaking in epicentral area.	
7.0–7.9	Major	X or greater	Causes damage to most buildings, some to partially or completely collapse or receive severe damage. Well-designed structures are likely to receive damage. Felt across great distances with major damage mostly limited to 250 km from epicenter.	10 to 20 per year
8.0–8.9	Great		Major damage to buildings, structures likely to be destroyed. Will cause moderate to heavy damage to sturdy or earthquake-resistant buildings. Damaging in large areas. Felt in extremely large regions.	One per year
9.0 and greater			At or near total destruction – severe damage or collapse to all buildings. Heavy damage and shaking extends to distant locations. Permanent changes in ground topography.	One per 10 to 50 years

SOURCE: UNITED STATES GEOLOGICAL SURVEY

HISTORY

In general, earthquakes with an epicenter in Maryland are a rare occurrence, especially events with high intensity and/or magnitude. In most cases, earthquakes that are felt in Maryland occur in adjacent states, such as Virginia or Pennsylvania. Table 15-2, following, details earthquake events within and around Maryland that have occurred in the past 20 years.

Table 15-2: Earthquake Events

Earthquake Events			
Date	General Location	Intensity	Magnitude
1996/08/02	Perryville	II-III	2.2
1996/10/17	Rising Sun (epicenter may be in Pennsylvania)	IV	2.2, 2.3
1996/12/06	Columbia - Allview Estates	II	<1.5 (est.)
1996/12/14	Columbia - Allview Estates	II	<1.5 (est.)
1996/12/16	Ilchester - Ellicott City	I	about 1 (est.)
1996/12/22	Columbia - Allview Estates	III	2.0, 2.3
2001/12/18	Columbia near US29-MD32	II	1.5-2.0 (est)
2002/03/22	Columbia near US29-MD32	I	1-2 (est.)
2003/12/09	28 miles west of the Richmond in rural Powhatan County, VA	VI	4.5
2005/02/23	Southeastern Baltimore near Fort McHenry, Dundalk, Glen Burnie, Pasadena, Gambrills	VI	2.0-2.1
2008/12/27	6 miles west of Lancaster, PA.	IV	3.4
2009/07/01	Southwestern New Jersey	III	2.8
2009/09/29	4 miles NNE (15°) from Bel Air North, MD	II	1.6
2010/07/16	Potomac-Shenandoah Region, MD	V	3.4
2011/08/23	5 miles SSW (195°) from Mineral, VA	V-VI	5.8

SOURCE: MARYLAND GEOLOGICAL SURVEY

The most recent nearby earthquake event struck Mineral, Virginia on August 23, 2011 with a magnitude of 5.8. The earthquake was approximately 130 miles west of the Town of Princess Anne in Somerset County and was felt throughout the County; some structures sustained minor damage.

COUNTY & MUNICIPAL PERSPECTIVE

Earthquake Hazard impacts would be experienced county-wide upon occurrence. As shown on figures presented in this chapter, Somerset County is in a low risk earthquake zone, furthermore were an earthquake to occur, Somerset County is located within a low shake impact area. That being stated, enforcement of building codes and proper construction techniques would assist in mitigating potential impacts.

The following list provides potential impacts from a community perspective due to earthquakes:

Health & Safety of the Public

- Looting
- Bodily Harm
- Evacuation of Vulnerable Population
- Risk of Fire

Health & Safety of the First Responders

- Falling Debris
- Biohazard
- Inability to go where they are needed
- Risk of Fire

Continuity of Operations (including Delivery Services)

- Structural damage to Police/Fire equipment
- Transportation Network Damage (i.e., roads)
- Cell Towers/Radio Operations

Property, Facilities, & Infrastructure

- Structural Damage
- Cell Phone Infrastructure
- Water Treatment Plant Damage

Environment

- Pip Ruptures/Gas Lines/Water Mains

Economic Conditions

- Cost of rebuilding structures & infrastructure
- Looting
- Loss of Commercial Industry

Public Confidence in Government

- Communication to Public

EARTHQUAKE RISK & VULNERABILITY

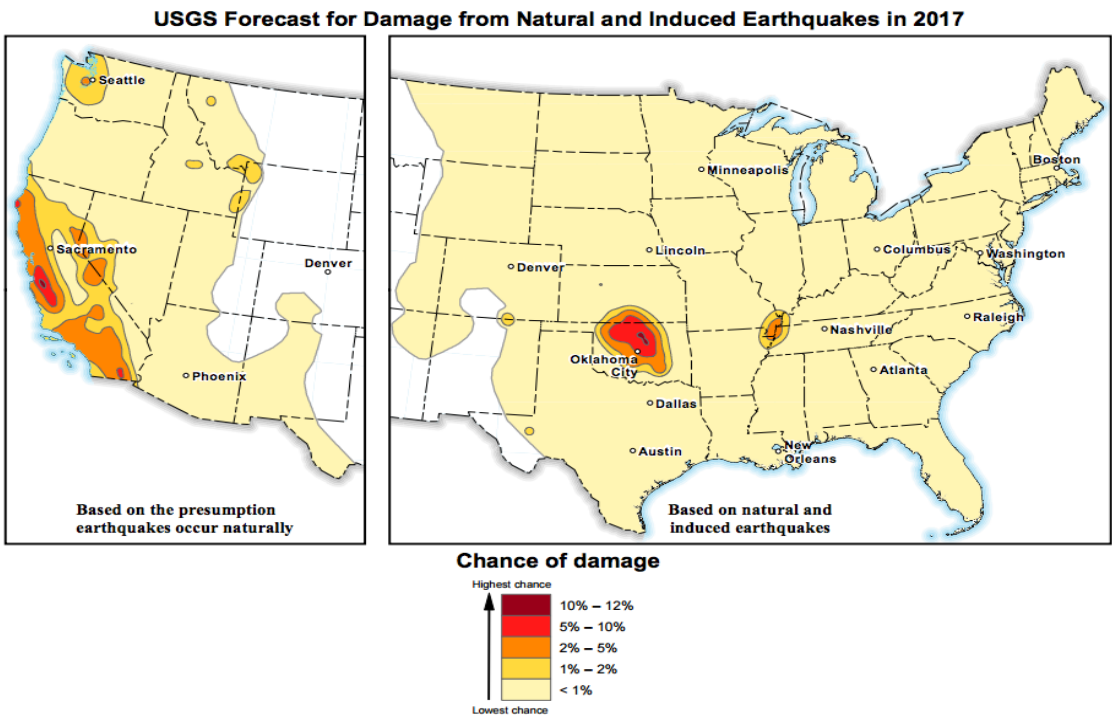
According to the Federal Emergency management Agency (FEMA) seismic hazard levels differ significantly across the United States, both between and within states.

The U.S Geological Survey (USGS) has produced a one-year 2017 seismic hazard forecast for the central and eastern United States from induced and natural earthquakes that updates the 2016 one-year forecast; this map is intended to provide information to the public and to facilitate the development of induced seismicity forecasting models, methods, and data. The 2017 hazard model applies the same methodology and input logic tree as the 2016 forecast, but with an updated earthquake catalog. As shown on Figure 15-1 below, the eastern United States, Maryland specifically, has less than a 1-percent chance of earthquake damage.

The following excerpt contains USGS Long-Term 2014 Model information, which indicates that Somerset County is within an earthquake low-risk area. Figure 15-2 further illustrates Maryland's status as a low-risk area.

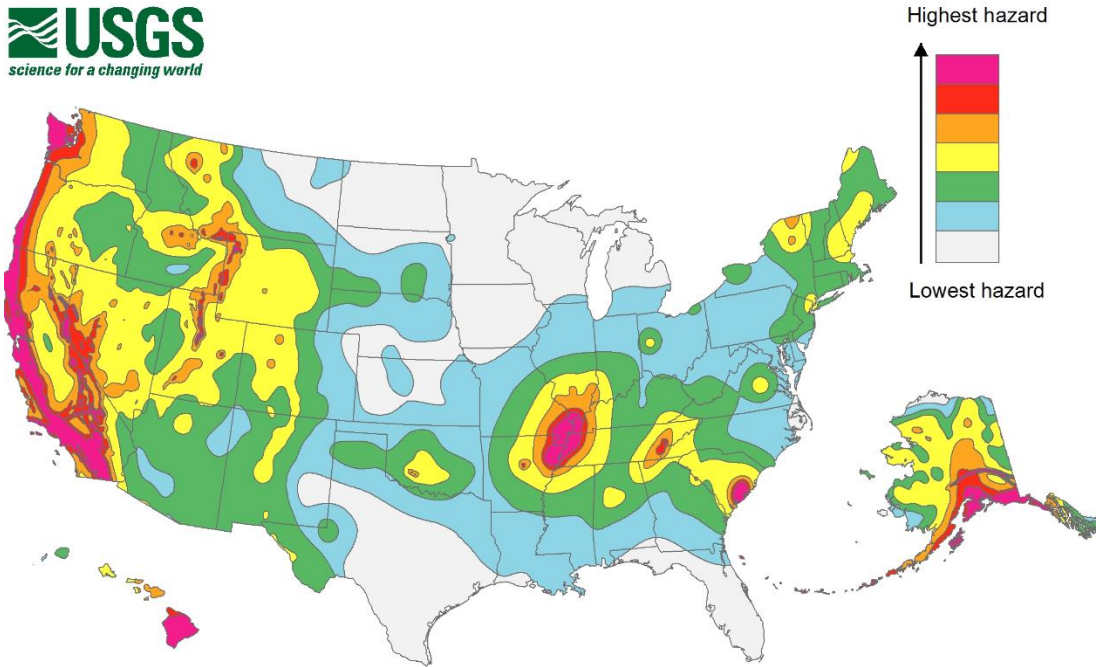
The 2014 U.S. Geological Survey (USGS) National Seismic Hazard Maps display earthquake ground motions for various probability levels across the United States and are applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. The updated maps represent an assessment of the best available science in earthquake hazards and incorporate new findings on earthquake ground shaking, faults, seismicity, and geodesy. The USGS National Seismic Hazard Mapping Project developed these maps by incorporating information on potential earthquakes and associated ground shaking obtained from interaction in science and engineering workshops involving hundreds of participants, review by several science organizations and State surveys, and advice from expert panels and a Steering Committee. The new probabilistic hazard maps represent an update of the seismic hazard maps; previous versions were developed by Petersen and others (2008) and Frankel and others (2002), using the methodology developed Frankel and others (1996). Algermissen and Perkins (1976) published the first probabilistic seismic hazard map of the United States which was updated in Algermissen and others (1990).

Figure 15-1: Forecast for Earthquake Damage 2017



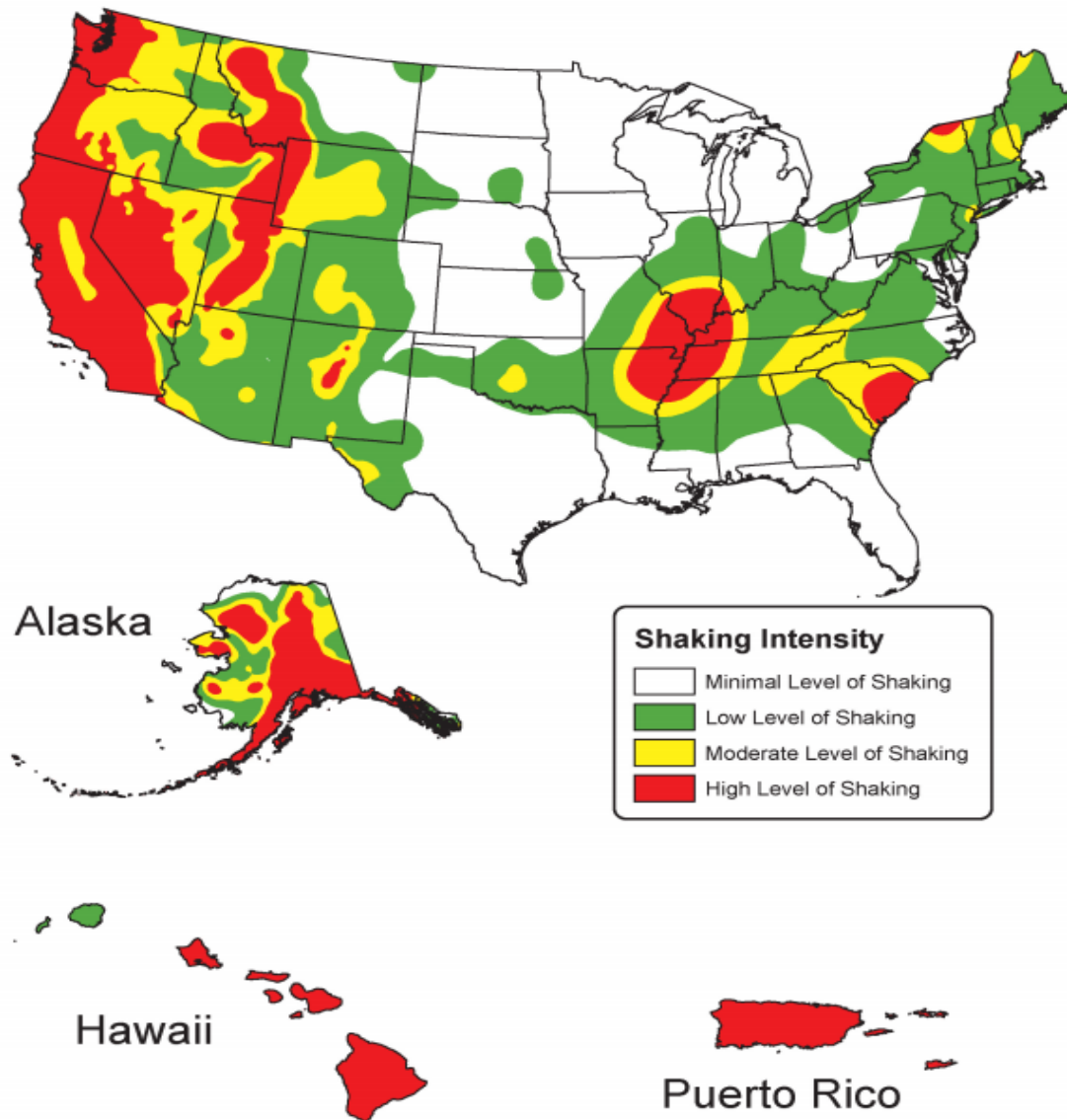
USGS map displaying potential to experience damage from natural or human-induced earthquakes in 2017. Chances range from less than 1 percent to 12 percent.

Figure 15-2: U.S. Earthquake Seismic Hazard Map



According to FEMA E-74 Reducing the Risk of Nonstructural Earthquake Damage –a Practical Guide dated December 2012, due to the low risk of earthquake and minimal to low potential for shaking due to seismic activity, the need for seismic anchorage and bracing of non-structural components is not necessary. However, if located in a low level of shaking area (depicted on Figure 15-3) and if the facility is not an essential facility, then only parapets and exterior unreinforced masonry walls should be considered for seismic retrofit.

Figure 15-3: Earthquake Shaking Intensity



The above figure was prepared by Ken Rukstales of the USGS and is based on the Figure R301.2(2) that was developed by the USGS for the 2006 International Residential Code where the Minimal Level = SDC A, Low Level = SDC B, Moderate Level = SDC C and the High Level = SDC D. Figure R301.2(2) was based on the MCE Design Value Maps prepared by the USGS for the 2003 NEHRP Recommended Provisions and presumes that the site soil classification is Site Class D and structure has Normal Occupancy (II).

Map of probable shaking intensity in the United States.

MITIGATION EFFORTS

According to the FEMA E-74 Reducing the Risk of Nonstructural Earthquake Damage –a Practical Guide dated December 2012 essential facilities located in a low-level shaking area may want to consider seismic retrofit.

The first step toward reducing the nonstructural hazards in an existing building is to perform a survey to assess the extent and magnitude of the potential risks. This chapter includes survey guidelines for nonstructural components and describes the inventory form, the checklist, and the risk ratings that are included in the appendices. To make informed decisions regarding nonstructural seismic risks, owners and managers will need to address the following questions:

- What types of nonstructural components are present in a facility?
- Are these items adequately braced or anchored?
- How will a specific nonstructural item perform in an earthquake, and what are the consequences of failure of that item in terms of life safety, property loss, and functional loss?
- If the decision is made to upgrade a facility, which problems should be addressed first?

The focus of this guide is on reducing nonstructural seismic hazards, particularly in those areas where the seismic shaking intensity is expected to be moderate or high and where significant structural hazards do not exist or will be addressed independently. A simplified map of probable shaking intensities is presented above in Figure 15-3. If the expected shaking for the facility in question is minimal, then the survey procedures and seismic protection measures described in this guide might be undertaken on a voluntary basis but may not be necessary, and in most cases, they would not be required for new construction.

Chapter 16: Cyber Attack

PROFILE

According to the Department of Homeland Security – Industrial Control Systems Cyber Emergency Response Team, cyber threats to a control system refer to persons who attempt unauthorized access to a control system device and/or network using a data communications pathway. This access can be directed from within an organization by trusted users or from remote locations by unknown persons using the Internet. Threats to control systems can come from numerous sources, including hostile governments, terrorist groups, disgruntled employees, and malicious intruders. To protect against these threats, it is necessary to create a secure cyber-barrier around the Industrial Control System (ICS). Though other threats exist, including natural disasters, environmental, mechanical failure, and inadvertent actions of an authorized user, this discussion will focus on the deliberate threats mentioned above.

For this discussion, deliberate threats will be categorized consistent with the remarks in the Statement for the Record to the Joint Economic Committee by Lawrence K. Gershwin, the Central Intelligence Agency's National Intelligence Officer for Science and Technology, 21 June 2001. These include: national governments, terrorists, industrial spies, organized crime groups, hacktivists, hackers, and the GAO Threat Table. Activities could include espionage, hacking, identity theft, crime, and terrorism.

Security measures currently in place for Somerset County are physically secure with video monitoring and include the following.

- Firewalls at each remote location, which:
 - Monitor network,
 - Block incoming connections from known threats, and
 - Block connections to and from unsafe countries.
- Cisco Email Security, which includes:
 - Email malware protection, and
 - Scans all incoming emails for phishing attempts.
- ESET Antivirus, which provides:
 - Real time virus scanning,
 - Scans emails locally for infections, and
 - Exploit/Botnet blocking.
- Cisco Umbrella, conducts:
 - Web filtering,
 - Web traffic reporting, and
 - Protect against known malicious websites.
- Group Policies, which conducts:
 - Software file restriction,
 - Path restriction, and
 - User restriction.
- Shadow Protect, which provides:
 - System backup and recovery,
 - Remote location backups,
 - Full backups daily, and
 - Incremental backups hourly.

National Governments

National cyber warfare programs are unique in posing a threat along the entire spectrum of objectives that might harm U.S. interests. These threats range from propaganda and low-level nuisance web page defacements to espionage and serious disruption with loss of life and extensive infrastructure disruption. Among the array of cyber threats, as seen today, only government-sponsored programs are developing capabilities with the future prospect of causing widespread, long-duration damage to U.S. critical infrastructures.

The tradecraft needed to effectively employ technology and tools remains an important limiting factor, particularly against more difficult targets such as classified networks or critical infrastructures. For the next 5 to 10 years, only nation states appear to have the discipline, commitment, and resources to fully develop capabilities to attack critical infrastructures.

Their goal is to weaken, disrupt or destroy the U.S. Their sub-goals include espionage for attack purposes, espionage for technology advancement, disruption of infrastructure to attack the US economy, full scale attack of the infrastructure when attacked by the U.S. to damage the ability of the US to continue its attacks.

Terrorists

Traditional terrorist adversaries of the U.S., despite their intentions to damage U.S. interests, are less developed in their computer network capabilities and propensity to pursue cyber means than are other types of adversaries. They are likely, therefore, to pose only a limited cyber threat. Since bombs still work better than bytes, terrorists are likely to stay focused on traditional attack methods in the near term. We anticipate more substantial cyber threats are possible in the future as a more technically competent generation enters the ranks.

Their goal is to spread terror throughout the U.S. civilian population. Their sub-goals include: attacks to cause 50,000 or more casualties within the U.S. and attacks to weaken the U.S. economy to detract from the Global War on Terror.

Industrial Spies and Organized Crime Groups

International corporate spies and organized crime organizations pose a medium-level threat to the US through their ability to conduct industrial espionage and large-scale monetary theft as well as their ability to hire or develop hacker talent.

Their goals are profit based. Their sub-goals include attacks on infrastructure for profit to competitors or other groups listed above, theft of trade secrets, and gain access and blackmail affected industry using potential public exposure as a threat.

Hacktivists

Hacktivists form a small, foreign population of politically active hackers that includes individuals and groups with anti-U.S. motives. They pose a medium-level threat of carrying out an isolated but damaging attack. Most international hacktivist groups appear bent on propaganda rather than damage to critical infrastructures. Their goal is to support their political agenda. Their sub-goals are propaganda and causing damage to achieve notoriety for their cause.

Hackers

Although the most numerous and publicized cyber intrusions and other incidents are ascribed to lone computer-hacking hobbyists, such hackers pose a negligible threat of widespread, long-duration damage to national-level infrastructures. The large majority of hackers do not have the requisite tradecraft to threaten difficult targets such as critical U.S. networks and even fewer would have a motive to do so. Nevertheless, the large worldwide population of hackers poses a relatively high threat of an isolated or brief disruption causing serious damage, including extensive property damage or loss of life. As the hacker population grows, so does the likelihood of an exceptionally skilled and malicious hacker attempting and succeeding in such an attack.

In addition, the huge worldwide volume of relatively less skilled hacking activity raises the possibility of inadvertent disruption of a critical infrastructure.

For the purposes of this discussion, hackers are subdivided as follows:

- Sub-communities of hackers
- Script kiddies are unskilled attackers who do NOT have the ability to discover new vulnerabilities or write exploit code, and are dependent on the research and tools from others. Their goal is achievement. Their sub-goals are to gain access and deface web pages.
- Worm and virus writers are attackers who write the propagation code used in the worms and viruses but not typically the exploit code used to penetrate the systems infected. Their goal is notoriety. Their sub-goals are to cause disruption of networks and attached computer systems.
- Security researcher and white hat have two sub-categories; bug hunters and exploit coders. Their goal is profit. Their sub-goals are to improve security, earn money, and achieve recognition with an exploit.
- Professional hacker-black hat who gets paid to write exploits or actually penetrate networks; also falls into the two sub-categories-bug hunters and exploit coders. Their goal is profit.

NATURE OF THE COMPUTER SECURITY COMMUNITY

Hackers and researchers interact with each other to discuss common interests, regardless of color of hat. Hackers and researchers specialize in one or two areas of expertise and depend on the exchange of ideas and tools to boost their capabilities in other areas. Information regarding computer security research flows slowly from the inner circle of the best researchers and hackers to the general IT security world, in a ripple-like pattern.

GAO Threat Table

Table 16-1, below, is an excerpt from NIST 800-82, "Guide to Supervisory Control and Data Acquisition (SCADA) and Industrial Control System Security (SME draft), provides a description of various threats to CS networks:

Table 16-1: Threats to CS Networks

Threat	Description
Bot-network operators	Bot-network operators are hackers; however, instead of breaking into systems for the challenge or bragging rights, they take over multiple systems in order to coordinate attacks and to distribute phishing schemes, spam, and malware attacks. The services of these networks are sometimes made available in underground markets (e.g., purchasing a denial-of-service attack, servers to relay spam, or phishing attacks, etc.).
Criminal groups	Criminal groups seek to attack systems for monetary gain. Specifically, organized crime groups are using spam, phishing, and spyware/malware to commit identity theft and online fraud. International corporate spies and organized crime organizations also pose a threat to the United States through their ability to conduct industrial espionage and large-scale monetary theft and to hire or develop hacker talent.
Foreign intelligence services	Foreign intelligence services use cyber tools as part of their information-gathering and espionage activities. In addition, several nations are aggressively working to develop information warfare doctrine, programs, and capabilities. Such capabilities enable a single entity to have a significant and serious impact by disrupting the supply, communications, and economic infrastructures that support military power - impacts that could affect the daily lives of U.S. citizens across the country.
Hackers	Hackers break into networks for the thrill of the challenge or for bragging rights in the hacker community. While remote cracking once required a fair amount of skill or computer knowledge, hackers can now download attack scripts and protocols from the Internet and launch them against victim sites. Thus, while attack tools have become more sophisticated, they have also become easier to use. According to the Central Intelligence Agency, most hackers do not have the requisite expertise to threaten difficult targets such as critical U.S. networks. Nevertheless, the worldwide population of hackers poses a relatively high threat of an isolated or brief disruption causing serious damage.
Insiders	The disgruntled organization insider is a principal source of computer crime. Insiders may not need a great deal of knowledge about computer intrusions because their knowledge of a target system often allows them to gain unrestricted access to cause damage to the system or to steal system data. The insider threat also includes outsourcing vendors as well as employees who accidentally introduce malware into systems.

Threat	Description
Phishers	Individuals, or small groups, who execute phishing schemes in an attempt to steal identities or information for monetary gain. Phishers may also use spam and spyware/malware to accomplish their objectives.
Spammers	Individuals or organizations who distribute unsolicited e-mail with hidden or false information in order to sell products, conduct phishing schemes, distribute spyware/malware, or attack organizations (i.e., denial of service).
Spyware/malware authors	Individuals or organizations with malicious intent carry out attacks against users by producing and distributing spyware and malware. Several destructive computer viruses and worms have harmed files and hard drives, including the Melissa Macro Virus, the Explore.Zip worm, the CIH (Chernobyl) Virus, Nimda, Code Red, Slammer, and Blaster.
Terrorists	Terrorists seek to destroy, incapacitate, or exploit critical infrastructures in order to threaten national security, cause mass casualties, weaken the U.S. economy, and damage public morale and confidence. Terrorists may use phishing schemes or spyware/malware in order to generate funds or gather sensitive information.

Source: Government Accountability Office (GAO), Department of Homeland Security's (DHS's) Role in Critical Infrastructure Protection (CIP) Cybersecurity, GAO-05-434 (Washington, D.C.: May 2005).

MITIGATION EFFORTS

2016 Cybersecurity Legislation

Legislation was introduced/considered in at least 28 states in 2016. Fifteen of those states enacted legislation, many addressing issues related to 1) security practices and protection of information in government agencies, 2) exemptions from state Freedom of Information or public records acts for information that could jeopardize security of critical information or infrastructure, and 3) cyber/computer crimes.

H.B. 1168

Status: Signed by Governor. Chap. 504

Provides that the amount of a credit against the state income tax is 50 percent, not to exceed \$500,000, of the investment in a qualified Maryland cybersecurity company located in Allegany County, Dorchester County, Garrett County, or Somerset County or Baltimore City; applies the act to initial tax credit certificates issued after June 30, 2016.

S.B. 412

Status: Failed.

Requires that the statewide information technology master plan developed by the Secretary of Information Technology include a cybersecurity framework; requires that the Secretary consider materials developed by the National Institute of Standards and Technology in developing or modifying the cybersecurity framework.

S.B. 681

Status: Failed-Adjourned.

Provides that the amount of a credit allowed against the state income tax is 50 percent, not to exceed \$ 500,000, of the investment in a qualified Maryland cybersecurity company located in Allegany County, Dorchester County, Garrett County, or Somerset County or Baltimore City; applies the Act to initial tax credit certificates issued after June 30, 2016.

Before A Cyber Incident

You can increase your chances of avoiding cyber risks by setting up the proper controls. The following are things you can do to protect yourself, your family, and your property before a cyber incident occurs.

- Only connect to the Internet over secure, password- protected networks
- Do not click on links or pop-ups, open attachments, or respond to emails from strangers.
- Always enter a URL by hand instead of following links if you are unsure of the sender.
- Do not respond to online requests for Personally Identifiable Information (PII); most organizations – banks, universities, companies, etc. – do not ask for your personal information over the Internet.
- Limit who you are sharing information with by reviewing the privacy settings on your social media accounts.
- Trust your gut; if you think an offer is too good to be true, then it probably is.

Password protect all devices that connect to the Internet and user accounts.

- Do not use the same password twice; choose a password that means something to you and you only; change your passwords on a regular basis.
- If you see something suspicious, report it to the proper authorities.
- Familiarize yourself with the types of threats and protective measures you can take by:
 - Sign up for the United States Computer Emergency Readiness Team mailing list.
 - Sign up for the Department of Homeland Security's Stop.Think.Connect. Campaign and receive a monthly newsletter with cybersecurity current events and tips.

During A Cyber Incident

Immediate Actions

- Check to make sure the software on all your systems is up-to-date.
- Run a scan to make sure your system is not infected or acting suspiciously.
- If you find a problem, disconnect your device from the Internet and perform a full system restore.
- If in a public setting immediately inform a librarian, teacher, or manager in charge to contact their IT department.
- Report the incident to your local police so there is a record of the incident. You may also contact federal agencies able to provide assistance and investigate the incident:

- FBI field offices and Internet Crime Complaint Center
- National Cyber Investigative Joint Task Force or call 855-292-3937
- United States Secret Service
- U.S. Immigration and Customs field offices or cybercrimes or call 866-347-2423
- National Cybersecurity and Communications Integration Center or call 888-282-0870
- U.S. Computer Readiness Team

At Work

- If you have access to an IT department, contact them immediately. The sooner they can investigate and clean your computer, the less damage to your computer and other computers on the network.
- If you believe you might have revealed sensitive information about your organization, report it to the appropriate people within the organization, including network administrators. They can be on alert for any suspicious or unusual activity.

Immediate Actions if your Personally Identifiable Information (PII) is compromised:

PII is information that can be used to uniquely identify, contact, or locate a single person. PII includes but is not limited to:

- Full Name
- Social security number
- Address
- Date of birth
- Place of birth
- Driver's License Number
- Vehicle registration plate number
- Credit card numbers
- Physical appearance
- Gender or race

If you believe your PII is compromised:

- Immediately change all passwords; financial passwords first. If you used the same password for multiple resources, make sure to change it for each account, and do not use that password in the future.
- Contact companies, including banks, where you have accounts as well as credit reporting companies.
- Close any accounts that may have been compromised. Watch for any unexplainable or unauthorized charges to your accounts.

After a Cyber Incident

- File a report with the local police so there is an official record of the incident.
- Report identity theft to the Federal Trade Commission.
- Contact additional agencies depending on what information was stolen. Examples include contacting the Social Security Administration if your social security number was compromised, or the Department of Motor Vehicles if your driver's license or car registration has been stolen.

- Report online crime or fraud to your local United States Secret Service (USSS) Electronic Crimes Task Force or the Internet Crime Complaint Center.
- For further information on preventing and identifying threats, visit US-CERT's Alerts and Tips page.

CHAPTER 17: COMMUNITY CAPABILITY

GENERAL OVERVIEW

Through its Emergency Services Department, Somerset County has developed a network of trained agency and volunteer personnel through the Maryland MEMAC, a statewide mutual aid agreement to mitigate and respond to a variety of hazards. This network includes state agencies such as the Maryland State Police, Department of Natural Resources, Department of the Environment, Department of Health and Mental Hygiene, Department of Transportation, State Highway Administration and the Maryland Emergency Management Agency. County agencies include the Roads Department, Sanitary District, Planning and Zoning Office, Board of Education, Social Services, Health Department, Economic Development, Information Technology, Fire Services, Detention Center, and the Sheriff's Office.

The County has mutual aid agreements with Wicomico and Worcester Counties and has also developed working relationships with volunteer organizations including the fire and rescue units that are active in incorporated communities and in rural areas. The County also has mutual agreements with the American Red Cross and other groups, such as the Wicomico County Haz-Mat team, that may be called upon in special circumstances. In addition, the county has agreements to coordinate mitigation activities with private utility companies, including but not limited to Conectiv and Verizon and with private transportation companies, such as the Delmarva Central rail line, for rail transportation Hazmat events.

Through its Planning and Zoning Office, Somerset County has developed a system to regulate land use in sensitive areas, including 100-year floodplains, stream buffer areas, wetlands and Critical Areas. The County also has subdivision regulations for the creation of new lots and a zoning ordinance. Each municipality has similar regulations that are administered locally. Municipalities were asked to complete a capability assessment matrix; results are shown in Appendix E. Furthermore, an assessment of existing planning tools that may address hazard risks and community resiliency was completed during the plan update process. Effective integration of hazard mitigation into the Somerset County's planning framework will result in development patterns that do not increase risks from known hazards or leads to redevelopment that reduces risk from known hazards. The Safe Growth Audit, Appendix C, provides the results of existing local plans and hazard mitigation plan integration to date. Recommendations for improvement are provided in Appendix C on pages C-8 and C-9.

WEATHER RELATED EVENTS

Winter Storm Capability

As discussed in *Chapter 2: County Profile*, Somerset County normally receives less than 6 inches of snow annually. The County Roads Department, the School Board and local municipalities, along with the State Highway Regional Office are equipped to deal with the occasional snow storm. As mentioned in the County Profile, the County also has to

deal with the occasional ice storm during the winter months and the occurrence of fog on days when low hanging clouds hamper visibility.

In addition to the County Roads Department and State Highway Administration, the Emergency Services Department has close ties with both public and private utilities that provide electrical and telephone service to the citizens of the county. Both of these utility companies clear dead or overhanging trees from utility rights-of-way during summer months so that ice and wind damage is lessened during winter storms.

Regarding equipment utilized during winter storm events, the Sheriff's Office currently has two humvees. In 2010, the County Roads Department purchased 4 dump trucks, all of which are well equipped and have plows. Furthermore, the Town of Princess Anne is in the process of purchasing a truck and plow for winter storm events.

With respect to new construction, the County's Building Code has both snow loading and wind loading requirements. The current wind load requirement for new structures is 120 mph wind speed, while the snow load requirement is 20 psf.

Coastal and Riverine Flooding - Hurricane and Tornado Capability

During major weather events, including thunderstorms, tornadoes and the passage of hurricanes, most of the agency and volunteer groups mentioned in the General Overview are called upon for assistance by the Department of Emergency Services. Somerset County is continuously works to expand and build new capabilities to prepare for and respond to flood hazards.

Emergency Management has a plan which coordinates evacuation activities with the Roads Department and State Highway Administration and with local police, fire and rescue units and the Health Department. While Somerset County makes a great effort to mitigate flood events, the character of the natural environment and the large storm surge inundation area, the County lends itself to further mitigation efforts, particularly when moving people and structures from harm's way.

The County also has the capability to mitigate future flood losses through Floodplain Management Ordinance, Subdivision Regulations and Building Codes. The 2011 Somerset County Floodplain was updated in February 4, 2015 in conjunction with the adoption of new FEMA DFIRM maps. While the new Somerset County Floodplain Ordinance does not use the word "Freeboard" specifically, the code does adopt a higher standard by two references:

- a. The ordinance requires the lowest horizontal structural member to be at or above Base Flood Elevation (BFE) (Ordinance 1084 see Section 5.3A(1). This would be the bottom of the floor joist, which makes the first-floor elevation approximately 10.5-11" BFE.
- b. The ordinance also references the Building code (Ordinance 1084 see Sec 4.4A. In Somerset County's case, the 2015 International Building Code requires a 12" freeboard which is the more restrictive of the two ordinances. By enforcing the International Building Code requirement, we automatically comply with our floodplain ordinance.

In addition, both Princess Anne and Crisfield have adopted a new floodplain ordinance, which requires all new development to be built at a minimum of two feet above BFE.

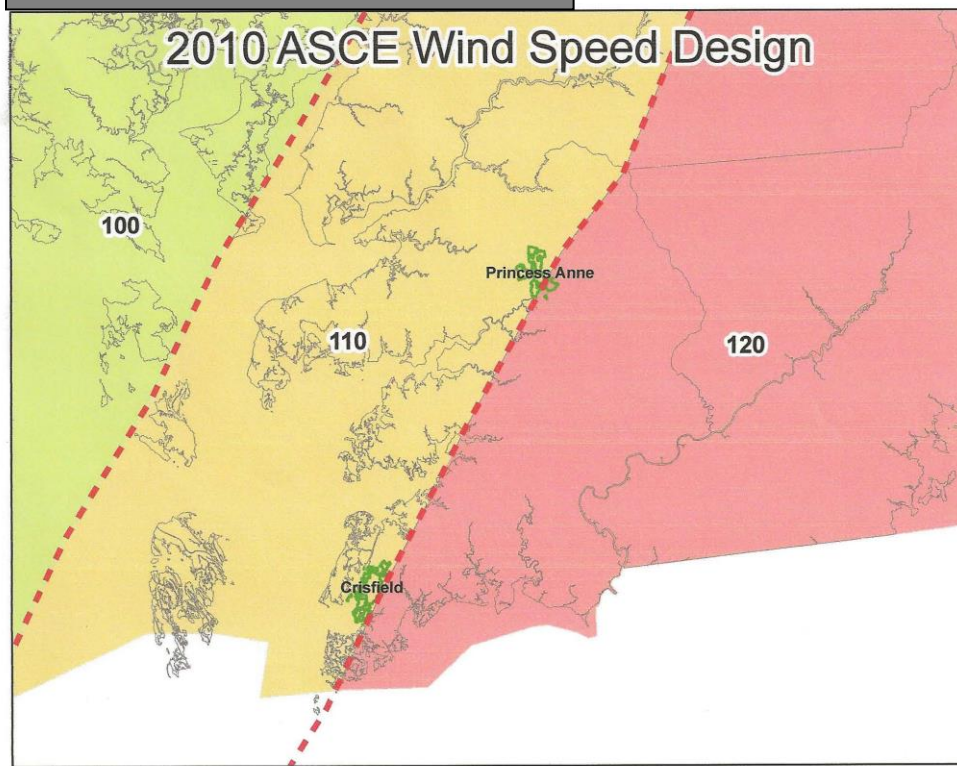
The County also participates in the Chesapeake Bay Critical Area Program, with the purpose of establishing a Resource Protection Program for the bay and its tributaries and encouraging more environmentally sensitive development in areas near the shoreline. This law created a statewide Critical Area Commission to oversee the development and implementation of local land use programs directed towards the Critical Area. Regarding Shoreline Erosion, Somerset County utilizes the State Critical Area Law and has adopted a local program, Local Critical Area Program, which provides for a 100- foot Buffer from the shoreline. This Buffer is measured 100 feet inland from mean high water, the landward extent of tidal wetlands, and the edge of tributary streams. The Buffer also refers to areas that have been expanded beyond 100 feet to include hydric soils. The Critical Area Program also requires the first 100-300 feet from tidal wetlands be managed to protect aquatic and shoreline environments from man-made disturbances. Finally, the program requires that existing vegetation be protected and planting of un-vegetated areas is strongly encouraged.

The local program explains the requirements and protection measures in place and provides Critical Area Maps that visually show the boundaries, 100-foot buffer, land classifications, resources and other resource information and portions of the Subdivision Regulations and Zoning Ordinance that implement the Critical Area requirements. Additional portions of the Critical Area Legislation include: Water-Dependent Facilities Program, Shore Erosion Protection Program, Forest and Developed Woodland Program and Buffer Protection Program. The County Planning and Zoning Office's Department of Technical and Community Services provides printed brochures and information on the 100-foot buffer and tree plantings. Maps may also be reviewed with local planning staff.

Furthermore, the County participates in the National Flood Insurance Program to allow property owners to purchase insurance through this federally sponsored program. As of May 2017, there are 1,940 insurance policies with a total coverage of \$363,588,900 in the County.

Finally, the Building Code has wind loading requirements for new structures and tie-down requirements for mobile homes. The County utilizes the 2015 International Building Code which requires structures to be constructed with a wind speed design of 120 mph. Map 17-1 illustrates the 2010 ASCE Wind Speed Design for Somerset County. The County is divided by two wind speed designs; 110 or 120 mph. The County opted to enforce the higher wind speed design of 120 mph for new structures.

Map 17-1: Wind Speed Design



Heat and Drought Capability

As noted in the Hazard Profile, heat and drought are normally not a severe problem in Somerset County. However when dry conditions disrupt water service in an area of the county, the Emergency Management Agency can request the Maryland Emergency Management Agency to ask the Maryland National Guard to provide temporary water storage tanks. Additionally, the 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.

Furthermore, when heat indexes exceed 105°F for three consecutive days, public service announcements are issued and cooling centers may be available to the public. Announcements regarding the location of cooling centers are provided through the MEMA newsroom, WMDT 47 News and WBOC 16 website. Fire Departments, libraries and the MAC Center are typically utilized for cooling centers.

TECHNOLOGICAL OR OTHER EVENTS

Wildfire Capability

The Department of Natural Resources is the lead agency in wildfire suppression and works with local fire departments in training related to wildfire suppression. In addition, the Department of Natural Resources and Health Department have strict requirements for burning in outdoor areas to help prevent forest and brush wildfires.

Through the years, DNR has developed working relationships with Somerset County agencies including Emergency Services to coordinate resources for suppression and to control wildfires. Local volunteer fire companies, police and the Sheriff's office assist with fire suppression and traffic control in fire situations.

Hazmat Capability

As discussed in *Chapter 12 HazMat*, the County has Mutual Aid Agreements with both Wicomico and Worcester Counties and the Wallops Flight Center for HazMat response activities. In addition, the Crisfield Coast Guard Station, which has a HazMat trailer, will respond to an incident if needed. All County Fire and EMS personnel are required to have HazMat awareness and operations training. Training for all new recruits is conducted at the Maryland Fire and Rescue Institute (MFRI). Somerset County possesses a new HazMat response trailer which was furnished by MDE. The County is currently working on obtaining supplies for the trailer.

The Maryland Department of the Environment is also on call to assist in the cleanup of hazardous materials. The Department of Transportation would be called upon to assist with a major transportation accident or transportation HazMat incident.

Public Health Capability

In terms of health-related risks, Epidemic was included in the Hazard Identification and Risk Assessment (HIRA) in the 2005 Plan, 2012 Plan, and 2017 Plan Update. While Epidemic was rated Medium-Low by the HMPC in both 2005 and again in 2012, it was rated High by the HMPC in 2017. Somerset County has worked diligently on preparedness initiatives and operational planning during this planning cycle.

Somerset County Emergency Management bases its All Hazards Emergency Operations Plan on sixteen Emergency Support Functions (ESFs). These functions work in tandem with public health's preparedness domains to enable both agencies to develop a plan (event specific) and respond in a seamless effort.

Somerset County ESF partners utilize many communication methods and systems to build and organize a response to the threat of an epidemic. Utilization of the Incident Command System further solidifies that the actions taken during a critical health emergency (CHE) will include all the agencies within the jurisdiction's infrastructure to provide the needed response. No single agency could possibly cover all the needed functions to prevent loss of life or property in most critical health emergencies.

Epidemics or the threat of an epidemic is a concern which is addressed by several public health programs on an ongoing daily basis. Maryland Department of Health (MDH) provides guidance to local health department Emergency Preparedness Programs based on guidelines established by the CDC. Program implementation is based on phases defined as detect, respond to, mitigate, and recover from a variety of public health threats. The guidelines from 2012-2016 followed strategies based on fifteen capabilities that helped define roles and responsibilities for multi-agency coordination during each of the phases. Those capabilities have been streamlined into six key preparedness domains for the next five-year period (2017-2022).

The CDC fifteen capabilities (2012-2016) were:

1. Community Preparedness
2. Community Recovery
3. Emergency Operations Coordination
4. Emergency Public Information and Warning
5. Fatality Management
6. Information Sharing
7. Mass Care
8. Medical Countermeasure Dispensing
9. Medical Materiel Management and Distribution
10. Medical Surge
11. Non-pharmaceutical Interventions
12. Public Health Laboratory Testing
13. Public Health Surveillance and Epidemiological Investigation
14. Responder Safety and Health
15. Volunteer Management

The new key domains (2017-2022) are defined as:

1. Community Resilience
2. Incident Management
3. Information Management
4. Countermeasures and Mitigation
5. Surge Management
6. Bio surveillance

Table 17-1 below gives examples of some of Somerset County Health Department strategies and capabilities to respond to real world events and associated Health Vulnerability Assessment (HVA) goals and objectives.

Table 17-1: Mitigation Strategies & Real-Life Examples

2017 Somerset County HVA Goals and Objectives	SCHD Types of Mitigation Strategies Utilized	SCHD Examples for each mitigation strategy in real world events
Goal 1 Objective 1.2 Goal 2 Objective 2.1 Goal 3 Objective 3.1 Objective 3.3	Public Messaging: <ul style="list-style-type: none"> Public Service Announcements via radio, TV & newspaper Face book SCHD website LED message board signs Billboards Town Hall meetings Educational sessions public and private schools Lobby displays SCHD newsletter CDC Educational brochures, handouts, posters 	<p>Somerset County Health Department (SCHD) utilized all the methods listed to provide the public with Zika messaging 2016-2017</p>
Goal 1 Objective 1.2 Goal 2 Objective 2.1 Goal 3 Objective 3.1 Objective 3.3	Utilization of Systems/Equipment: <ul style="list-style-type: none"> Essence & NEDDS (surveillance) HAN (alert notification & document library) MEMRAD (alert notification & resource tracking) WEB EOC (resource tracking & event documentation) Maryland Responds Volunteer database MDH Facility Tracking Tool MSAT G2 Satellite Phone 800 MHz Radios HHS emPower map MDH surveillance tracking systems disease specific 	<ul style="list-style-type: none"> SCHD utilized Maryland Responds volunteers from UMES to educate on Zika Virus in community outreach 2016-2017 SCHD Communicable Disease (CD) staff monitored HAN document library for Zika information (ongoing) MSAT G2 satellite phone and 800 MHz radios tested quarterly with partners for redundant communication (ongoing) CD staff monitored surveillance reporting systems during Ebola and Zika responses (ongoing)
Goal 4 Objective 4.2 Objective 4.3 Objective 4.6	Educational Sessions at community events (Health Fairs and seasonal events)	Zika information 2016-2017 provided at: <ul style="list-style-type: none"> Parks and Recreation Field Day Shorebirds Annual EP Night Somerset County Fair Street Fest Princess Anne Crisfield school events Crisfield Resource Event UMES Health Fair National Night Out
Goal 4 Objective 4.6	Educational outreach to at risk populations	<ul style="list-style-type: none"> University of Maryland Eastern Shore (international campus with worldwide traveler risk) (Zika 2016 & 2017 Annual Health Fair) Faith based outreach in rural communities for seafood and farming industry (Crisfield and Deal Island) 2016 Migrant camp environmental assessments and education in collaboration with Maryland Department of Agriculture (Zika 2016) Pregnant women and persons in reproductive life cycle age group at Chesapeake Health Care (FQHC) provided with Zika information (ongoing)

2017 Somerset County HVA Goals and Objectives	SCHD Types of Mitigation Strategies Utilized	SCHD Examples for each mitigation strategy in real world events
Goal 1 Objective 1.2 Goal 3 Objective 3.1 Objective 3.3	Exercises with ESF Partners: Workshops Table Top Exercises Full Scale Exercises	<ul style="list-style-type: none"> Caroline County Zika TTX with Region IV coalition partners (2017) Participated in PRMC's Ebola workshop, TTX, and Full Scale Functional Exercise (2016-2017) Participation in UMES TTX Ebola (2016) Participated in Statewide Radiological Exercise series x3 (2017) Regional Avian Flu Exercise with Department of Agriculture & MEMA (2016) Attended McCready Hospital Ebola TTX and full scale set up of Mobile Medical Station Region IV asset (2016) Mass Dispensing Exercises with: <ul style="list-style-type: none"> UMES School of Pharmacy (2012-2016) Go Getters (2013-2016) Somerset Community Services (2012-2017)
Goal 1 Objective 1.2 Goal 3 Objective 3.1 Objective 3.3	Training with ESF partners	<ul style="list-style-type: none"> Provided PPE training for Chesapeake Health Care-FQHC (2016) Provided PPE training for McCready Hospital (2016) Sponsored Homeland Security Exercise Evaluation (HSEEP) and Incident Action Plan (IAP) training for regional partners (2017)
Goal 1 Objective 1.2 Goal 3 Objective 3.1 Objective 3.3	Participation in Region IV Healthcare Coalition: <ul style="list-style-type: none"> Hospital Preparedness Program (HPP) partners networking Access to coalition purchased assets EMAC agreements with the Delmarva region partners (Delaware & Virginia) 	<ul style="list-style-type: none"> Member of Delmarva Regional Healthcare Mutual Aid Group (DRHMAG) Participation in workgroups (Coalition Development, Ebola, Radiological) Utilization of coalition regional plans and purchased assets such as the Region IV Mobile Medical Station, Baby PODs, PPE, Mass Fatality supplies
Goal 1 Objective 1.2 Goal 3 Objective 3.1 Objective 3.3	Include Somerset ESF partners in Emergency Preparedness Plans: <ul style="list-style-type: none"> Mass Dispensing Mass Care Fatality Management Medical Surge Volunteer Management Avian Influenza Pandemic Flu 	<ul style="list-style-type: none"> SCHD Mass Dispensing Plans include partners: Law Enforcement, McCready Hospital, UMES, Long Term Care Facilities Shelter Operations in conjunction with Somerset Department of Social Services, Emergency Management, and Red Cross for evacuation of at risk populations <ul style="list-style-type: none"> Shelter Operations 2012 in response to Hurricane Sandy Participation in Long Term Recovery 2012-2014 Monthly Shelter Operations countywide meetings (ongoing) Delivery of Zika prevention kits to at risk populations: <ul style="list-style-type: none"> Chesapeake Health Care OB/GYN clients Migrant Camp clients Outdoor labor workers UMES students and staff Go Getters mental health advocacy clients

Source: Somerset County Health Department

*Refer to Chapter 19: Mitigation Strategies in this document

CHAPTER 18: VULNERABILITY ASSESSMENT

VULNERABILITY REVIEW

Risk and vulnerability assessments were completed to various degrees for each hazard identified and detailed within plan Chapters 4-16. Vulnerability for hazards that have well defined areas of impact or inundation areas, such as flood, storm surge, and sea level rise, were analyzed further.

As noted within *Chapter 3: Hazard Identification, Risk, and Critical Facilities*, the 2017 Hazard Mitigation Planning Committee for Somerset County ranked the following natural hazards as "High": flood, hurricane, and shoreline erosion and sea level rise. Only those hazards that were ranked "High" are included in the vulnerability analysis tables (18-1 and 18-2). Epidemic and cyber security were also ranked as "High" by the committee, but much like hazards such as drought, thunderstorm, and high wind, these hazards are random in their occurrence in the county and therefore, will not be further assessed in the vulnerability analysis.

HAZARD RANKING SYSTEM

During the 2017 Plan Update, the Somerset County Hazard Mitigation Planning Committee ranked a total of 15 different hazards in the Hazard Identification and Risk Assessment (HIRA) section of the Plan. A hazard vulnerability analysis was conducted for those hazards with inundation areas, which includes flood, hurricane (storm surge), and sea level rise. Vulnerability was assessed for essential facilities as well as critical and public facilities. Essential facilities are defined as those facilities that must continue to operate for a community to effectively respond to, and recover from, a hazard incident. Essential facilities include: Emergency Operation Centers (EOCs), Fire and Rescue Stations, Police, Schools, and Medical facilities. Critical and public facilities are also important to the community and include transportation (e.g. bridges and heliports), government buildings, utilities (e.g. communication towers and electric substations), and miscellaneous facilities (e.g. marinas and public spaces).

The vulnerability analysis results for essential facilities is shown on Table 18-1 and the vulnerability analysis results for critical and public facilities is shown on Table 18-2. Each table is composed of a listing of essential or critical and public facilities along with a vulnerability ranking that corresponds to each facility. Vulnerability for each facility is ranked as high, medium, or low depending upon how flood, storm surge, and sea level rise impact the facility. For example, a facility would be considered highly vulnerable if it is impacted by category 1 storm surge, sea level rise, and flood (zones AE or VE).

VULNERABILITY ANALYSIS AND DATA COMPILATION

The vulnerability analysis depicted on Tables 18-1 and 18-2 are composed of a listing of Essential Facilities (18-1) and Critical and Public Facilities (18-2) along with specific hazard rankings that correspond to each facility. The ranking system used for this assessment and methodology is described in the Hazard Ranking System section on page 18-1. Table 18-1 includes essential facilities included in the 2012 Plan, as well as new essential facilities added for the 2017 Plan Update. The same is true for Table 18-2, which depicts both old and new Critical and Public Facilities. Facilities no longer existing and/or operational have been removed. Tables 18-3 and 18-4 have also been updated and the information within includes flooding damage estimates for residential properties.

ESSENTIAL FACILITIES

Somerset County has chosen to identify and classify Essential Facilities into five general categories. As shown on Table 18-1, essential facilities include EOCs, Fire and Rescue Stations, Police, Schools, and Medical facilities. These essential facilities are depicted on Map 6-3 in relation to 2050 Mean Sea Level Rise. Table 18-1 also shows the vulnerability for each Essential Facility to a number of hazards including flood, hurricane storm surge, and sea level rise.

As noted on Table 18-1, there are 49 Essential Facilities identified in Somerset County including 15 schools, 14 medical facilities, 9 police stations, 9 fire and rescue stations, and 2 EOCs. In terms of vulnerability to flood, storm surge, and sea level rise, 3 essential facilities are ranked as "high", 26 are ranked as "medium", and 20 are ranked as "low".

Additionally, the 2017 Plan Update added 10 new essential facilities, which primarily included health facilities such as urgent care centers and pharmacies.

Table 18-1: Essential Facility Vulnerability

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
County	Fire	Ewell Fire Dept.	AE	2.8	1	Yes	High
County	Fire	Tylerton Fire Dept.	AE	4.2	1	Yes	High
County	School	Ewell E.S.	AE	2.9	1	Yes	High
County	Fire	Fairmount Fire Dept.	AE	1.3	1	No	Medium
County	School	Macedonia School	AE	3.9	1	No	Medium
County	Fire	Deal Island/Chance Fire Dept.	X	0	2	No	Medium
County	School	Deal Island	X	0	2	No	Medium
County	School	Marion Sarah Peyton Alt. School	X	0	2	No	Medium
County	School	Somerset Community Services	X	0	2	No	Medium
County	Fire	Marion Fire Dept.	X	0	3	No	Medium
County	School	J.M. Tawes Tech and Career	X	0	3	No	Medium
County	School	Somerset Intermediate School	X	0	3	No	Medium
County	EOC	Back up EOC	X	0	4	No	Medium
County	Medical	Behavioral Health DHMH	X	0	4	No	Medium
County	Police	Eastern Correctional Facility	X	0	4	No	Medium
County	Police	County Sheriff	X	0	0	No	Low
County	Police	911 Back-up Facility	X	0	0	No	Low
County	Police	Detention Center	X	0	0	No	Low
County	School	Holly Grove Ch. School	X	0	0	No	Low
Crisfield	Fire	Crisfield Fire Dept.	AE	2.5	1	No	Medium
Crisfield	Medical	Crisfield Pharmacy	AE	3.1	1	No	Medium
Crisfield	Medical	McCready Memorial Hospital	AE	3.2	1	No	Medium
Crisfield	Medical	Crisfield Clinic	AE	1.3	1	No	Medium
Crisfield	Police	Crisfield Police	AE	3.0	1	No	Medium
Crisfield	School	Woodson E.S.	AE	0.5	1	No	Medium
Crisfield	Fire	Lower Somerset Ambulance Squad	AE	1.5	2	No	Medium
Crisfield	Medical	Marion Pharmacy	AE	0.8	2	No	Medium
Crisfield	Police	DNR Police	AE	1.6	2	No	Medium
Crisfield	School	Crisfield H.S.	AE	3.8	2	No	Medium
Princess Anne	Fire	Mt. Vernon Fire Dept.	AE	0.5	1	No	Medium

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
Princess Anne	Police	UMES Police	X	0	2	No	Medium
Princess Anne	Police	Princess Anne Police	X	0	3	No	Medium
Princess Anne	Medical	Lower Shore Immediate Care	X	0	4	No	Medium
Princess Anne	EOC	EOC	X	0	0	No	Low
Princess Anne	Fire	Princess Anne Fire Dept.	X	0	0	No	Low
Princess Anne	Medical	McCready Outpatient	X	0	0	No	Low
Princess Anne	Medical	Eastern Shore Psychological	X	0	0	No	Low
Princess Anne	Medical	Aurora Senior Living of Manokin	X	0	0	No	Low
Princess Anne	Medical	TLC Medical Center	X	0	0	No	Low
Princess Anne	Medical	Rite Aid Pharmacy	X	0	0	No	Low
Princess Anne	Medical	TLC Pharmacy	X	0	0	No	Low
Princess Anne	Medical	Fresenius Kidney Care	X	0	0	No	Low
Princess Anne	Medical	Karemore Pharmacy	X	0	0	No	Low
Princess Anne	Police	MD. State Police	X	0	0	No	Low
Princess Anne	School	U. of MD Eastern Shore	X	0	0	No	Low
Princess Anne	School	Princess Anne E.S.	X	0	0	No	Low
Princess Anne	School	Greenwood E.S.	X	0	0	No	Low
Princess Anne	School	Washington H.S.	X	0	0	No	Low
Princess Anne	School	Princess Anne Head Start	X	0	0	No	Low

CRITICAL AND PUBLIC FACILITIES

Somerset County has chosen to identify and classify Critical and Public Facilities into four general categories. As shown on Table 18-2, this inventory includes government buildings, transportation structures, utility structures, and communication structures. Table 18-2 also shows the vulnerability for each critical or public facility to a number of hazards including flood, hurricane storm surge, and sea level rise.

As noted on Table 18-2, there are 178 Critical and Public Facilities identified in Somerset County including 21 government buildings, 46 transportation structures, 66 utility structures, and 45 miscellaneous structures. In terms of vulnerability to flood, storm surge, and sea level rise, 27 critical and public facilities are ranked as "high", 62 are ranked as "medium", and 89 are ranked as "low".

Additionally, the 2017 Plan Update added several new Critical and Public Facilities, which primarily included transportation structures (heliports), and utilities (pumping stations, well houses, water towers, and SD building).

Table 18-2: Critical and Public Facility Vulnerability

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
County	Miscellaneous	St. Peters Creek Marina	AE	5.8	1	Yes	High
County	Miscellaneous	Rumbly Point Boat Ramp	AE	6.2	1	Yes	High
County	Transportation	Smith Island Heliport	AE	4.8	1	Yes	High
County	Transportation	Major Bridge	AE	2.2	1	Yes	High
County	Transportation	Major Bridge	AE	0.5	1	Yes	High
County	Transportation	Major Bridge	AE	6.0	1	Yes	High
County	Transportation	Major Bridge	AE	7.1	1	Yes	High
County	Transportation	Major Bridge	AE	2.4	1	Yes	High
County	Transportation	Major Bridge	AE	4.6	1	Yes	High
County	Transportation	Major Bridge	AE	4.5	1	Yes	High
County	Transportation	Major Bridge	AE	5.0	1	Yes	High
County	Transportation	Major Bridge	AE	5.0	1	Yes	High
County	Miscellaneous	Dames Quarter Dock & Ramp	AE	4.0	1	Yes	High
County	Transportation	Major Bridge	AE	2.3	1	Yes	High
County	Miscellaneous	Ewell Ramp/Wharf	AE	4.6	1	Yes	High
County	Utility	Ewell WWTP	AE	5.0	1	Yes	High
County	Miscellaneous	Smith Island Cultural Center	AE	3.1	1	Yes	High
County	Miscellaneous	Smith Island Library	AE	3.1	1	Yes	High
County	Utility	Pumping Station	AE	4.9	1	Yes	High
County	Utility	WWTP	AE	4.9	1	Yes	High
County	Transportation	Major Bridge	AE	7.6	1	Yes	High
County	Miscellaneous	Rhodes Point Dock	AE	6.2	1	Yes	High
County	Miscellaneous	Tylerton Wharf	AE	3.4	1	Yes	High
County	Miscellaneous	Tylerton Marina	AE	3.6	1	Yes	High
County	Utility	Tylerton Transfer Station	AE	4.0	1	Yes	High
County	Transportation	Major Bridge	AE	1.8	1	Yes	High
County	Miscellaneous	Rehoboth Boat Ramp	AE	3.4	1	No	Medium
County	Miscellaneous	Coulbourn Creek Boat Ramp	AE	4.1	1	No	Medium
County	Miscellaneous	Shelltown Boat Ramp	AE	8.5	1	No	Medium
County	Utility	Telecom Tower	AE	4.5	1	No	Medium

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
County	Miscellaneous	Rumbley Marina	AE	2.6	1	No	Medium
County	Transportation	Major Bridge	AE	5.1	0	Yes	Medium
County	Transportation	Major Bridge	AE	6.3	0	Yes	Medium
County	Transportation	Major Bridge	AE	3.8	0	Yes	Medium
County	Transportation	Major Bridge	AE	2.9	0	Yes	Medium
County	Transportation	Major Bridge	AE	0.5	0	Yes	Medium
County	Transportation	Major Bridge	AE	3.3	0	Yes	Medium
County	Transportation	Major Bridge	AE	4.6	1	No	Medium
County	Miscellaneous	Deal Island WMA (3)	AE	5.7	1	No	Medium
County	Miscellaneous	Deal Island/Last Chance Marina	AE	1.7	1	No	Medium
County	Miscellaneous	Wenona Marina	AE	2.3	1	No	Medium
County	Transportation	Major Bridge	VE	11.1	0	Yes	Medium
County	Utility	Chance Transfer Station	AE	3.5	1	No	Medium
County	Miscellaneous	Ewell P.O.	AE	1.3	1	No	Medium
County	Utility	Telephone	AE	1.7	1	No	Medium
County	Miscellaneous	Eddie Evans Ball Field	AE	1.4	1	No	Medium
County	Utility	Smith Island Incinerator	AE	2.2	1	No	Medium
County	Miscellaneous	Webster Cove Marina	AE	8.0	0	Yes	Medium
County	Miscellaneous	Tylerton P.O.	AE	1.7	1	No	Medium
County	Miscellaneous	Upper Hill Playground	AE	0.8	2	No	Medium
County	Miscellaneous	Fairmount Academy	AE	5.0	1	No	Medium
County	Miscellaneous	Upper Fairmount P.O.	AE	2.6	1	No	Medium
County	Utility	Pumping Station	AE	2.6	1	No	Medium
County	Utility	Well House	AE	2.7	1	No	Medium
County	Miscellaneous	Burgess Early Am. Museum	AE	4.0	2	No	Medium
County	Miscellaneous	Raccoon Point Rec. Area	AE	3.1	1	No	Medium
County	Utility	Well House	AE	3.0	1	No	Medium
County	Utility	WWTP	AE	3.0	1	No	Medium
County	Utility	Well House	AE	1.6	2	No	Medium
County	Utility	Halls Creek Road WTP	AE	2.8	1	No	Medium
County	Utility	Well House	AE	3.0	1	No	Medium
County	Utility	Pumping Station	AE	0.5	2	No	Medium
County	Transportation	Major Bridge	AE	4.3	0	Yes	Medium

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
County	Transportation	Major Bridge	AE	4.7	0	Yes	Medium
County	Transportation	Fairmount Heliport	AE	3.4	1	No	Medium
County	Utility	Crisfield Transfer Station	X	0.0	3	No	Low
County	Transportation	Major Bridge	X	0.0	1	No	Low
County	Transportation	Major Bridge	X	0.0	1	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Miscellaneous	Deal Island P.O.	X	0.0	2	No	Low
County	Utility	Verizon Telephone	X	0.0	2	No	Low
County	Miscellaneous	Eden P.O.	X	0.0	0	No	Low
County	Utility	Telecom Tower	X	0.0	0	No	Low
County	Transportation	Major Bridge	X	0.0	3	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Utility	Telecom Verizon Tower	X	0.0	2	No	Low
County	Utility	Marion Electric Substation	X	0.0	3	No	Low
County	Miscellaneous	Marion Station P.O.	X	0.0	2	No	Low
County	Utility	Telephone	X	0.0	2	No	Low
County	Utility	Marion 911 Tower	X	0.0	2	No	Low
County	Utility	Communication	X	0.0	2	No	Low
County	Utility	Pocomoke Electric Substation	X	0.0	0	No	Low
County	Utility	Costen Transfer Station	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Transportation	RR Crossing	X	0.0	0	No	Low
County	Government	Health Dept. Main Office	X	0.0	4	No	Low
County	Government	Dog Shelter	X	0.0	3	No	Low
County	Government	Great Hope Golf Course	X	0.0	2	No	Low

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
County	Miscellaneous	Westover P.O.	X	0.0	4	No	Low
County	Utility	Westover Transfer Station	X	0.0	4	No	Low
County	Utility	Water Tower	X	0.0	4	No	Low
County	Government	Recreation & Parks Complex	X	0.0	4	No	Low
County	Government	Roads & Waterways Complex	X	0.0	4	No	Low
County	Utility	Somerset Co. Landfill	X	0.0	4	No	Low
County	Utility	Pumping Station	X	0.0	4	No	Low
County	Utility	Pumping Station	X	0.0	4	No	Low
County	Government	Mosquito Control	X	0.0	4	No	Low
County	Government	Centralized Athletic Facility	X	0.0	4	No	Low
County	Utility	Telecom Verizon Tower	X	0.0	2	No	Low
County	Government	Cat Shelter	X	0.0	4	No	Low
Crisfield	Utility	Telephone	AE	3.5	1	Yes	High
Crisfield	Miscellaneous	Janes Island Boat Ramp	AE	1.8	1	No	Medium
Crisfield	Utility	Well House	AE	0.8	1	No	Medium
Crisfield	Utility	Crisfield Electric Substation	AE	0.5	2	No	Medium
Crisfield	Utility	Pumping Station	AE	2.4	1	No	Medium
Crisfield	Transportation	Crisfield Airport	AE	3.3	1	No	Medium
Crisfield	Miscellaneous	Glen Ward Ballfield	AE	3.5	1	No	Medium
Crisfield	Utility	Water Tower	AE	1.2	1	No	Medium
Crisfield	Miscellaneous	City Dock	AE	3.3	1	No	Medium
Crisfield	Utility	Telephone & Wireless Tower	AE	2.1	1	No	Medium
Crisfield	Miscellaneous	Somers Cove	AE	1.8	1	No	Medium
Crisfield	Miscellaneous	Crisfield P.O.	AE	3.2	1	No	Medium
Crisfield	Government	Coast Guard	AE	0.5	1	No	Medium
Crisfield	Miscellaneous	American Legion	AE	2.9	1	No	Medium
Crisfield	Utility	Pumping Station	AE	2.4	1	No	Medium
Crisfield	Utility	WWTP	AE	2.0	1	No	Medium
Crisfield	Miscellaneous	Jenkins Creek Dock & Boat Ramp	VE	2.6	1	No	Medium
Crisfield	Miscellaneous	Crisfield Library	AE	4.3	1	No	Medium

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
Crisfield	Transportation	McCready Health Heliport	AE	4.3	1	No	Medium
Crisfield	Government	City Hall	AE	3.0	1	No	Medium
Princess Anne	Miscellaneous	Mt. Vernon Park	AE	1.3	1	No	Medium
Princess Anne	Miscellaneous	Manokin River Park	AE	0.5	2	No	Medium
Princess Anne	Utility	Communication	AE	0.5	1	No	Medium
Princess Anne	Utility	Telephone	X	0.0	4	No	Low
Princess Anne	Miscellaneous	Princess Anne Library	X	0.0	0	No	Low
Princess Anne	Government	Princess Anne Town Hall	X	0.0	0	No	Low
Princess Anne	Utility	Telephone	X	0.0	0	No	Low
Princess Anne	Utility	Well House	X	0.0	4	No	Low
Princess Anne	Miscellaneous	Civic Center	X	0.0	0	No	Low
Princess Anne	Government	DNR Wellington Wildlife	X	0.0	0	No	Low
Princess Anne	Utility	Pumping Station/Water Tower	X	0.0	0	No	Low
Princess Anne	Utility	Water Tower	X	0.0	0	No	Low
Princess Anne	Utility	Well House	X	0.0	0	No	Low
Princess Anne	Miscellaneous	Teackle Mansion	X	0.0	0	No	Low
Princess Anne	Transportation	State Highway Administration	X	0.0	0	No	Low
Princess Anne	Utility	Telecom Tower	X	0.0	0	No	Low
Princess Anne	Utility	Well House	X	0.0	2	No	Low
Princess Anne	Utility	Water Tower	X	0.0	0	No	Low
Princess Anne	Government	Princess Anne Town Garage	X	0.0	0	No	Low
Princess Anne	Government	NRCS, SCD & Extension Office	X	0.0	0	No	Low
Princess Anne	Utility	Telecom Tower	X	0.0	0	No	Low
Princess Anne	Utility	Princess Anne Electric Substation	X	0.0	0	No	Low
Princess Anne	Government	States Attorney Building	X	0.0	0	No	Low
Princess Anne	Government	County/Circuit Court & Annex	X	0.0	0	No	Low
Princess Anne	Utility	Telecom Tower	X	0.0	0	No	Low
Princess Anne	Government	Dept. of Assessments	X	0.0	0	No	Low
Princess Anne	Miscellaneous	Princess Anne P.O.	X	0.0	0	No	Low

Location	Facility Type	Facility Name	Flood Zone	Flood Depth (feet)	Storm Surge Category	2050 Mean Sea Level Rise	Vulnerability Ranking
Princess Anne	Utility	Telecom Tower	X	0.0	0	No	Low
Princess Anne	Utility	Water Tower	X	0.0	0	No	Low
Princess Anne	Utility	Princess Anne WWTP	X	0.0	4	No	Low
Princess Anne	Utility	Princess Anne Electric Substation	X	0.0	0	No	Low
Princess Anne	Utility	Mt. Vernon Transfer Station	X	0.0	3	No	Low
Princess Anne	Government	Tourism Center	X	0.0	2	No	Low
Princess Anne	Utility	Princess Anne Electric Substation	X	0.0	0	No	Low
Princess Anne	Utility	State Police Telecom Tower	X	0.0	0	No	Low
Princess Anne	Utility	Telecom Verizon Tower	X	0.0	0	No	Low
Princess Anne	Utility	Telecom Verizon Tower	X	0.0	0	No	Low
Princess Anne	Utility	Pumping Station	X	0.0	4	No	Low
Princess Anne	Utility	Communication	X	0.0	2	No	Low
Princess Anne	Utility	Pumping Station	X	0.0	4	No	Low
Princess Anne	Utility	Well House	X	0.0	0	No	Low
Princess Anne	Government	Dept. of Social Services	X	0.0	0	No	Low
Princess Anne	Government	District Court	X	0.0	0	No	Low
Princess Anne	Transportation	RR Crossing	X	0.0	0	No	Low
Princess Anne	Transportation	RR Crossing	X	0.0	0	No	Low
Princess Anne	Transportation	RR Crossing	X	0.0	4	No	Low
Princess Anne	Miscellaneous	Washington Inn	X	0.0	0	No	Low
Princess Anne	Government	Annex behind EOC	X	0.0	0	No	Low
Princess Anne	Miscellaneous	Lower Shore Shelter	X	0.0	0	No	Low

RESIDENTIAL STRUCTURES

The vulnerability of residential structures to the impacts of flood, storm surge, and sea level rise is of major concern to Somerset County. In mitigating for a hazard event, it is important to have an approximation of the number of structures that may be affected so appropriate planning measures can be taken. To that end, the vulnerability of residential structures to flood, storm surge, and sea level rise was measured by intersecting the appropriate hazard layer data with data relating to parcels and residential structures. Additionally, results were referenced from FEMA HAZUS software and compared with results from Smith Planning and Design as well as other studies.

Vulnerability to Residential Structures - 100-year Flood

The 2011 Maryland State Hazard Mitigation Plan Update analyzed flood vulnerability for Maryland using FEMA mapped floodplains and FEMA HAZUS software. According to the State Plan, damages from a 100-year flood would cost \$614,479,000 to residential structures in Somerset County. It was estimated that out of over eight thousand households, 3,166 households would be displaced due to a 100-year flood. As a comparison, an Assessment on Maryland's Vulnerability to Flooding by the Eastern Shore Regional GIS Cooperative, completed in 2005, conducted their own HAZUS analysis using a 100-year floodplain created by HAZUS. The results from this Plan identified 2,678 residential households as affected by flooding.

In 2012, residential structures that were built during the planning cycle were analyzed. These figures were also adjusted for the 2017 Plan Update. The following table displays the results:

Table 18-3: New Residential Data

Annual Permit Report Summary (2004-2011)				
Land Use Type	New Structures (Total)	Within 100-year Floodplain	Value Within Floodplain	Total Value
Residential	637	213	\$26,853,473	\$89,099,536
Mobile Homes (Extracted from Residential)	131	24	\$1,633,345	\$8,583,054
Municipal Building Permits (2011-2017) Update Princess Anne				
Residential	58	0	0	\$20,411,833
Commercial	2	0	0	\$720,000

This residential data illustrates that approximately one third of new residential structures constructed between 2004-2011 were built in the 100-year floodplain, supporting the findings from the HAZUS analysis mentioned above. Additionally, based on information provided by the municipalities, between the years 2011 and 2017, 58 residential and 2 commercial building permits were issued. Of these, zero were constructed within the 100-year floodplain, which is a positive improvement.

An analysis was also conducted by Smith Planning and Design during the 2017 Update process using GIS parcel and address locations that intersected the 100-year floodplain to determine the

vulnerability to residential structures and land parcels in Somerset County. There were 9,739 land parcels and 4,786 address points located within the 100-year floodplain in Somerset County. Of those 4,786 address points in the 100-year floodplain, 4,405 were identified as residential.

Somerset County's coastal flood risk analysis incorporates results from a FEMA HAZUS analysis (Version 2.1 for the 2010 AAL Study Data, Version 2.2 for Flood Risk Project Refined Data), 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 computed using state-level tax data (parcel centroids from the Maryland Department of Planning) and local building footprints provided by Somerset County to estimate loss ratios for the 1-percent-annual-chance flood scenario.

Table 18-4: Estimated Potential Losses for 100-year Flood Event Scenario

Flood Risk Refined Losses			
Type	Inventory Estimated Value	% Of Total	1% (100-yr) Dollar Losses
Residential Building & Contents	\$424,900,000	71%	\$57,600,000
Commercial Building & Contents	\$104,400,000	18%	\$13,400,000
Other Building & Contents	\$65,600,000	11%	\$11,800,000
Total Building & Contents	\$594,400,000	100%	\$82,800,000
Business Disruption	N/A	N/A	\$5,700,000
Total	\$594,400,000	N/A	\$88,500,00

Source: FEMA Flood Risk Report - Somerset County, Maryland Coastal Study, May 4, 2016
Flood Risk Project Refined Losses calculated using HAZUS Version 2.2

Vulnerability to Residential Structures - Coastal

The 2011 Maryland State Hazard Mitigation Plan Update analyzed the hurricane wind vulnerability for Maryland using the FEMA HAZUS software. Somerset County was reported as having \$497,000 in annualized loss estimates affecting residential structures. In addition, The Delmarva Hurricane Evacuation Study Technical Data Report by FEMA and the U.S. Army Corps of Engineers also provides some helpful information related to hurricanes in the Somerset County area. The Report consists of a table representing the number of residents (including tourists) that would be affected by each storm surge category. The table is displayed below and depicts a low (10 percent) and high (90 percent) tourist occupancy rate has been used for evacuation scenarios in Somerset County.

Table 18-5: Vulnerability of Evacuating Population

Somerset County Vulnerability to the Evacuating Population							
Cat 1 Low Occ	Cat 1 High Occ	Cat 2 Low Occ	Cat 2 High Occ	Cat 3 Low Occ	Cat 3 High Occ	Cat 4 Low Occ	Cat 4 High Occ.
9,473	10,647	11,768	13,039	14,146	15,544	14,747	16,147

Source: Delmarva Hurricane Evacuation Study Technical Data Report

The Delmarva Hurricane Evacuation Study Technical Data Report also states:

“Delmarva survey participants were presented with three hypothetical hurricane threats and asked whether they would leave their homes to go someplace safer in each. The storms were a category 1 hurricane with 80 MPH winds, a category 2 hurricane with 100 MPH winds, and a category 3 hurricane with winds of 125 MPH. In each instance the category and wind velocity was provided, and it was indicated that a hurricane warning was in effect for the respondent’s community and for all of the Delmarva Peninsula. Interviewees were told that hurricanes have five categories of intensity. They were also told meteorologists refer to a category 3 storm as a major hurricane. Finally, they were told that officials had called for the evacuation of all areas that would be flooded by the respective category of hurricane, plus all mobile homes.”

The results for the Somerset County area are displayed in the table below.

Table 18-6: Intention to Evacuate

Intention to Evacuate Somerset County Region		
Category 1	Category 2	Category 3
44%	52%	77%

Source: Delmarva Hurricane Evacuation Study Technical Data Report

During the 2017 Update process, an analysis was also conducted by Smith Planning and Design using GIS parcels and address points that intersected the Category One storm surge inundation area (the most common and probable to occur) to determine the vulnerability in Somerset County. There were 8,947 land parcels and 6,467 address points located within the Category One storm surge inundation area in Somerset County. Of those 6,467 address points located in the Category One storm surge inundation area, 4,954 were identified as residential.

Vulnerability to Residential Structures - Shoreline Erosion & Sea Level Rise

During the 2017 Plan Update process, an analysis was conducted by Smith Planning and Design using GIS parcels and address points that intersected the 100-foot erosion risk zone to determine the vulnerability of shoreline erosion in Somerset County. There were 2,644 land parcels and 437 address points located within the 100-foot risk zone in Somerset County. Of those 437 address points located within the 100-foot risk zone, 226 were identified as residential.

For the 2017 Plan Update, additional data was gathered from the U.S. Army Corp of Engineers regarding erosion in Somerset County. According to the USACE, of a total measured 813.25 miles of shoreline in Somerset County, 93.14 miles is experiencing 'slight' erosion, 26.25 miles is experiencing 'low' erosion, 7.27 miles is experiencing 'moderate' erosion, and 0.36 miles of shoreline is experiencing a 'high' rate of erosion. A high rate of erosion is defined as a loss of 11

feet per year. More data regarding shoreline erosion can be found on Table 6-1 in *Chapter 6: Shoreline Erosion & Sea Level Rise*.

In regard to sea level rise, an analysis was conducted by Smith Planning and Design during the 2017 Plan Update using GIS parcels and address points that intersected the 2050 Mean Sea Level Rise data layer to determine the vulnerability of structures to sea level rise in Somerset County. There were 5,702 land parcels and 1,970 address points located within the 2050 Mean Sea Level Rise area in Somerset County. Of those 1,970 address points located within the 2050 Mean Sea Level Rise data, 1,133 were identified as residential.

CHAPTER 19: MITIGATION STRATEGIES

MITIGATION STATUS REPORT

In an effort to update the 2012 Somerset County Hazard Mitigation Plan, mitigation strategies from 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.

Prevention

- Staff attended Community Rating System (CRS) workshops. In addition, Planning and Zoning-Technical and Community Services staff attended the National Flood Insurance Program Floodplain Management week-long course at Emergency Management Institute. However, Somerset County has not completed the CRS letter of interest and application to date.
- County adopted new Stormwater Management Ordinance on 8/30/11. The Stormwater Management Ordinance incorporates provisions of Maryland's Stormwater Design Manual and other enhanced Stormwater Management policies recommended by the Maryland Department of the Environment (MDE).
- Adopted new Floodplain Management Ordinance on 1/27/15.

Property Protection

- Princess Anne completed acquisition on blighted property that was damaged during Hurricane Sandy at a total project cost of \$35K.
- Conducted assessment of county designated shelter, Washington High School to determine wind speed design rating for existing roof. The roof meets county code of 100mph. Furthermore, shelter design layout was completed.
- Smith Island United was formed following Hurricane Sandy. A *Smith Island Vision Plan* was developed, as a result.
- Acquired and removed former Whittington Elementary School which housed Head Start and another separate after school and summer program. The building was severely damaged during Hurricane Sandy. Head Start was relocated to Crisfield High School where an addition was added to accommodate.
- Completed *Housing Authority Relocation Planning Study* at a total cost of \$69,750. The facility was severely damaged during Hurricane Sandy. The Study considered alternatives to make facilities more resilient.

Public Education and Awareness

- The county website includes hazard preparedness information on, but not limited to, the following:
 - Emergency Preparedness; and,
 - Hazard Mitigation.
- The Health Department includes hazard preparedness information on, but not limited to, the following:
 - Immunization Clinics;
 - Substances Abuse Treatment Resources;

- Zika Information; and,
- Emergency Preparedness.

Natural Resources Protection

- The Rhodes Pt. Jetty Construction Project is proposed in conjunction with the Rhodes Pt. Shoreline Stabilization Project. The project began in the fall of 2016 and is scheduled to begin again in the summer 2017. Summer of 2017 will know if Jetty Project received total funding
- The Rhodes Pt. Jetty Stabilization Project was slated to begin in the summer of 2017.

Emergency Services

- Damage assessment committee was formed and a new damage assessment plan was completed. In addition, staff attended damage assessment training.
- Installed new generator at Washington High School with a project cost of \$68,648.
- Installed new generator at County Office Complex that operates the entire building. Previous generator is now used as a back-up generator for the Department of Emergency Services.

Structural Projects

- Infrastructure projects completed during the 2015-2017 planning cycle included:
 - Rhodes Pt. County Dock Replacement – Completed
Total cost: \$559,949.20
 - Crisfield – Street Resurfacing – Completed
Total cost: \$1,148,884.75
 - Crisfield – Bulk Head Replacement – Complete
Total cost: \$585,145
 - Crisfield – Cover Street Lift Station – Complete
Total cost: \$79,900
 - Crisfield – Md. Ave. Well Generator – Complete
Total cost: \$61,970
 - Princess Anne drainage project – Complete
Total cost: \$75,362
- Installed (13) flood gates within the City of Crisfield to prevent high tides from entering the streets through the storm drainage system.
- Completed Smith Island drainage feasibility study.

2017 MITIGATION STRATEGIES

Following the update to the vulnerability analysis, the 2017 Somerset County Hazard Mitigation Planning Committee reviewed and modified the 2012 mitigation strategies, which includes a set of goals and objectives that serve as the basis for new mitigation projects. Goals and objectives are multi-hazard and include property acquisition and elevation. Mitigation projects were developed based on those hazards posing the greatest risk to the community based on their local perspective. In addition, projects identified by hazard(s) mitigated and the six broad categories previously discussed.

The nine goals and accompanying objectives are listed in this section. Goals as identified in this plan are broad-based and long-term in nature. The following goals identify what the

community expects to accomplish through mitigation projects during the next five years. Objectives as identified in this plan are more specific and narrow in scope than goals. They expand upon the goals and provide more details on how to accomplish them.

*These goals, objectives, and mitigation action items apply to municipal participants as well as the unincorporated parts of the county. New goals and objectives for the 2017 Plan Update are denoted in **Red**.*

GOAL 1 Maintain and enhance Somerset County's Department of Communications and Emergency Service's capacity to continuously make Somerset 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 and applications.
- Objective 1.5 Maximize use of hazard vulnerability data, such as Hazus Risk Map products.**

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 Assist in the preparation of technical reports for critical facilities hazard mitigation, as requested.

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 and preparedness.

- 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 business that have developed a business risk reduction plan.
- Objective 4.5 Increase the proportion of businesses and residences that have flood insurance.
- Objective 4.6 Increase public awareness and preparedness specific to emerging infectious diseases.**
- Objective 4.7 Increase public awareness of evacuation routes including roads with no outlet/dead-end.**

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 flooding, 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 Continue to 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 repetitive losses from 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. This goal includes facilities at the UMES campus which are identified by the University as being in the floodplain or storm surge area.
- Objective 5.6 Ensure existing high risk residential structures are utilizing retrofitting techniques to mitigate repetitive flooding.

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 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 management 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 and facilities.

- Objective 9.1 Upgrade or replace public roads and stormwater management features to include mitigation into the project design and construction.

- Objective 9.2 Improve 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.
- Objective 9.4 Mitigate disruption of county and municipal services and security issues from cyber-attacks.
- Objective 9.5 Install signage at roadways designated as repetitive flood issues.
- Objective 9.6 Ensure continuous power supply to critical and public facilities.

MITIGATION PROJECTS

Upon completing the review of the goals and objectives established during the 2017 planning process, the Planning Committee reviewed the six broad categories of mitigation action items. These actions include Prevention, Property Protection, Public Education and Awareness, Natural Resource Protection, Emergency Services and Structural Projects. Mitigation ideas were discussed and identified during several of the HMPC meetings that occurred throughout the planning process.

Mitigation projects address the goals and objectives developed by the Hazard Mitigation Planning Committee. Project implementation is expected to occur over the five-year planning cycle. Projects have been identified as both short-term (0-2 years) and long-term (0-5 years). These projects form the core of the *2017 Somerset County Hazard Mitigation Plan Update*. The mitigation projects are grouped into the following six broad categories:

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 Facilities and other buildings or structures to protect them from hazards. Examples include acquisition, elevation, relocation, structural retrofits, and storm shutters.
3. **Public Education and Awareness.** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach 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 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. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

Mitigation projects have been identified by the Hazard Mitigation Planning Committee during the plan update. Several projects have been carried over from either the 2005 or 2012 plan, however, the majority of the projects have been identified during the 2017 plan update. Project

sheets have been developed to fully expand upon mitigation ideas identified throughout the planning process.

There were fifteen projects identified for the 2017 plan update. Projects were reviewed and prioritized by the Hazard Mitigation Planning Committee (HMPC). Prioritization of each project was completed using Survey Monkey, Figure 19.1. A link to the survey was provided to each HMPC member. The survey included project titles, a brief description of each project, and five (5) yes/no questions:

- Do you consider this project cost effective;
- Would there be community acceptance/support for this project;
- Is this project technically feasible;
- Is this project consistent with the County's environment goals; and,
- Should this project be a high priority project for Somerset County?

A reference document containing fully developed project sheets was provided to assist members with completing the survey. As a result, seven (7) projects were ranked "high," five (5) as "medium," and the remaining three (3) projects were ranked "low." Table 19.1 provides the prioritization result for each project.

Figure 19-1: Survey Monkey Example

Table 19-1: Project Prioritization Results

Projects	Category	Ranking
Project A: Community Rating System	Prevention	High
Project B: Commodity Flow Study	Emergency Services	High
Project C: Somerset Civic Center Generator	Emergency Services	High
Project D: Natural Resource Planning-100 ft. Critical Bay Buffer	Natural Resources Project	Low
Project E: Crisfield Tidal Flooding Prevention	Structural Project	High
Project F: Mitigation of Roadway Flooding	Structural Project	Medium
Project G: Critical Facility Accessibility & Signage	Emergency Services & Prevention	Medium
Project H: Mitigation McCready Health Flood Issues	Property Protection	Medium
Project I: Essential Facility Flood Mitigation	Property Protection	High
Project J: Back-up Servers – Cyber Attack	Prevention	High
Project K: Public Outreach – Emerging Diseases	Public Education & Awareness	Medium
Project L: Flood Mitigation Plan Development	Prevention	High
Project M: Repetitive Loss Outreach	Public Education & Awareness	Medium
Project N: Smith Island Heliport, Waterway Facilities & Channel Improvements	Property Protection & Structural Project	Low
Project O: "Dead End" and "No Outlet" Signage	Emergency Services	Low

The following pages contain project sheets, which include:

- Goals associated with each project;
- Project discussion and description;
- Responsible organization(s);
- Estimated cost (if known);
- Possible funding sources; and,
- Timeline for implementation.

PROJECT A: Community Rating System

Goals 1, 2, 4, and 6 are directly related to the Community Rating System as discussed in the following project. This project has been carried over from both the 2005 and 2012 Plans.

DISCUSSION: 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. 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

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
- Flood Preparedness

PROJECT: Prepare a CRS application to reduce insurance costs within the county. Currently, Somerset County is not enrolled in the CRS. As of April 2017, there are 1,388 NFIP policy holders in the county with \$1,085,258 being paid in insurance premiums. On average, Somerset County policy holders pay \$782 per year in flood insurance. By participating in the CRS, policy holders could potentially save between \$39 (5%) to \$352 (45%) per year. The Federal Emergency Management Agency (FEMA) website has a vast amount of detailed information pertaining to the CRS program, including a reference guide to the CRS program titled “National Flood Insurance Policy - Community Rating System Coordinators Guide”. The following table was taken from this guide and depicts the point system for activities.

PREVENTION
Hazard Mitigated: Flood
Project A Goals
Goal 1: Maintain and enhance Somerset County’s Department of Communications and Emergency Service’s capacity to continuously make Somerset County less vulnerable to hazards.
Goal 2: Build and support municipal capacity and commitment to become continuously less vulnerable to hazards.
Goal 4: Increase public understanding, support, and demand for hazard mitigation and preparedness.
Goal 6: Ensure that public funds are used in the most efficient manner.

Responsible Organizations: Somerset County Emergency Services, MDE, Somerset County Planning and Zoning

Estimated Costs: Staff Time

Possible Funding Sources: MDE Technical Assistance, Flood Mitigation Assistance Grant

Timeline for Implementation: Short-Term (0-2 years)

Table 19-2: Credit Points Awarded for CRS Activities

Activity	Maximum Possible Points	Maximum Points Earned	Average Points Earned	Percentage of Communities Credited
300 Public Information Activities				
310 Elevation Certificates	116	116	38	96%
320 Map Information Service	90	90	73	85%
330 Outreach Projects	350	350	87	93%
340 Hazard Disclosure	80	62	14	84%
350 Flood Protection Information	125	125	38	87%
360 Flood Protection Assistance	110	100	55	41%
370 Flood Insurance Promotion ⁵	110	110	39	4%
400 Mapping and Regulations				
410 Flood Hazard Mapping	802	576	60	55%
420 Open Space Preservation	2,020	1,603	509	89%
430 Higher Regulatory Standards	2,042	1,335	270	100%
440 Flood Data Maintenance	222	249	115	95%
450 Stormwater Management	755	605	132	87%
500 Flood Damage Reduction Activities				
510 Floodplain Mgmt. Planning	622	514	175	64%
520 Acquisition and Relocation	2,250	1,999	195	28%
530 Flood Protection	1,600	541	73	13%
540 Drainage System Maintenance	570	454	218	43%
600 Warning and Response				
610 Flood Warning and Response	395	365	254	20%
620 Levees	235	207	157	0.5%
630 Dams	160	99	35	35%
<p>* Figures are based on communities that have received verified credit under the 2013 CRS Coordinator's Manual (about 43% of CRS communities), as of October 2016. The maximum possible points are based on the 2013 Coordinator's Manual. Growth adjustments are not included.</p>				

Source: National Flood Insurance Policy - Community Rating System Coordinator's Guide

Public outreach activities associated with this project, such as targeted residential mailings would result in points awarded within the CRS to Somerset County, resulting in lower flood insurance premiums.

PROJECT B: Commodity Flow Study

Goal 4 is directly related to the Commodity Flow Study as discussed in the following project. This project has been carried over from both the 2005 and 2012 Plans.

EMERGENCY SERVICES
Hazards Mitigated: HazMat & Major Transportation
Project B Goal
Goal 4: Increase public understanding, support, and demand for hazard mitigation and preparedness.

DISCUSSION: In response to an ever-increasing number of hazardous materials incidents during the 1970's and early 1980's, Congress passed Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This Act required that all states and local jurisdictions create a Local Emergency Planning Committee (LEPC) to develop and implement a Hazardous Materials Response Plan. The purpose of these plans is to prevent or reduce loss of life and injury by developing methods to mitigate or minimize damage from Hazardous Materials (HazMat) releases.

Initially, most planning efforts were centered around fixed sites storing or utilizing hazardous materials, but as plan documents were updated and refined, it became apparent that planning efforts needed to also focus more intently on the transportation of hazardous materials. As trucking became more prominent in the movement of hazardous materials, local jurisdictions began to note the movement of these materials and to be concerned about the type of hazardous materials and the volume being moved by this method of transportation.

As a result of this increasing concern, a number of local jurisdictions have chosen to undertake Hazardous Materials Commodity Flow Studies to provide their local LEPC with a better understanding of the type of hazardous materials and associated volumes traveling by truck through their communities. A hazardous materials commodity flow study is an analysis of the hazardous goods that are moving through a particular area.

PROJECT: Conduct a Hazardous Material Commodity Flow Study utilizing University of Maryland Eastern Shore Interns on Rt. 13 in Somerset County. This study is important to the county, as discussed by the HMPC, there are many hazardous material trucks needing to travel through the county using Rt. 13 to carry products to facilities and manufacturers (not necessary within Somerset County). The HMPC also discussed previous transportation HazMat events that have occurred and how a study would be helpful to Emergency Services in preparing for future incidents. Conducting a Hazardous Materials Commodity Flow Study would include detailed information pertaining to the amount and frequency of HazMats and truck traffic travelling through the county.

Responsible Organizations: Somerset County Emergency Services

Estimated Costs: Staff Time (Possibly Intern assistance from UMES)

Possible Funding Sources: Hazard Materials Emergency Preparedness (HMEP) may help offset cost.

Timeline for Implementation: Short-term (0-2 years)

Following the completion of the Commodity Flow Study, targeted planning efforts may be undertaken by the county's Emergency Services Department to train and exercise in preparation of events that may occur based on the types of HazMat materials identified in the Commodity Flow Study.

PROJECT C: Somerset County Civic Center Generator

Goals 6, and 9 are directly related to s as discussed in the following of the Somerset County Civic Center Generator project.

DISCUSSION: The Somerset County Civic Center has been designated as a shelter facility. The main shelter facility for Somerset County is a school, Washington High School, which must be reopened as soon as possible following a storm event. Returning children to school in a timely manner provides continuity and sense of normalcy to the community. As such, a second location is needed, particularly in the case of long-term disaster incidents. In fact, the Civic Center was used in 2012 following the passage of Hurricane Sandy as a step-down shelter. There were 50 remaining evacuees at the time in which Washington High School needed to be reopened, as per the Board of Education, a second location was determined. The Civic Center was identified and used as a shelter until all evacuees were able to return to their homes or were relocated. In addition, the Civic Center is used as a backup facility for the Aurora Senior Living Center at Manokin.

EMERGENCY SERVICES
Hazards Mitigated: Flood, Hurricane, Tornado, High Wind, Winter Storm, Thunderstorm, Extreme Heat, Earthquake
Project C Goals
Goal 6: Ensure that public funds are used in the most efficient manner.
Goal 9: Protect public infrastructure and facilities.

PROJECT: Assess the Somerset County Civic Center 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.



Responsible Organizations: Civic Center, Somerset County Emergency Services

Estimated Costs: TBD

Possible Funding Sources: Hazard Mitigation Assistance Grant Program (HMGP); Pre-Disaster Mitigation Grant (PDM)

Timeline for Implementation: Short-term (0-2 years)

PROJECT D: Natural Resources Planning

Goals 5, 6, and 7 are directly related to Natural Resources Planning as discussed in the following project.

DISCUSSION: Somerset County participates in the Chesapeake Bay Critical Area Program, with the purpose of establishing a resource protection for the bay and its tributaries and encouraging more environmentally sensitive development in areas near the shoreline. This law created a statewide Critical Area Commission to oversee the development and implementation of local land use programs directed towards the Critical Area. The Critical Area law provides for a 100-foot Buffer from the shoreline. This Buffer is measured 100 feet inland from mean high water, the landward extent of tidal wetlands, and the edge of tributary streams. The Buffer also refers to areas that have been expanded beyond 100 feet to include hydric soils. Although the county supports these buffer zones, projects/programs are not in place to require natural vegetation be located in these buffers. In addition, lot/parcels existing prior to 1985 are not subject to the critical area laws. Applying the same regulations of the critical area to areas in the county with significant stormwater issues would improve hazard vulnerability as well.

PROJECT: Implement measures that protect people, property, and natural resources including:

- Due to past development within the critical bay area, identify and complete mitigation activities on these properties such as planting native vegetation, vegetated swales, buffer strips, etc.
 - Step 1: Utilizing the 100-foot critical bay area buffer as a base layer, overlay existing parcel and building footprint layers in GIS to identify those properties within this area.
 - Step 2: Prioritize parcels lacking vegetation and those parcels experiencing a high rate of shoreline erosion.
 - Step 3: Once a priority listing has been established, review listing with Chesapeake Bay Critical Area Commission staff to determine those projects with the highest benefit/cost ratios.
- The Roads Department would identify stormwater management issues and the most vulnerable properties affected in the county. Adopt similar building regulations (such as those in the critical bay area) to these properties.

NATURAL RESOURCES PROJECT
Hazards Mitigated: Shoreline Erosion & Sea Level Rise
Project D Goals
Goal 5: Protect existing and future properties (residential, commercial, public, and critical facilities).
Goal 6: Ensure that public funds are used in the most efficient manner.
Goal 7: Promote sustainable development to improve the quality of life.

Responsible Organizations: Somerset County Department of Technical and Community Services, Chesapeake Bay Critical Area Commission, GIS consultant firm, Somerset County Department of Public Works

Estimated Costs: Staff time, \$5,000-\$7,500 for GIS work

Possible Funding Sources: Hazard Mitigation Assistance Grant Program (HMGP), Flood Mitigation Assistance Program (FMA), Watershed Protection and Flood Prevention Program, Chesapeake Bay Critical Area Commission

Timeline for Implementation: Long-Term

PROJECT E: Tidal Flooding Prevention

Goals 2, 5, 6, and 9 are directly related to Tidal Flooding Prevention as discussed in the following project.

DISCUSSION: Somerset County has been historical impacted by flooding associated with high tides. The City of Crisfield experiences high tide issues daily with roads in the town flooding due to water entering into the storm drainage system and flowing into the city streets. This flood risk impacts the economy, affecting many local businesses with waterfront property.

PROJECT: The City of Crisfield identified 25 areas in need of new or replacement of existing tide gates. Of the original identified 25 tidal gates, 13 have been installed. The City of Crisfield will work with MEMA-Hazard Mitigation Grant Program, to replace 4 defective tidal gates within Somers Cove Marina area and install 8 new gates throughout the city limits.

City of Crisfield

Responsible Organizations: City of Crisfield, MEMA, Somerset County Department of Public Works

Estimated Costs: TBD

Possible Funding Sources: Hazard Mitigation Assistance Grant Program (HMGP), Pre-Disaster Mitigation Grant (PDM)

Timeline for Implementation: Long-Term (0-5 years)

Another mitigation project, similar to the City of Crisfield project, is to identify high tide flooding issues throughout the rest of the county. The storm drainage systems should be evaluated and backflow/flex valves installed following the evaluation process. These backflow/flex valves allow the storm water to pass through the system but prevent the inflow of water from forcing its way up gradient during high tides. Somerset County Public Works assists coastal communities, as well as residents of Smith Island to prioritize storm drainage areas in the county most affected by tidal flooding. Those areas with high cost/benefit ratios would then be considered for the installation of backflow/flex valves or other suitable mitigation actions.

STRUCTURAL PROJECT

Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise

Project E Goals

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

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

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

Goal 9: Protect public infrastructure and facilities.



Source: <http://nehalemmarine.com>

Somerset County

Responsible Organizations: Somerset County Emergency Services and Somerset County Department of Public Works

Estimated Costs: Based on the size of storm drain, type of valve used, and quantity needed

Possible Funding Sources: Hazard Mitigation Assistance Grant Program (HMGP), Pre-Disaster Mitigation Grant (PDM)

Timeline for Implementation: Long-Term (0-5 years)

PROJECT F: Mitigating Roadway Flooding

Goals 4, 6, and 9 are directly related to Roadway Flooding as discussed in the following project.

DISCUSSION: Out of the 124 flood related roadway issues identified for Somerset County, 44 were ranked as “high priority” for mitigation by the HMPC. Those 44 roadways are listed on the below.

STRUCTURAL PROJECT	
Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise	
Project F Goals	
Goal 4:	Increase public understanding, support, and demand for hazard mitigation and preparedness.
Goal 6:	Ensure that public funds are used in the most efficient manner.
Goal 9:	Protect public infrastructure and facilities.

Table 19-3: Excerpt from Repetitive Roadway Flooding Appendix

Flooding Issues – Roads							
Location #	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	State, County, or Municipal	Hazard/Issue	Ranking (High, Medium, Low)
1	Mt Vernon Road @ Elm Street	No	SWM	Occasional	Princess Anne	Stormwater and Heavy Rain Events	High
2	Mt Vernon Road	No	Elevation	Repetitive	Princess Anne	Tidal & Stormwater	High
3	Somerset Avenue @ Fluers Lane	Yes	SWM	Repetitive	Princess Anne	Tidal, Storm Events, and Evacuation Issues	High
Note: Road (Somerset Avenue @ Fluers Lane) cuts town in half when flooded.							
5	Whitehaven Ferry Road	No	Elevation	Repetitive	Princess Anne	Flooding	High
10	Peggy Neck Road	No	SWM	Occasional	Princess Anne	Heavy Rain	High
22	Dublin Road	Yes	SWM	Occasional	Princess Anne	Swamp & Stormwater	High
41	Calvary Road	Yes	Elevation	Repetitive	Crisfield	Flooding	High
42	Sackertown Road	Yes	Elevation	Repetitive	Crisfield	Flooding	High
50	Green Road	No	Elevation	Repetitive	Crisfield	Flooding, Tidal, and Heavy Rain	High
55	Bryan Hall Road	Yes	Elevation	Repetitive	Crisfield	Flooding	High
12	Long Point Road	Yes	Elevation	Repetitive	County	Flooding	High
13	Riley Roberts Road	Yes	Elevation	Repetitive	County	Flooding	High
14	Shores Road	Yes	Elevation	Repetitive	County	Tidal Flooding	High
19	Hodson White Road	Yes	Elevation	Repetitive	County	Flooding, Tidal, and Heavy Rain	High
29	Rumbley Road	Yes	Elevation	Occasional	County	Tidal	High
30	Frenchtown Road	Yes	Elevation	Occasional	County	Tidal/Flooding	High

Location #	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	State, County, or Municipal	Hazard/Issue	Ranking (High, Medium, Low)
	Clifton Bozman Road	Yes	Elevation	Repetitive	County	Flooding, Tidal, and Heavy Rain	High
37	Coulbourne Creek Road	Yes	Elevation	Occasional	County	Flooding	High
39	Daughtery Town Road	Yes	Elevation	Repetitive	County	Flooding, Tidal, and Heavy Rain	High
58	Smith Island Roads - West	Yes	Elevation	Repetitive	County	Tidal	High
86	Smith Island Roads - East	Yes	Elevation	Repetitive	County	Tidal	High
15	Oriole Road	Yes	Elevation	Repetitive	State	Flooding	High
74	Cove Street @ South Somerset Avenue to South 3 rd Street	Yes	Elevation	Repetitive	Crisfield	Flooding	High
76	West Main Street to end of Peninsula (Terminus of Road)	Yes	Elevation	Repetitive	Crisfield	Flooding	High
77	Maryland Avenue extending to beginning of Blue Crab Scenic Byway	Yes	Elevation	Repetitive	Crisfield	Flooding	High
97	Broadway	No	SWM	Repetitive	Crisfield	Flooding	High
123	Riverview Road	Yes	Elevation	Occasional	Crisfield	Flooding & Tidal	High
68	Calvery Road – North of Jenkins Creek	Yes		Repetitive	County	Flooding	High
82	Deal Island Road (Bridge to Hotel Road)	Yes	SWM/Elevation	Repetitive	County	Flooding	High
83	Deal Island Road (Southernmost End)	Yes	SWM/Elevation	Repetitive	County	Flooding	High
116	Stouty Sterling Road	No	Elevation	Repetitive	County	Flooding, Tidal, and Heavy Rain	High
177	Sackertown	Yes	Elevation	Repetitive	County	Tidal Flooding	High
101	Byrd Road	Yes	Elevation	Repetitive	County/State	Tidal Flooding	High
86	Hall Highway	Yes	SWM/Elevation	Repetitive	State	Flooding	High
87	Broad Street	No	SWM	Repetitive	State	Flooding	High

Location #	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	State, County, or Municipal	Hazard/Issue	Ranking (High, Medium, Low)
88	Williams Street	No	SWM	Repetitive	State	Flooding	High
89	10 th Street	No	SWM	Repetitive	State	Flooding	High
90	Dock Street	No	SWM	Repetitive	State	Flooding	High
91	N 11 th Street	No	SWM	Repetitive	State	Flooding	High
92	Goodsell Alley	No	SWM	Repetitive	State	Flooding	High
93	Spruce Street	No	SWM	Repetitive	State	Flooding	High
94	9 th Street	No	SWM	Repetitive	State	Flooding	High
95	8 th Street	No	SWM	Repetitive	State	Flooding	High
96	7 th Street	No	SWM	Repetitive	State	Flooding	High

PROJECT: Conduct engineering studies to determine the most effective mitigation measures to ensure the prevention of future flooding to these roadways. Roadways of concern are depicted on the following maps, including Somerset County, Princess Anne, and Crisfield. After the study is complete, use available grant funding sources to implement the construction phase. These projects should be included within the County Capital Improvement Plan.

Note, priority consideration should be given to those roadways that provide accessibility to critical facilities as discussed in Project F.

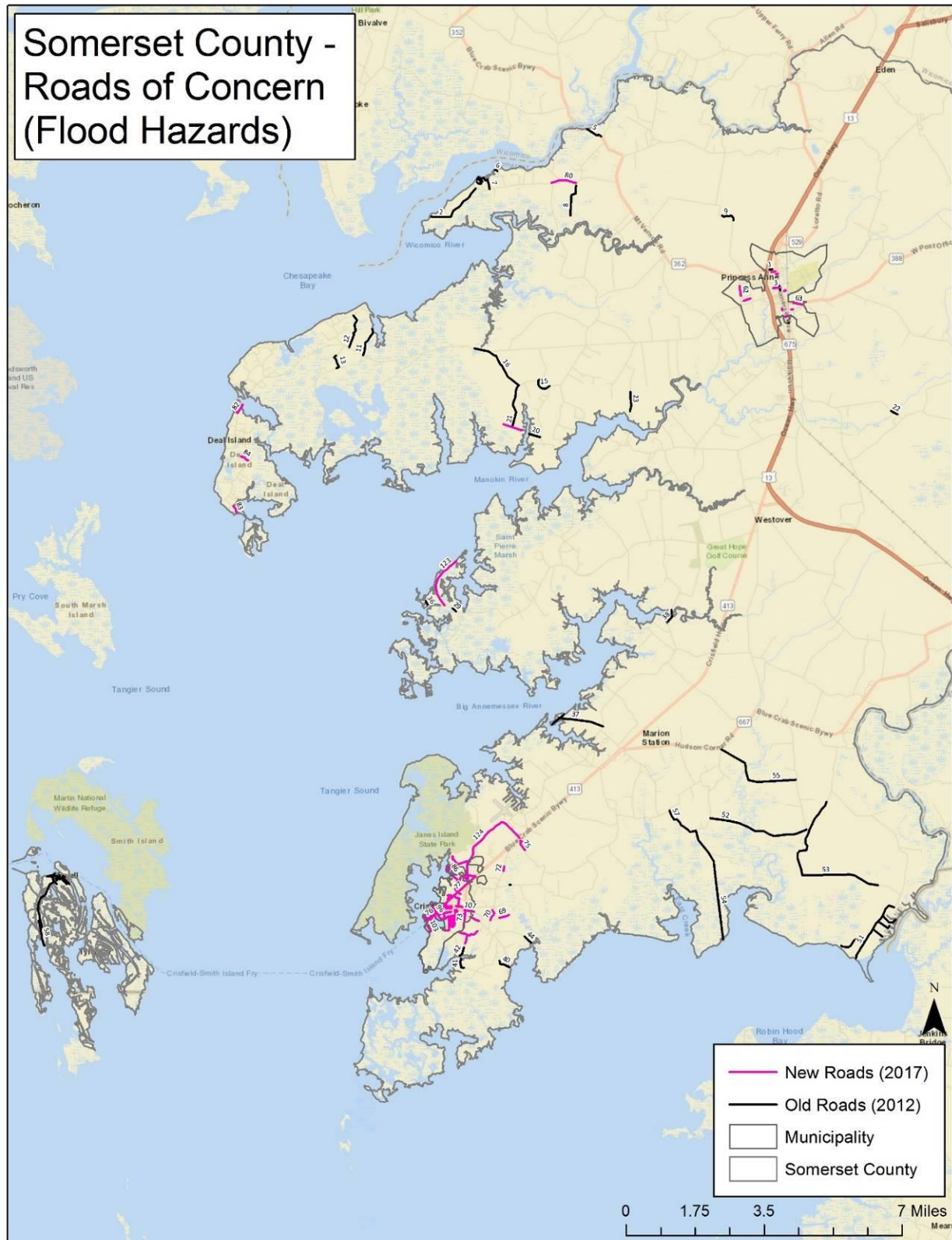
Responsible Organizations: Somerset County Department of Public Works, Private Engineering Firm, and Somerset County Emergency Services

Estimated Costs: To be determined during the conceptual design phase process.

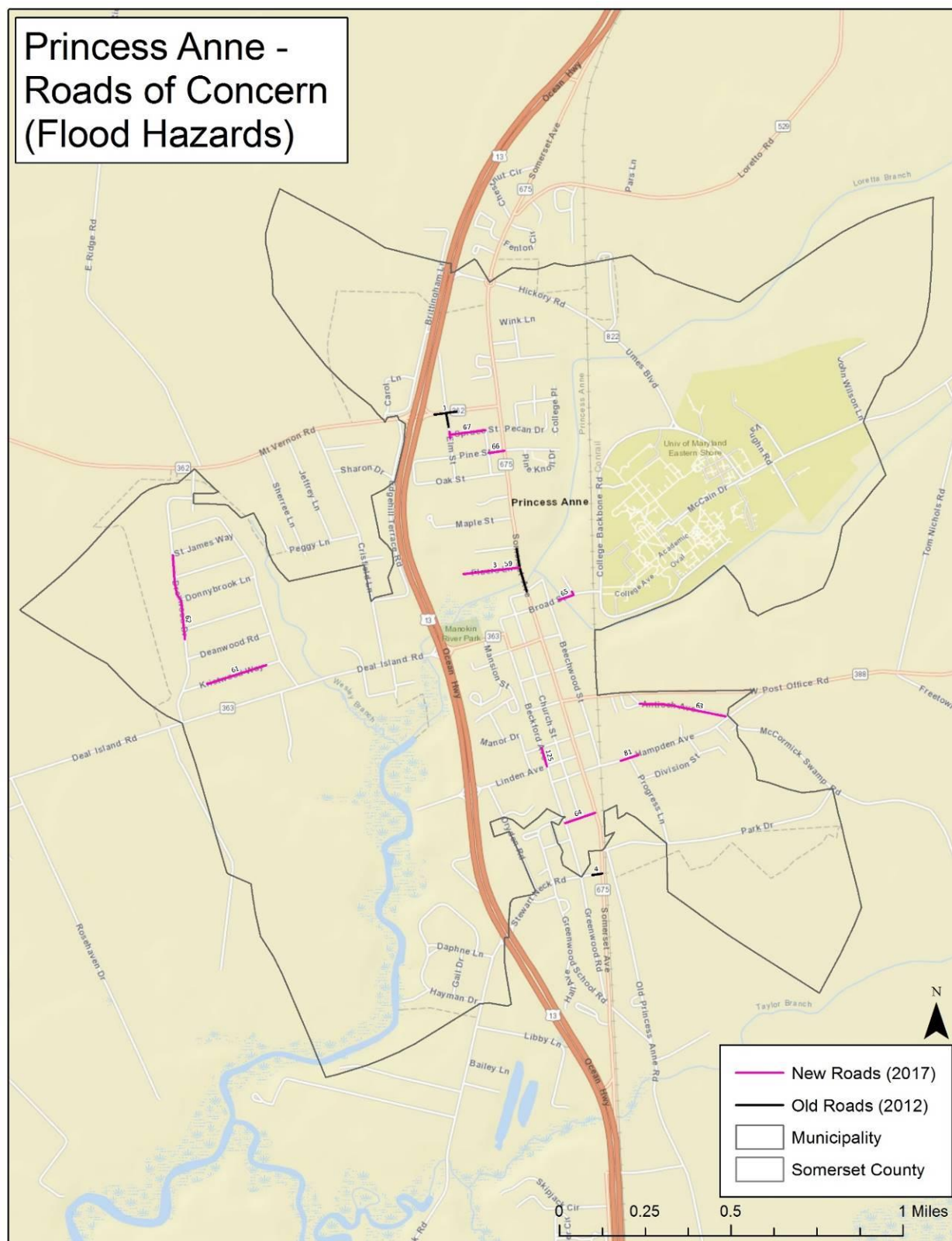
Possible Funding Sources: FEMA Hazard Mitigation Grant Program, FEMA Pre-Disaster Mitigation Grant Program, Emergency Advance Measures for Flood Prevention

Timeline for Implementation: Long-Term (0-5 years)

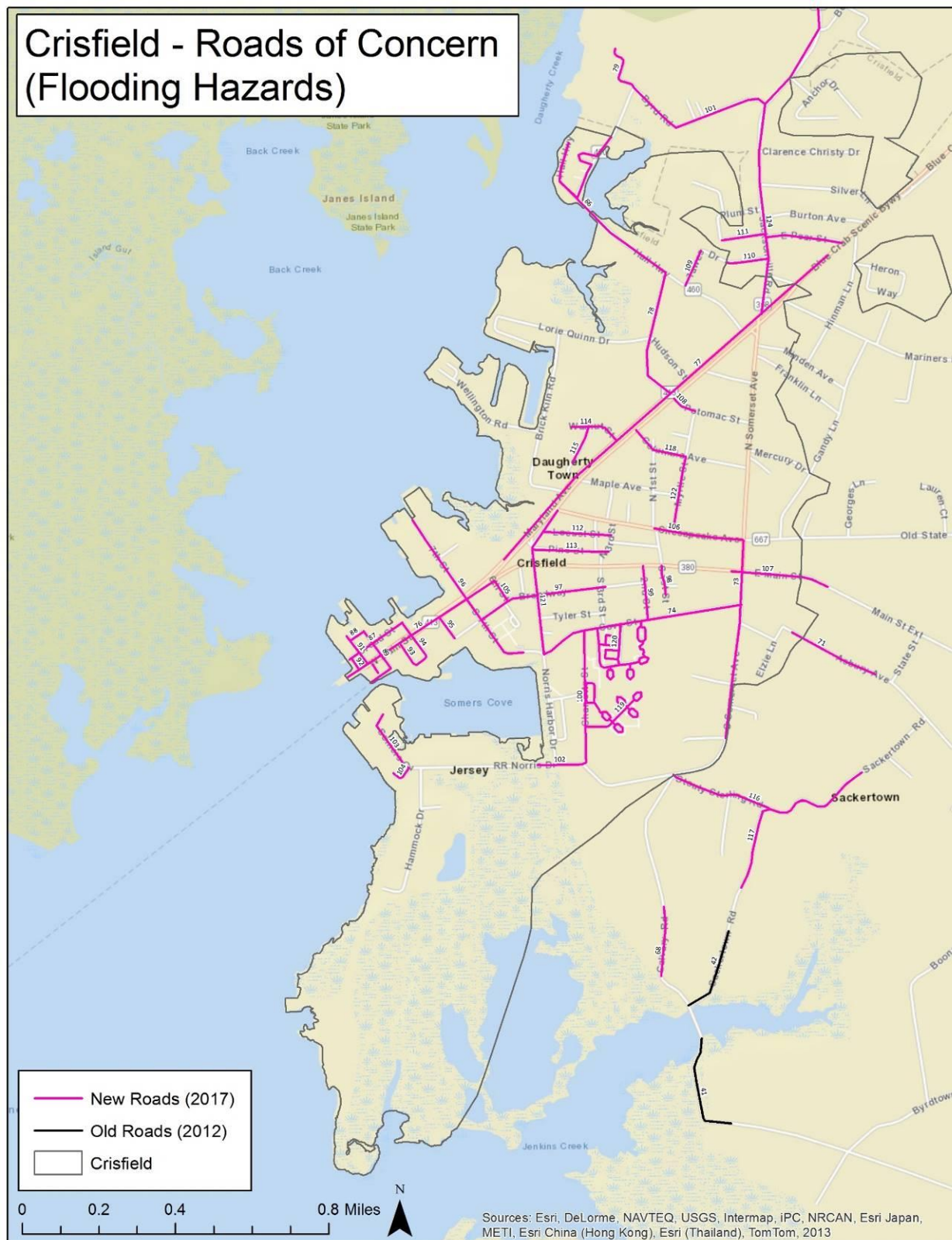
Map 19-1: Somerset County Roads of Concern



Map 19-2: Princess Anne Roads of Concern



Map 19-3: Crisfield Roads of Concern



PROJECT G: Critical Facility Accessibility & Signage at Repetitive Roadway Flood Locations

Goals 4 and 9 are directly related to Critical Facility Accessibility and Signage as discussed in the following project.

DISCUSSION: Maps are the most effective way to convey actual and relative location of critical facilities. Critical facility mapping is a prerequisite to addressing and reducing natural hazards that may affect new or existing critical facilities.

The primary purpose of Critical facility mapping is not just to convey to planners and decision-makers the location of a facility, but to show its capacity and service area in an accurate, clear, and convenient way. Roadways in Somerset County are considered "of concern" if they experience repetitive flooding. These roads were initially identified and ranked in 2012 and new roads were identified in 2017. Depending upon the severity and frequency, roads are ranked as high, medium, or low.

Due to the repetitive nature of flooding on these roadways, it could be the case, that during a flood hazard event, certain essential facilities might become inaccessible. A proximity analysis was conducted to determine which critical facilities were within 1000 feet from a road of concern. The analysis identified eighteen (18) critical facilities that matched these criteria, including:

- Crisfield Fire Department
- Crisfield Pharmacy
- Crisfield Police
- DNR Police
- EOC
- Ewell Fire Department
- Ewell Elementary School
- Fresenius Kidney Care
- Karemore Pharmacy
- L. Somerset Rescue & Fire Department
- Marion Pharmacy
- McCready Health
- Mt. Vernon Fire Department
- Princess Anne Fire Department
- Princess Anne Elementary School
- Princess Anne Police
- TLC Medical Center
- TLC Pharmacy
- Woodson Elementary School

EMERGENCY SERVICES & PREVENTION
Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise
Project G Goals
Goal 4: Increase public understanding, support, and demand for hazard mitigation and preparedness.
Goal 9: Protect public infrastructure and facilities.

Figure 19-1: McCready Health



Based upon the mapping, there are certain critical facilities that might be more prone to inaccessibility than others during a flood hazard event. For example, McCready Health has two primary means for vehicular entrance: Hall Highway and Byrd Road. Nearly all of Hall Highway leading up to the hospital is ranked as high concern (depicted in Figure 19-1), and Byrd Road (not shown) has also been identified as a roadway with frequent flooding issues. Essential facilities with limited road access are important to identify prior to a flood hazard event and these types of facilities may require greater prioritization.

Moving forward, it would be prudent to identify such aforementioned scenarios and identify backup routes to reach essential facilities if the need should arise. If alternative routes cannot be reasonably established, then precautions could be taken to limit flooding on roadways near essential facilities prior to significant flood events.

PROJECT: Somerset County has identified eighteen (18) Critical Facilities where signage markers are needed to identify its location; depicted in Maps 1 and 2. Signage markers need to be placed 12 feet from the centerline on either side of the roadway leading to and from designated Critical Facility. Signage should include depth markers.

Examples of Signage



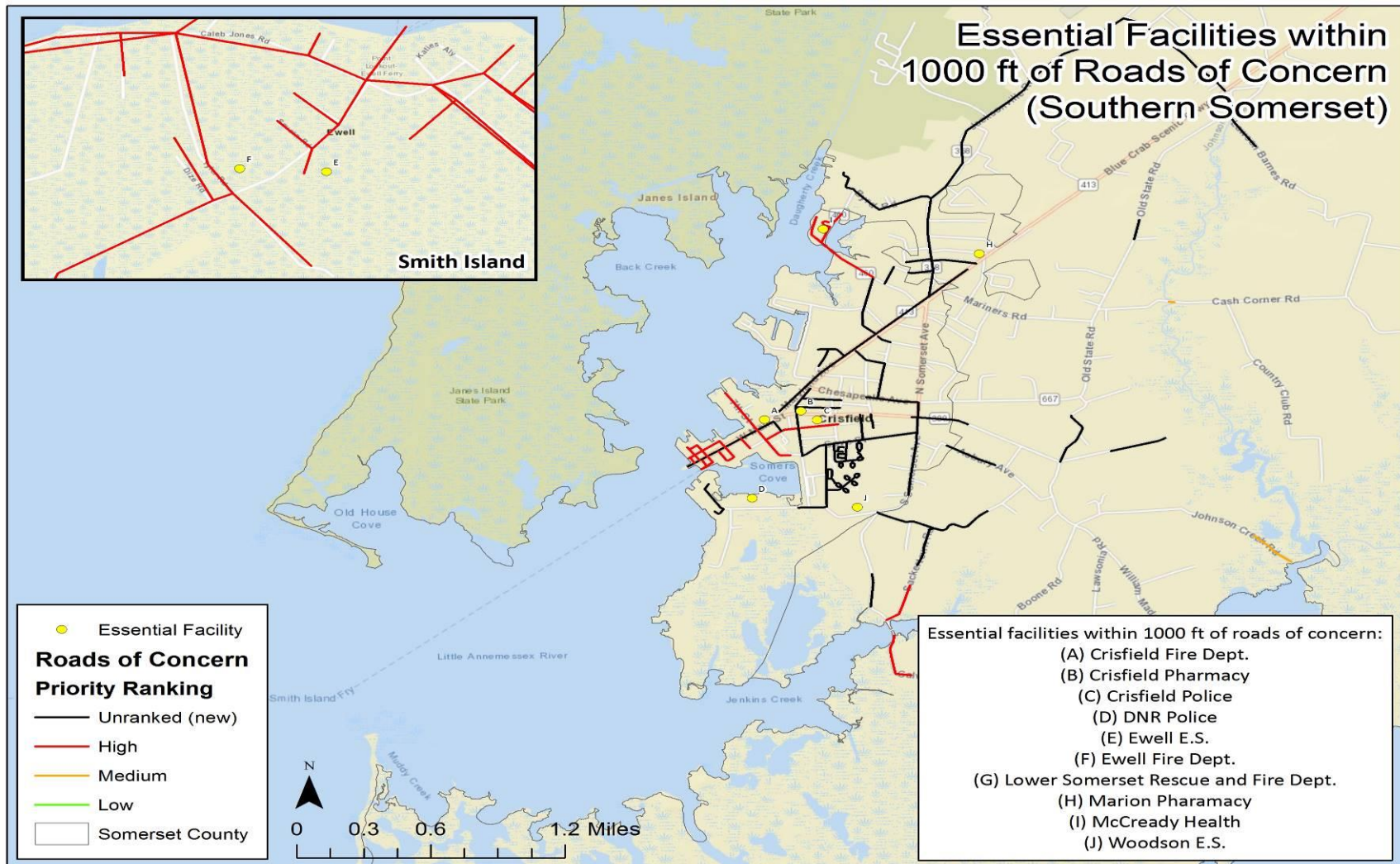
Responsible Organizations: Somerset County Department of Public Works, Somerset County Department of Emergency Services, City of Crisfield, and the Town of Princess Anne

Estimated Costs: Somerset County Resources

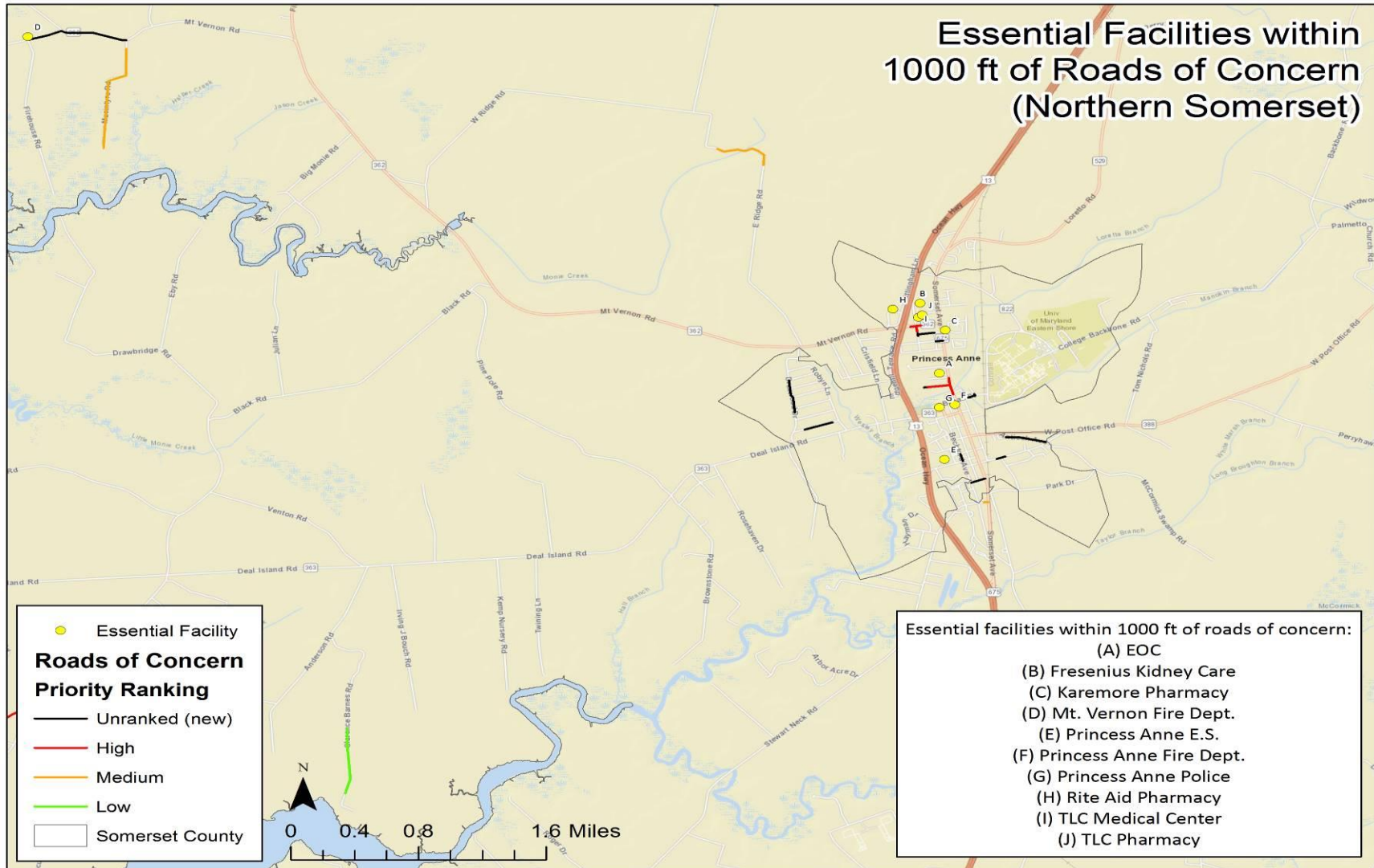
Possible Funding Sources: Somerset County Resources

Timeline for Implementation: Short-Term (0-2 years)

Map 19-4: Southern Somerset-Essential Facilities & Roads of Concern



Map 19-5: Northern Somerset-Essential Facilities & Roads of Concern



PROJECT H: Mitigate Flood Issue at McCready Health

Goals 4, 5, and 6 are directly related to McCready Health Flood Mitigation as discussed in the following project.

DISCUSSION: McCready Health, a network of medical and care facilities serving the Lower Eastern Shore. The main campus in Crisfield, Maryland is located on waterfront property donated by the McCready family in 1919. It features Edward W. McCready Memorial Hospital, the McCready Outpatient Center, McCready Outpatient Rehabilitation, Alice B. Tawes Nursing & Rehabilitation Center and Chesapeake Cove Assisted Living.

McCready Health facilities and the major bridge (S-0010) on Byrd Road, located in the City of Crisfield are located the FEMA floodplain, hurricane storm surge and 2050 mean sea level rise inundation areas. It is important to note that the location data does not include information regarding elevations; some of these facilities were constructed after the County began to issue permits in accordance with the Floodplain Management Ordinance.

PROPERTY PROTECTION	
Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise	
Project H Goals	
Goal 4:	Increase public understanding, support, and demand for hazard mitigation and preparedness.
Goal 5:	Protect existing and future properties (residential, commercial, public, and critical facilities).
Goal 6:	Ensure that public funds are used in the most efficient manner.



Source: www.mccreadyhospital.org

According to an October 30, 2012 article in Reuters Online:

In tiny Crisfield, Maryland, on the eastern shore of the Chesapeake Bay, McCready Memorial Hospital claims to be the smallest hospital in the state of Maryland with only half a dozen beds. Situated at sea level on a tiny peninsula, the hospital faced a 6-foot storm surge and wind-driven rain that brought water into the building as power from the electrical main flickered off and on. "We're at sea level, so it doesn't take much to get right up close. We're up high enough so water didn't enter the building through any doors. But it did enter through some windows," said Shane Kelley, who handles community outreach for McCready. Kelley said staff plugged the leaking windows with towels and used large commercial vacuums to clear water before closing off rooms. While no new patients showed up for emergency care during the storm, McCready had 11 emergency room visitors before noon on Tuesday, mainly elderly people who waited out the storm before seeking care for hypothermia and respiratory problems. "We remained open throughout the storm. We did have to go onto our generator several times throughout the storm. We did lose power. At this point, we're all here as a team and able to accept any patient who needs our help," said Kelley.

PROJECT: Mitigate flood issues at McCready Health by installing flood protection devices, including but not limited to, flood barriers. In addition, hurricane resist windows (impact glass), should be considered, as well. A technical assessment of this facility should be completed to determine the most cost-effective and beneficial hazard mitigation measures considering the extent and scope of flood hazards that have a potential to substantially impact this essential facility.

Responsible Organizations: McCready Health, Somerset County Department of Emergency Services

Estimated Costs: TBD

Possible Funding Sources: Hazard Mitigation Grant Program, FEMA Pre-Disaster Mitigation Grant Program, Emergency Advance Measures for Flood Prevention

Timeline for Implementation: Long-Term (0-5 years)

Figure 19-2: McCready Health Viewing Hall Highway & Bridge



During Hurricane Sandy, Hall Highway and the bridge leading into the hospital were flooded, isolating the facility and making evacuation difficult.

Source: Somerset County Department of Emergency Services.

PROJECT I: Essential Facilities Flood Mitigation & Resiliency

Goals 2, 5, and 6 are directly related to Essential Facilities Flood Mitigation and Resiliency as discussed in the following project.

DISCUSSION: According to *the Reducing Flood Effects in Critical Facilities, FEMA, April 2013, (Hurricane Sandy Recovery Advisory)* in numerous instances, critical facilities could not function because essential equipment was placed in basements, sub-basements, or ground floor levels that flooded. In some cases, components of essential systems were elevated well above the floodwaters, while other critical system elements (transformers, transfer switches, fuel tanks, pumps, etc.) were placed at lower levels and therefore were vulnerable to flooding. When those vulnerable critical elements failed, the systems were rendered inoperative and the functionality of the critical facilities suffered as a result.

PROJECT: Provide information and recommendations to improve the functionality of critical facilities by reducing the vulnerability of essential systems, equipment, and the overall facility to flooding.

Following the review and analysis of information presented herein, flood hazard impacts to Somerset County and its communities is the loss of essential facilities, which would be felt community-wide. As such, essential facilities that were found to be at-risk to coastal and/or riverine flooding, hurricane storm surge inundation, and sea level rise during the development of the plan are priorities for hazard mitigation.

Three Essential Facilities are vulnerable to the following flood hazards: FEMA Flood Zone AE, Flood Depth, Hurricane Category 1 and Sea Level Rise. These facilities are depicted on the following maps, which include depth of flooding.

- Tylerton Fire Department
- Ewell Elementary School
- Ewell Fire Department

The following Essential Facilities are vulnerable to the following flood hazards: FEMA Flood Zone AE, Flood Depth, and Hurricane Category 1.

- Crisfield Police Station – 3.0 ft.
- Crisfield Fire Department – 2.5 ft.
- Woodson Elementary School – 0.5 ft.
- Fairmount Fire Department – 1.3 ft.
- Mt. Vernon Fire Department – 0.5 ft.
- McCready Health – 3.2 ft.

PROPERTY PROTECTION

Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise

Project I Goals

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

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

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

Responsible Organizations: Somerset County Department of Emergency Services and Affected Facilities

Estimated Costs: TBD

Possible Funding Sources: Hazard Mitigation Grant Program, FEMA Pre-Disaster Mitigation Grant Program

Timeline for Implementation: Long-Term (0-5 years)

Map 19-6: Ewell Fire Department



Map 19-7: Ewell Elementary School



Map 19-8: Tylerton Fire Department



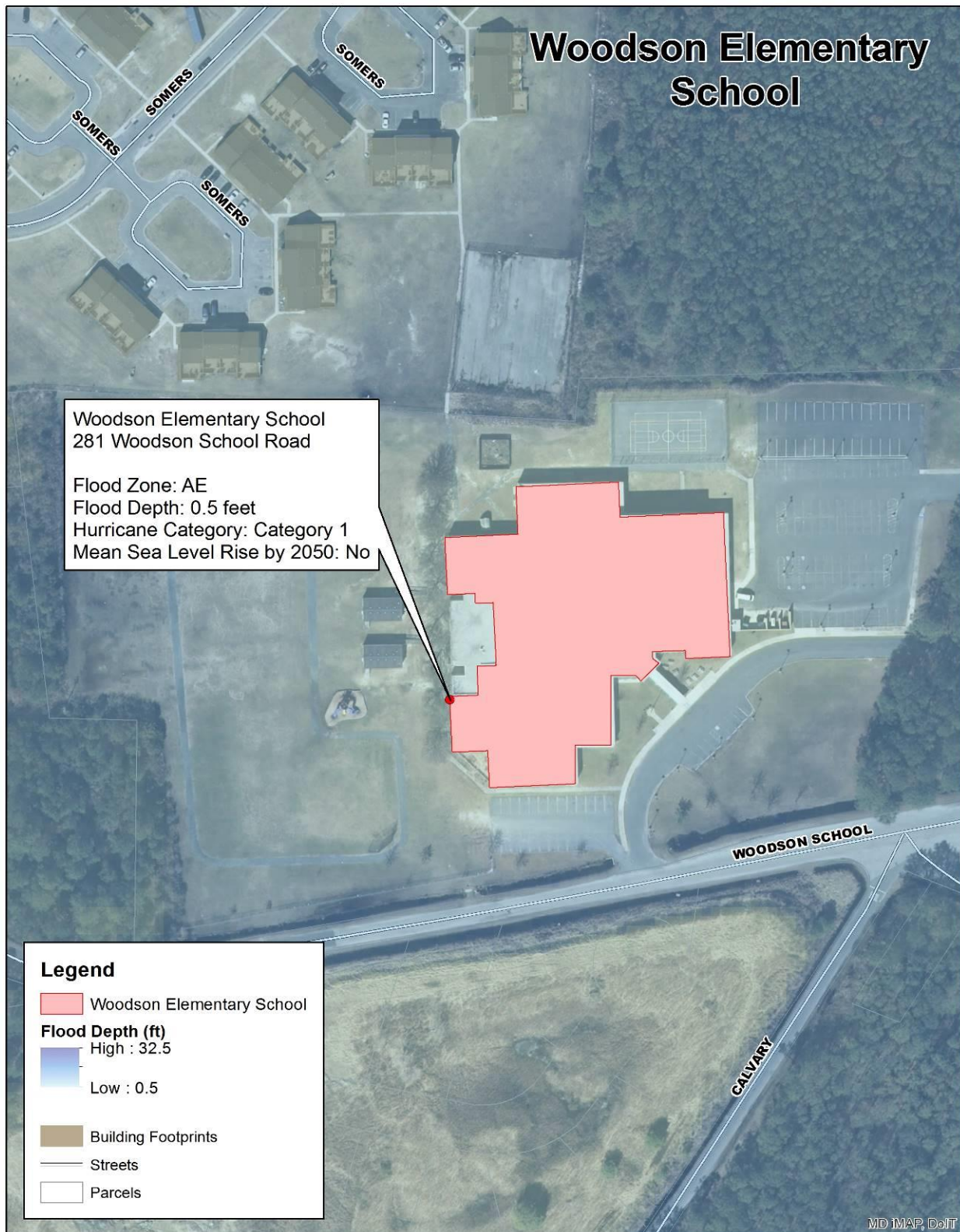
Map 19-9: Crisfield Police Station



Map 19-10: Crisfield Fire Department



Map 19-11: Woodson Elementary School



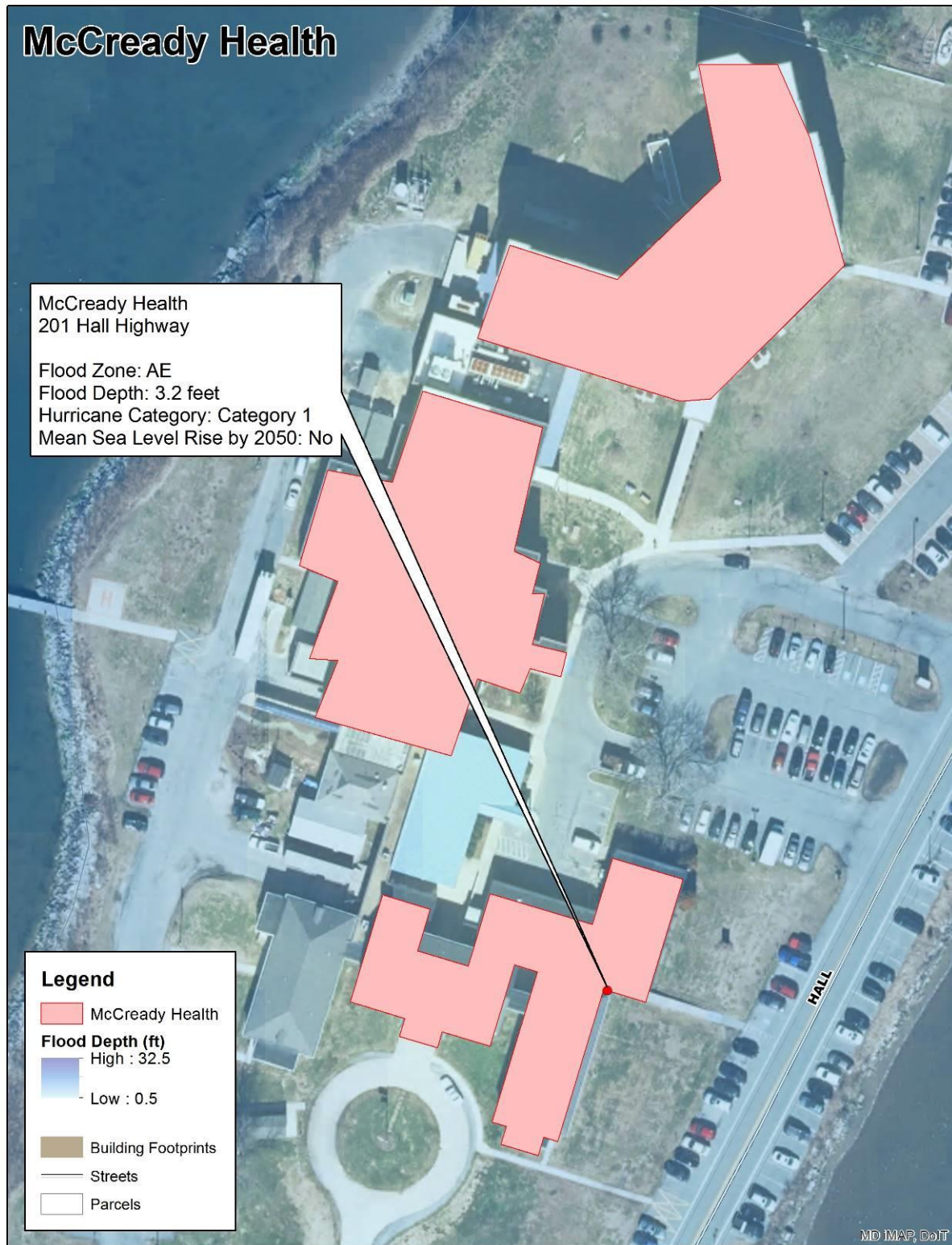
Map 19-12: Fairmont Fire Department



Map 19-13: Mt. Vernon Fire Department



Map 19-14: McCready Health



PROJECT J: Back-Up Servers - Cyber Attack

Goals 9 is directly related to Cyber Attack mitigation as discussed in the following project.

DISCUSSION: Currently backup server locations for Somerset County include: the Sheriff's Office and the main County complex. Additional locations outside of the county are needed in the event that impacts are countywide.

PREVENTION
Hazard Mitigated: Cyber Attack
Project J Goal
Goal 9: Protect public infrastructure and facilities.

On June 26, 2017, a CBS Baltimore affiliate reported that one Maryland county was among the government websites across the country that were shut down for hours after being hacked. At least three states were hit in this cyber breach Sunday, and Howard County Government was one of those attacked, though they had their website back up and running by Monday morning. Their website was in the hands of hackers for hours, and they're now calling this a criminal investigation. Officials say there was no breach of data, and no personal information was compromised during the hack. What appeared to be pro-ISIS propaganda was the threatening message that was blasted out nationwide, front and center on some government websites. "Unfortunately, it's a problem that doesn't seem to be going away," said Markus Rauschecker, cyber security program manager, for the University of Maryland Center for Health and Homeland Security. The breach hit hard in multiple states, including Maryland, where Howard County was hit

PROJECT: Install a back-up server at the Board of Education and in adjacent jurisdictions to avoid interruptions of internet services to Somerset County government from cyber-attack.

Responsible Organizations: Somerset County Information Technology and Somerset County Emergency Services

Estimated Costs: TBD

Possible Funding Sources: FEMA Preparedness (Non-Disaster) Grants

Timeline for Implementation: Short-Term (0-2 years)

PROJECT K: Public Outreach on Emerging Diseases, i.e. Zika

Goals 4 is directly related to Public Outreach as discussed in the following project.

DISCUSSION: According to the CDC -

PUBLIC HEALTH PREPAREDNESS AND RESPONSE NATIONAL SNAPSHOT 2017, ensuring states, localities, and territories are ready to fight Zika and other emerging diseases to make sure the latest science is available for state, local, and territorial health departments during a public health emergency. The CDC activates the State Coordination Task Force (SCTF) within the Emergency Operations Center. The task force has been instrumental during the Zika response in helping communities prepare for and respond to the outbreak. They have facilitated the development of key guidance documents and provided

recommendations that jurisdictions can adapt as they develop state-specific Zika action plans. In areas affected by Zika, the task force worked with national partners to coordinate staffing support with expertise in health education, laboratory, and epidemiology; conduct needs assessments; provide training; and develop resource guides.

PROJECT: Somerset County needs to prepare for multiple public health emergencies, from Zika virus to the growing opioid epidemic. Work with State agencies to improve local response readiness, expand medical countermeasure partnerships, and strengthen emergency management programs.

PUBLIC EDUCATION & AWARENESS
Hazard Mitigated: Epidemic
Project K Goal
Goal 4: Increase public understanding, support, and demand for hazard mitigation and preparedness.

7 Things to Consider When Communicating About Health



Christine E. Prue, MSPH, Ph.D.
Centers for Disease Control and Prevention

Responsible Organizations: Somerset County Health Department, Department of Emergency Services

Estimated Costs: Staff Resources

Possible Funding Sources: Staff Resources

Timeline for Implementation: Ongoing

PROJECT L: Flood Mitigation Plan

Goals 2, 3, and 4 is directly related to development of a Flood Mitigation Plan as discussed in the following project.

DISCUSSION: CRS information – Somerset County obtains the maximum points available for completing a Flood Mitigation Plan.

- **Floodplain management planning (FMP): The most credit is for the first element, a community-wide floodplain management plan,** credit is also available for multi-hazard mitigation plans, multi-jurisdictional floodplain management and hazard mitigation plans, and floodplain management plans prepared for the U.S. Army Corps of Engineers.

PREVENTION
Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise
Project L Goals
Goal 2: Build and support municipal capacity and commitment to become continuously less vulnerable to hazards.
Goal 3: Improve coordination and communication with other relevant organizations.
Goal 4: Increase public understanding, support, and demand for hazard mitigation and preparedness.

PROJECT: A Flood Mitigation Plan will articulate a comprehensive strategy for implementing technically feasible flood mitigation activities for the area affected by the plan. The outcome of the project will result in a FEMA-approved and adopted Flood Mitigation Plan that complies with the requirements of 44 CFR Part 78. The Flood Mitigation Plan refines data and expands upon flood chapters within the County Hazard Mitigation Plan. Upon completion, the Flood Mitigation Plan may be included as an appendix or annex to the *2017 Somerset County Hazard Mitigation Plan Update*.

At a minimum, the plan will include the following required elements:

- Description of the planning process and public involvement. Public involvement may include workshops, public meetings, or public hearings.
- Description of the existing flood hazard and identification of the flood risk, including estimates of the number and type of structures at risk, repetitive loss properties, and the extent of flood depth and damage potential.
- Identification and description of floodplain management goals for the area covered by the plan.
- Identification and evaluation of cost-effective and technically feasible mitigation actions considered.
- Presentation of the strategy for reducing flood risks and continued compliance with the NFIP, and procedures for ensuring implementation, reviewing progress, and recommending revisions to the plan.
- Documentation of formal plan adoption by the legal entity submitting the plan (e.g., County Executive).

Responsible Organizations: Somerset County Department of Emergency Services and Somerset County Department of Planning & Zoning

Estimated Costs: ~\$35,000

Possible Funding Sources: Flood Mitigation Assistance Grant

Timeline for Implementation: Short-Term (0-2 years)

PROJECT M: Repetitive Loss Outreach

Goal 4 is directly related to Repetitive Loss Outreach as discussed in the following project.

DISCUSSION: According to the 2017 CRS Coordinator's Manual, to receive CRS credit for Activity 504, a Category B

community must implement an annual outreach project to the properties in the mapped repetitive loss areas that have insurable buildings, and include a copy of the project with its application and annual recertification. Currently there thirty-seven (37) repetitive loss properties within the unincorporated areas of Somerset County, while fifteen (15) are located in the City of Crisfield and one (1) in the Town of Princess Anne. Additional information can be found in the NFIP & CRS Appendix.

PUBLIC EDUCATION & AWARENESS
Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise
Project M Goal
Goal 4: Increase public understanding, support, and demand for hazard mitigation and preparedness.

PROJECT: The outreach project must advise the recipient of four things:

1. That the property is in or near an area subject to flooding;
2. What property protection measures are appropriate for the flood situation;
3. What sources of financial assistance may be available for property protection measures; and,
4. Basic facts about flood insurance.

The outreach project must be delivered to all properties near repetitive loss areas, not just the properties on the FEMA list. This may be done in one of two ways:

1. An outreach project that is distributed each year to the properties in the repetitive loss areas that have insurable buildings. This project may also be submitted for credit as a targeted outreach project under Activity 330.
2. An annual outreach project developed as part of a Program for Public Information (PPI) credited under Activity 330. The PPI Committee may conclude that there are more effective ways to inform repetitive loss area residents than mailing a notice once a year. The PPI may use a different approach, such as neighborhood meetings, provided the PPI document identifies the priority audience for the service and discusses the best way to reach that audience. For continued PPI credit, the committee must annually evaluate the effectiveness of the outreach projects and revise them as needed.

Responsible Organizations: Somerset County Planning & Zoning; Somerset County Emergency Services

Estimated Costs: Staff Time

Possible Funding Sources: FEMA Hazard Mitigation Grant Program (HMPG), FEMA Pre-Disaster Mitigation Grant Program (PMD)

Timeline for Implementation: Ongoing

An example of the outreach project is as follows:

Dear Resident:

You have received this letter because your property is in an area that has been flooded several times. Our community is concerned about repetitive flooding and has an active program to help you protect yourself and your property from future flooding, but here are some things you can do:

- 1. Check with the Building Department on the extent of past flooding in your area. Department staff can tell you about the causes of repetitive flooding, what the County is doing about it, and what would be an appropriate flood protection level. The staff can visit your property to discuss flood protection alternatives.*
- 2. Prepare for flooding by doing the following:*
 - Know how to shut off the electricity and gas to your house when a flood comes.*
 - Make a list of emergency numbers and identify a safe place to go.*
 - Make a household inventory, especially of basement contents.*
 - Put insurance policies, valuable papers, medicine, etc., in a safe place.*
 - Collect and put cleaning supplies, camera, waterproof boots, etc., in a handy place.*
 - Develop a disaster response plan. See the Red Cross' website at www.redcross.org for information about preparing your home and family for a disaster.*
 - Get a copy of Repairing Your Flooded Home. We have copies at the Public Works Department or it can be found on the Red Cross' website, too.*
- 3. Consider some permanent flood protection measures.*
 - Mark your fuse or breaker box to show the circuits to the floodable areas. Turning off the power to the basement before a flood can reduce property damage and save lives.*
 - Consider elevating your house above flood levels.*
 - Check your building for water entry points, such as basement windows, the basement stairwell, doors, and dryer vents. These can be protected with low walls or temporary shields.*
 - Install a floor drain plug, standpipe, overhead sewer, or sewer backup valve to prevent sewer backup flooding.*
 - More information can be found at FEMA's website, www.ready.gov/floods.*
 - Note that some flood protection measures may need a building permit and others may not be safe for your type of building, so be sure to talk to the Building Department.*
- 4. Get a flood insurance policy.*
 - Homeowner's insurance policies do not cover damage from floods. However, because the community participates in the National Flood Insurance Program, you can purchase a separate flood insurance policy. This insurance is backed by the Federal government and is available to everyone, even properties that have been flooded. Because the community participates in the Community Rating System, you will receive a reduction in the insurance premium.*
 - Because your area is not mapped as a Special Flood Hazard Area, you may qualify for a lower-cost Preferred Risk Policy.*
 - Some people have purchased flood insurance because it was required by the bank when they got a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. During the kind of flooding that happens in your area, there is usually more damage to the furniture and contents than there is to the structure. Be sure you have contents coverage.*
 - Don't wait for the next flood to buy insurance protection. In most cases, there is a 30-day waiting period before National Flood Insurance Program coverage takes effect.*
 - Contact your insurance agent for more information on rates and coverage.*

PROJECT N: Smith Island Heliport, Waterway Facilities, and Channel Improvements

Goals 5, 6, and 9 are directly related to Smith Island Heliport, Water Facilities, and Channel Improvements as discussed in the following project.

DISCUSSION:

Smith Island is only accessible by helicopter or boat, it is essential that the heliport (Ewell/Rhodes Point), waterways facilities (Ewell, Rhodes Point and Tylerton) and the channel to Crisfield remain accessible. The Smith Island Vision Plan included the following goal: “Develop and maintain infrastructure that is resilient, supports the local economy, and increases the quality of life.”

PROPERTY PROTECTION & STRUCTURAL PROJECT
Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise
Project N Goals
Goal 5: Protect existing and future properties (residential, commercial, public, and critical facilities).
Goal 6: Ensure that public funds are used in the most efficient manner.
Goal 9: Protect public infrastructure and facilities.

PROJECT:

The Smith Island roadway systems have been stressed by the constant inundation from deficient drainage. An additional major consideration with respect to roadway flooding, is when the emergency services helicopter needs to transport a resident off the Island for immediate medical attention and the roadway leading to the heliport may be flooded, thereby preventing access. The heliport has recently been recoated and restriped, but improvements are necessary to comply with FAA standards in order to access federal and/or state funding. In addition, the county docks and boat ramps need improvements. The channel will require routine dredging to maintain navigable depths.

Responsible Organizations: FAA/MAA, DNR, Army Corps of Engineers, and Somerset County Department of Emergency Services

Estimated Costs:

Possible Funding Sources:



PROJECT O: "Dead End" and "No Outlet" Road Signage

Goal 4 is directly related to "Dead End" and "No Outlet Road" Signage as discussed in the following project.

DISCUSSION:

Considering how important evacuation routes are during emergency situations, proper road signage is essential. Evacuation routes have been identified and posted. However, there are numerous state service roads, county roads and municipal streets which dead end and pose a potential risk to the general public attempting to evacuate. These roads and streets should be posted as "Dead End" or "No Outlet" per the Manual of Uniform Traffic Control Devices (MUTCD). Additional funding will be required to do so.

PROJECT:

Identify all State roads, county roads and municipal streets within Somerset County that are "Dead End" or "No Outlet" to assist public during emergency situations and/or evacuations.

Manual of Uniform Traffic Control Devices, 2009

Section 2C.26

DEAD END/NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)

- 01 The DEAD END (W14-1) sign (see Figure 2C-5) may be used at the entrance of a single road or street that terminates in a dead end or cul-de-sac.
The NO OUTLET (W14-2) sign (see Figure 2C-5) may be used at the entrance to a road or road network from which there is no other exit.
- 02 DEAD END (W14-1a) or NO OUTLET (W14-2a) signs (see Figure 2C-5) may be used in combination with Street Name (D3-1) signs (see Section 2D.43) to warn turning traffic that the cross street ends in the direction indicated by the arrow.
- 03 At locations where the cross street does not have a name, the W14-1a or W14-2a signs may be used alone in place of a street name sign. Standard:
- 04 The DEAD END (W14-1a) and NO OUTLET (W14-2a) signs shall be horizontal rectangles with an arrow pointing to the left or right.
Page 120 2009 Edition
- 05 When the W14-1 or W14-2 sign is used, the sign shall be posted as near as practical to the entry point or at a sufficient advance distance to permit the road user to avoid the dead end or no outlet condition by turning at the nearest intersecting street.
- 06 The DEAD END (W14-1a) or NO OUTLET (W14-2a) signs shall not be used instead of the W14-1 or W14-2 signs where traffic can proceed straight through the intersection into the dead-end street or no outlet area.

EMERGENCY SERVICES

Hazards Mitigated: Flood, Hurricane, Shoreline Erosion & Sea Level Rise, Wildfire, Earthquake

Project P Goal

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

Responsible Organizations: Somerset County Department of Public Works

Estimated Costs: County Resources

Possible Funding Sources: County Resources

Timeline for Implementation: Short-Term (0-2 years)

CHAPTER 20: PLAN MAINTENANCE AND IMPLEMENTATION

PLAN ADOPTION

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

PLAN UPDATE AND 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 Planning Committee, which was instrumental in developing the Hazard Mitigation Plan, will continue to meet on an annual basis during the five-year cycle to monitor and evaluate mitigation projects and to keep the plan current. Annual status reports will be submitted to the County Commission to update that group on the progress of various mitigation activities. Copies of these reports will be made available to the general 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 has 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 status report will be made available to Planning Committee 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 Planning Committee and the Emergency Management Agency 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 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.

Table 20-1: 2017 Mitigation Strategies – Implementation Matrix

Project	Project Title	Descriptions	Implementation Timeframe		Responsible Organization(s)	Project Completion Yearly Review (Yes/No)				
			Short Term (0-2 years)	Long Term (0-5 years)		Year 1	Year 2	Year 3	Year 4	Year 5
A	Community Rating System Application	Prevention	✓		Planning & Zoning; Emergency Services; MDE					
		Prepare a CRS application to reduces insurance cost for County residents.								
B	Commodity Flow Study	Emergency Services	✓		Emergency Services					
		Conduct a Hazardous Materials Commodity Flow Study on Route 13 within Somerset County.								
C	Somerset County Civic Center Generator	Emergency Services	✓		Civic Center; Emergency Services					
		Assess the Somerset County Civic Center for vulnerability, capacity, facility resources, and back-up power (generator).								
D	Natural Resources Planning	Natural Resource Project		✓	Department of Technical & Community Services; Roads Department					
		Identify and complete mitigation activities on properties within the 100-foot Critical Bay Area Buffer. Utilized resources protections, such as vegetated swales and buffer strips, as mitigation activities.								

Note: Projects highlighted in pink were rated “high” by the 20017 Hazard Mitigation Planning Committee. Please see project sheets for complete project description and additional information within Chapter 19: Mitigation Strategies.

Project	Project Title	Descriptions	Implementation Timeframe		Responsible Organization(s)	Project Completion Yearly Review (Yes/No)				
			Short Term (0-2 years)	Long Term (0-5 years)		Year 1	Year 2	Year 3	Year 4	Year 5
E	Tidal Flooding Prevention	Structural Project		✓	City of Crisfield; Maryland Emergency Management Agency; Emergency Services					
		Install or replace tide gates at the 12 identified locations within Crisfield. Also install backflow/flex valves in areas of the storm drainage system that experience high tidal flooding.								
F	Mitigating Roadway Flooding	Structural Project		✓	Roads Department; Private Engineering Firm					
		Determine the most effective mitigation measures for repetitive flooded roadways. Utilize grant funding to implement mitigation activities.								
G	Critical Facility Accessibility & Signage at Repetitive Roadway Flood Locations	Emergency Services & Prevention	✓		Roads Department; Emergency Services					
		Install signage markers indicating depth by feet and roadway width on both sides of the roadway leading to and from Critical Facilities that are floodprone.								
H	Mitigate Flood Issue at McCready Health	Property Protection		✓	McCready Health Facilities Management; Emergency Services					
		Mitigate flood issues at McCready Health by installing flood protection devices, including but not limited to, flood barriers.								

Note: Projects highlighted in pink were rated "high" by the 20017 Hazard Mitigation Planning Committee. Please see project sheets for complete project description and additional information within Chapter 19: Mitigation Strategies.

Project	Project Title	Descriptions	Implementation Timeframe		Responsible Organization(s)	Project Completion Yearly Review (Yes/No)				
			Short Term (0-2 years)	Long Term (0-5 years)		Year 1	Year 2	Year 3	Year 4	Year 5
I	Essential Facilities Flood Mitigation & Resiliency	Property Protection		✓	Emergency Services; Affected Facilities					
		Improve the functionality of Critical Facilities by reducing the flood vulnerability of essential systems and equipment.								
J	Back-Up Servers – Cyber Attack	Prevention	✓		Information Technology					
		Install a back-up server at the Board of Education and in adjacent jurisdictions to avoid interruptions of internet services to Somerset County government from cyber-attack.								
K	Public Outreach on Emerging Diseases; i.e. Zika	Public Education & Awareness	✓		Somerset County Health Department; Emergency Services					
		Prepare for multiple public health emergencies, from Zika virus to the growing opioid epidemic by working with State agencies to improve local response readiness, expand medical countermeasure partnerships, and strengthen emergency management programs.								

Note: Projects highlighted in pink were rated “high” by the 2017 Hazard Mitigation Planning Committee. Please see project sheets for complete project description and additional information within Chapter 19: Mitigation Strategies.

Project	Project Title	Descriptions	Implementation Timeframe		Responsible Organization(s)	Project Completion Yearly Review (Yes/No)				
			Short Term (0-2 years)	Long Term (0-5 years)		Year 1	Year 2	Year 3	Year 4	Year 5
L	Flood Mitigation Assistance Plan	Prevention	✓		Emergency Services					
		Develop a FEMA – approved and adopted Flood Mitigation Plan that complies with the requirements of 44 CFR Part 78.								
M	Repetitive Loss Outreach	Public Education & Awareness	✓		Planning and Zoning; Emergency Services					
		Conduct public outreach to all properties near repetitive loss areas, not just the repetitive loss properties on the FEMA list.								
N	Smith Island Heliport, Waterway Facilities, and Channel Improvements	Property Protection & Structural Project		✓	FAA/MAA; Department of Natural Resources; Army Corps of Engineers					
		Improve accessibility to the Smith Island Heliport. Complete improvements to the county docks and boat ramps. Routinely dredge the channel to maintain navigable depths.								
O	“Dead End” and “No Outlet” Road Signage	Emergency Services	✓		Roads Department					
		Identify all State roads, county roads and municipal streets within Somerset County that are “Dead End” or “No Outlet” to assist public during emergency situations and/or evacuations.								

Note: Please see project sheets for complete project description and additional information within Chapter 19: Mitigation Strategies.

APPENDIX A

CRITICAL & PUBLIC FACILITIES METHODOLOGY & DATABASE

METHODOLOGY

Critical and Public Facilities identified for the 2012 Somerset County Hazard Mitigation Plan were reviewed and updated for utilization in the 2017 Somerset County Hazard Mitigation Plan Update. For the 2017 Plan Update, Smith Planning and Design created an "Essential Facility" designation which included the following primary categories: EOCs, Fire, Medical, Police, and School. Critical and Public facilities now include the following categories: Government, Transportation, Utilities, and Miscellaneous. The following steps detail the data update methodology.

- Step 1.** An updated critical and public facilities database provided by Somerset County staff was cross-referenced with the 2012 critical and public facilities (which included 'essential facilities') database to determine changes and additions that needed to be made to the database.

Essential facilities were separated from the existing database in order to create a new database containing only essential facilities.

- Step 2.** As part of the 2017 Plan Update, a geodatabase for essential facilities as well as critical and public facilities was created in ArcMap. In order to map each facility, locations such as addresses or coordinates were required. All of the essential facilities included an exact and correct address, which allowed for easy mapping.

Many of the critical and public facilities included an exact location, but for those facilities lacking necessary information to identify their location, the 2013 Maryland Property View Database was utilized to extrapolate information such as: account number, address, city, improved value, and facilities descriptions. For particularly difficult facilities, Google, specifically Google Maps, was utilized to determine locations.

- Step 3.** Once locations were determined for each facility, they were added as point data into the ArcMap geodatabase in one of several ways: address matching via MD Property View, Account ID matching via MD Property View, or digitized by hand.

- Step 4.** Once the geodatabase was finalized, essential and critical and public facilities were included on hazard inundation mapping (e.g. flood) and utilized in tables for the Vulnerability Analysis.

Overall modifications include the following updates:

- **Critical & Public Facilities**
 - 2012 – 213 Facilities (included essential facilities)
 - 2017 – 238 Facilities (49 essential facilities, 178 mapped critical and public facilities, and 11 unmapped critical and public facilities)
 - In total, 25 new facilities were added, taking into consideration that several facilities included in the critical and public database, upon review, were deemed private and removed.
 - New facilities included Medical (e.g. urgent care centers), Police (e.g. UMES police), Transportation (e.g. heliports), and Utilities (e.g. pumping stations, well houses, water towers, and SD control building).
- **2017 Critical & Public Facilities New Attributes**
 - New Attributes Columns added in 2017 Plan Update Process
 - 2050 Mean Sea Level Rise (Yes/No)
 - Storm Surge Category
 - Flood Zone
 - Flood Depth
 - Year Built
 - Historic (Yes/No)
 - Building stories
 - Improvement value (based on SDAT)

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2017 Essential Facilities Database												
Facility Type	Facility Name	Location	Address	Zip Code	Year Built	Historic	# Of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
EOC	Back Up EOC	County	8928 Sign Post Road	21871	1989	N	1	X	0	No	4	\$1,718,000
EOC	EOC	Princess Anne	11916 Somerset Ave	21853	1950	Y	1	X	0	No	0	\$863,800
Fire	Marion Fire Dept.	County	28390 Crisfield Marion Road	21838	1948	Y	2	X	0	No	3	\$290,600
Fire	Deal Island/Chance Fire Dept.	County	10090 Deal Island Road	21821	1954	Y	1	X	0	No	2	\$124,000
Fire	Ewell Fire Dept.	County	3990 Smith Island Road	21824	1957	Y	2	AE	2.8	Yes	1	\$349,500
Fire	Fairmount Fire Dept.	County	27407 Fairmount Road	21871	2003	N	1	AE	1.3	No	1	\$492,500
Fire	Tylerton Fire Dept.	County	21140 Tuff St	21824	-	-	-	AE	4.2	Yes	1	\$85,000
Fire	Crisfield Fire Dept.	Crisfield	906 W Main St	21817	1961	Y	2	Ae	2.5	No	1	\$264,100
Fire	Lower Somerset Rescue and Fire Dept.	Crisfield	2 Mill Lane	21817	1985	N	1	AE	1.5	No	2	\$117,900
Fire	Mt. Vernon Fire Dept.	Princess Anne	27440 Mount Vernon Road	21853	1920	Y	1	AE	0.5	No	1	\$202,000
Fire	Princess Anne Fire Dept.	Princess Anne	11794 Somerset Ave	21853	-	-	2	X	0	No	0	\$572,600
Medical	Behavioral Health MDH	County	8928 Sign Post Road	21871	1950	Y	1	X	0	No	4	\$1,718,000
Medical	Crisfield Pharmacy	Crisfield	390 W Main St	21817	1928	Y	2	AE	3.1	No	1	\$42,600
Medical	McCready Health	Crisfield	201 Hall Hwy	21817	1980	N	2	AE	3.2	No	1	\$14,953,800
Medical	Crisfield Clinic	Crisfield	4384 Crisfield Hwy	21817	1982	N	1	AE	1.3	No	1	\$121,200
Medical	Marion Pharmacy	Crisfield	26427 Burton Ave	21817	1987	N	1	AE	0.8	No	2	\$156,900
Medical	McCready Outpatient	Princess Anne	12208 Brittingham Lane	21853	1963	Y	1	X	0	No	0	\$261,000
Medical	Eastern Shore Psychological	Princess Anne	11120 Somerset Ave	21853	1972	N	1	X	0	No	0	\$408,800
Medical	Aurora Senior Living Of Manokin	Princess Anne	11974 Edgehill Ter	21853	1985	N	1	X	0	No	0	\$9,495,100
Medical	TLC Medical Center	Princess Anne	12137 Elm St	21853	1985	N	1	X	0	No	0	\$428,800
Medical	Rite Aid Pharmacy	Princess Anne	12154 Brittingham Lane	21853	1997	N	1	X	0	No	0	\$481,100
Medical	TLC Pharmacy	Princess Anne	12145 Elm St	21853	2006	N	2	X	0	No	0	\$3,284,700

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Facility Type	Facility Name	Location	Address	Zip Code	Year Built	Historic	# Of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Medical	Lower Shore Immediate Care LLC	Princess Anne	12302 Somerset Ave	21853	2010	N	-	X	0	No	4	\$1,280,400
Medical	Fresenius Kidney Care	Princess Anne	12185 Elm St	21853	2011	N	1	X	0	No	0	\$1,159,100
Medical	Karemore Pharmacy	Princess Anne	12085 Somerset Ave	21853	-	-	-	X	0	No	0	\$89,300
Police	County Sheriff	County	30426a Sam Barnes Road	21871	1982	N	1	X	0	No	0	\$363,900
Police	911 Back-Up Facility	County	30426 Sam Barnes Road	21871	1982	N	1	X	0	No	0	-
Police	Eastern Correctional Facility	County	30420 Revells Neck Road	21890	1987	N	-	X	0	No	4	\$95,000,000
Police	Detention Center	County	30474 Revells Neck Road	21871	-	-	-	X	0	No	0	\$2,392,300
Police	Crisfield Police	Crisfield	315 W Main St	21817	1900	Y	1	AE	3.0	No	1	\$152,600
Police	DNR Police	Crisfield	800 Rear Norris Harbor Dr.	21817	-	-	1	AE	1.6	No	2	\$75,300
Police	Princess Anne Police	Princess Anne	11780 Beckford Ave	21853	1857	Y	2	X	0	No	3	\$227,300
Police	Md. State Police	Princess Anne	30581 Perry Road	21853	2004	N	1	X	0	No	0	\$1,403,600
Police	UMES Police	Princess Anne	30373 University Blvd South	21853	-	-	-	X	0	No	2	-
School	Marion Sarah Peyton Alt. School	County	28573 Hudson Corner Road	21838	1957	Y	1	X	0	No	2	\$944,100
School	Deal Island	County	23275 Lola Wheatley Road	21821	1970	N	1	X	0	No	2	\$881,500
School	Somerset Community Services	County	5574 Tulls Corner Road	21838	1970	N	1	X	0	No	2	\$1,724,000
School	J.M. Tawes Tech and Career	County	7982 Tawes Campus Dr.	21871	1976	N	1	X	0	No	3	\$16,850,800
School	Holly Grove Ch. School	County	7317 Mennonite Church Road	21871	1982	N	1	X	0	No	0	\$4,347,400
School	Macedonia School	County	10901 Riley Roerts Road	21821	-	-	1	AE	3.9	No	1	\$39,600
School	Somerset Intermediate School	County	7970 Tawes Campus Dr.	21871	-	-	-	X	0	No	3	-
School	Ewell E.S.	County	4055 Ewell Schoolhouse Road	21824	-	-	-	AE	2.9	Yes	1	\$230,000
School	Crisfield H.S.	Crisfield	210 N Somerset Ave	21817	1960	Y	1	AE	3.8	No	2	\$4,007,900

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Facility Type	Facility Name	Location	Address	Zip Code	Year Built	Historic	# Of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
School	Woodson E.S.	Crisfield	281 Woodson School Road	21817	-	-	-	AE	0.5	No	1	-
School	U. Of MD Eastern Shore	Princess Anne	11868 Academic Oval	21853	1886	Y	-	X	0	No	0	\$68,000,000
School	Princess Anne E.S.	Princess Anne	11576 Lankford St	21853	1958	Y	1	X	0	No	0	\$1,981,600
School	Greenwood E.S.	Princess Anne	11412 Dryden Road	21853	1961	Y	1	X	0	No	0	\$1,114,700
School	Washington H.S.	Princess Anne	10902 Old Princess Anne Road	21853	1975	N	2	X	0	No	0	\$6,027,700
School	Princess Anne Head Start	Princess Anne	12459 Independence Ct	21853	1994	N	1	X	0	No	0	\$515,100

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2017 Critical & Public Facilities Database											
Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Government	Cat Shelter	COUNTY	7922 CRISFIELD HWY	21871	-	-	X	0.0	No	4	-
Government	Centralized Athletic Facility	COUNTY	30290 SAM BARNES ROAD	21871	1940	-	X	0.0	No	4	\$48,600
Government	Health Dept. Main Office	COUNTY	7920 CRISFIELD HWY	21871	1976	1	X	0.0	No	4	\$958,800
Government	Mosquito Control	COUNTY	8981 SIGN POST ROAD	21871	-	-	X	0.0	No	4	\$146,100
Government	Recreation & Parks Complex	COUNTY	30290 SAM BARNES ROAD	21871	1940	-	X	0.0	No	4	\$48,600
Government	Roads & Waterways Complex	COUNTY	8981 SIGN POST ROAD	21871	-	-	X	0.0	No	4	\$146,100
Government	Dog Shelter	COUNTY	7922 CRISFIELD HWY	21871	-	-	X	0.0	No	3	\$26,400
Government	Great Hope Golf Course	COUNTY	8380 CRISFIELD HWY	21871	1995	1	X	0.0	No	2	\$3,082,800
Government	Coast Guard	CRISFIELD	-	-	-	-	AE	0.5	No	1	\$1,400,000
Government	City Hall	CRISFIELD	319 W MAIN ST	21817	-	-	AE	3.0	No	1	-
Government	Tourism Center	PRINCESS ANNE	11440 OCEAN HWY	21853	1970	1	X	0.0	No	2	\$95,200
Government	Annex behind EOC	PRINCESS ANNE	CEMETERY LANE	21853	-	-	X	0.0	No	0	-
Government	County/Circuit Court & Annex	PRINCESS ANNE	30512 PRINCE WILLIAM ST	21853	1904	2	X	0.0	No	0	\$617,000
Government	Dept. of Assessments	PRINCESS ANNE	11545 SOMERSET AVE	21853	1957	1	X	0.0	No	0	\$108,100
Government	Dept. of Social Services	PRINCESS ANNE	30397 MOUNT VERNON ROAD	21853	-	-	X	0.0	No	0	-
Government	District Court	PRINCESS ANNE	12155 ELM ST	21853	-	-	X	0.0	No	0	-
Government	DNR Wellington Wildlife	PRINCESS ANNE	32733 DUBLIN ROAD	21853	-	-	X	0.0	No	0	\$48,400
Government	NRCS, SCD & Extension Office	PRINCESS ANNE	30730 PARK DR	21853	1987	1	X	0.0	No	0	\$706,000
Government	Princess Anne Town Garage	PRINCESS ANNE	11336 OLD PRINCESS ANNE ROAD	21853	1977	1	X	0.0	No	0	\$87,000
Government	Princess Anne Town Hall	PRINCESS ANNE	30489 BROAD ST	21853	1971	1	X	0.0	No	0	\$168,300
Government	States Attorney Building	PRINCESS ANNE	30500 PRINCE WILLIAM ST	21853	1850	2	X	0.0	No	0	\$112,500
Miscellaneous	Westover P.O.	COUNTY	8930 CRISFIELD HWY	21871	1976	1	X	0.0	No	4	\$48,300
Miscellaneous	Deal Island P.O.	COUNTY	10051 DEAL ISLAND ROAD	21821	1991	1	X	0.0	No	2	\$149,900
Miscellaneous	Marion Station P.O.	COUNTY	28530 HUDSON CORNER ROAD	21838	1969	1	X	0.0	No	2	\$21,400
Miscellaneous	Upper Hill Playground	COUNTY	JONES FACTORY ROAD	21868	-	-	AE	0.8	No	2	-
Miscellaneous	Burgess Early Am. Museum	COUNTY	6303 OLD WESTOVER MARION ROAD	21871	-	2	AE	4.0	No	2	\$113,300
Miscellaneous	Ewell P.O.	COUNTY	20925 CALEB JONES ROAD	21824	1920	-	AE	1.3	No	1	\$31,800

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Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Miscellaneous	Eddie Evans Ball Field	COUNTY	-	21824	-	-	AE	1.4	No	1	-
Miscellaneous	Deal Island/Last Chance Marina	COUNTY	-	21821	-	-	AE	1.7	No	1	-
Miscellaneous	Tylerton P.O.	COUNTY	3071 Union Church Road	21866	-	1	AE	1.7	No	1	-
Miscellaneous	Wenona Marina	COUNTY	-	21821	-	-	AE	2.3	No	1	\$12,100
Miscellaneous	Rumbley Marina	COUNTY	-	-	-	-	AE	2.6	No	1	-
Miscellaneous	Upper Fairmount P.O.	COUNTY	27741 FAIRMOUNT ROAD	21871	1986	1	AE	2.6	No	1	\$70,000
Miscellaneous	Raccoon Point Rec. Area	COUNTY	27907 REVELLS NECK ROAD	21871	1988	-	AE	3.1	No	1	\$253,100
Miscellaneous	Rehoboth Boat Ramp	COUNTY	-	-	-	-	AE	3.4	No	1	-
Miscellaneous	Coulbourn Creek Boat Ramp	COUNTY	-	-	-	-	AE	4.1	No	1	-
Miscellaneous	Fairmount Academy	COUNTY	27286 FAIRMOUNT ROAD	21871	-	-	AE	5.0	No	1	\$73,500
Miscellaneous	Deal Island WMA (3)	COUNTY	27175 GAME RESERVE ROAD	21821	-	-	AE	5.7	No	1	\$9,400
Miscellaneous	Shelltown Boat Ramp	COUNTY	-	-	-	-	AE	8.5	No	1	-
Miscellaneous	Eden P.O.	COUNTY	31676 EDEN ALLEN ROAD	21822	1992	1	X	0.0	No	0	\$29,800
Miscellaneous	Smith Island Cultural Center	COUNTY	20846 CALEB JONES ROAD	21824	1995	1	AE	3.1	Yes	1	\$314,800
Miscellaneous	Smith Island Library	COUNTY	4005 SMITH ISLAND ROAD	21824	-	-	AE	3.1	Yes	1	-
Miscellaneous	Tylerton Wharf	COUNTY	Marshall Street	21866	-	-	AE	3.4	Yes	1	\$11,100
Miscellaneous	Tylerton Marina	COUNTY	Marshall Street	21866	-	-	AE	3.6	Yes	1	-
Miscellaneous	Dames Quarter Dock & Ramp	COUNTY	-	21821	-	-	AE	4.0	Yes	1	-
Miscellaneous	Ewell Ramp/Wharf	COUNTY	4080 Smith Island Road	21824	-	-	AE	4.6	Yes	1	-
Miscellaneous	St. Peters Creek Marina	COUNTY	-	-	-	-	AE	5.8	Yes	1	\$10,000
Miscellaneous	Rhodes Point Dock	COUNTY	Marsh Road	21824	-	-	AE	6.2	Yes	1	-
Miscellaneous	Rumbly Point Boat Ramp	COUNTY	-	-	-	-	AE	6.2	Yes	1	\$10,000
Miscellaneous	Webster Cove Marina	COUNTY	-	-	-	-	AE	8.0	Yes	0	\$98,500
Miscellaneous	Janes Island Boat Ramp	CRISFIELD	26280 ALFRED J LAWSON DR	21817	-	-	AE	1.8	No	1	\$673,200
Miscellaneous	Somers Cove	CRISFIELD	-	-	1967	2	AE	1.8	No	1	\$8,867,800
Miscellaneous	Jenkins Creek Dock & Boat Ramp	CRISFIELD	2990 CALVARY ROAD	21817	-	-	VE	2.6	No	1	-
Miscellaneous	American Legion	CRISFIELD	-	-	-	-	AE	2.9	No	1	-
Miscellaneous	Crisfield P.O.	CRISFIELD	400 W MAIN ST	21817	1930	2	AE	3.2	No	1	\$352,600
Miscellaneous	City Dock	CRISFIELD	1300 W MAIN ST	21817	-	-	AE	3.3	No	1	\$101,700
Miscellaneous	Glen Ward Ballfield	CRISFIELD	26827 OLD STATE ROAD	21817	-	-	AE	3.5	No	1	\$21,600
Miscellaneous	Crisfield Library	CRISFIELD	100 COLLINS ST	21817	-	-	AE	4.3	No	1	-
Miscellaneous	Manokin River Park	PRINCESS ANNE	11840 SOMERSET AVE	21853	-	-	AE	0.5	No	2	-
Miscellaneous	Mt. Vernon Park	PRINCESS ANNE	26616 MOUNT VERNON ROAD	21853	-	-	AE	1.3	No	1	\$5,000
Miscellaneous	Civic Center	PRINCESS ANNE	12023 CRISFIELD LANE	21853	1955	-	X	0.0	No	0	\$51,600
Miscellaneous	Lower Shore Shelter	PRINCESS ANNE	12518 SOMERSET AVENUE	21853	1952	1	X	0.0	No	0	\$20,800

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Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Miscellaneous	Princess Anne Library	PRINCESS ANNE	11767 BEECHWOOD ST	21853	-	-	X	0.0	No	0	\$552,500
Miscellaneous	Princess Anne P.O.	PRINCESS ANNE	11690 SOMERSET AVE	21853	1955	1	X	0.0	No	0	\$165,000
Miscellaneous	Teackle Mansion	PRINCESS ANNE	11736 MANSION ST	21853	1802	2	X	0.0	No	0	\$217,100
Miscellaneous	Washington Inn	PRINCESS ANNE	11784 SOMERSET AVE	21853	1744	2	X	0.0	No	0	\$366,000
Miscellaneous	Manokin Trail	-	Wenona	-	-	-	-	-	-	-	-
Miscellaneous	St. Peters Creek	-	Near Oriole Road	-	-	-	-	-	-	-	-
Miscellaneous	Tylerton Rec. Area	-	Tylerton	-	-	-	-	-	-	-	-
Transportation	Bridge @ CATHELL ROAD/PASSERDYKE CREEK	COUNTY	CATHELL ROAD/PASSERDYKE CREEK	-	-	-	X	0.0	No	3	-
Transportation	Bridge @ N. OCEAN HIGHWAY/KINGS CREEK	COUNTY	N. OCEAN HIGHWAY/KINGS CREEK	-	-	-	X	0.0	No	1	-
Transportation	Bridge @ S. OCEAN HIGHWAY/KINGS CREEK	COUNTY	S. OCEAN HIGHWAY/KINGS CREEK	-	-	-	X	0.0	No	1	-
Transportation	Fairmount Heliport	COUNTY	27407 FAIRMOUNT ROAD	21871	-	-	AE	3.4	No	1	-
Transportation	Bridge @ APE HOLE ROAD/LITTLE APE HOLE CREEK	COUNTY	APE HOLE ROAD/LITTLE APE HOLE CREEK	-	-	-	AE	4.6	No	1	-
Transportation	RR Crossing @ ARDEN STATION ROAD	COUNTY	ARDEN STATION ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ C N BAUGHAN ROAD	COUNTY	C N BAUGHAN ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ DUKE WEIDEMA ROAD	COUNTY	DUKE WEIDEMA ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ FLOWER HILL CHURCH ROAD	COUNTY	FLOWER HILL CHURCH ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ HOWARD H ANDERSON ROAD	COUNTY	HOWARD H ANDERSON ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ KING MILLER ROAD	COUNTY	KING MILLER ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ LORETTO ROAD	COUNTY	LORETTO ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ MULDER BRANCH ROAD	COUNTY	MULDER BRANCH ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ OLD PRINCESS ANNE ROAD	COUNTY	OLD PRINCESS ANNE ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ OLD PRINCESS ANNE ROAD @ INDUSTRIAL PARK	COUNTY	OLD PRINCESS ANNE ROAD @ INDUSTRIAL PARK	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ PEGGY NECK ROAD	COUNTY	PEGGY NECK ROAD	-	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ PERRY ROAD	COUNTY	PERRY ROAD	-	-	-	X	0.0	No	0	-

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Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Transportation	RR Crossing @ WALLACE TAYLOR ROAD	COUNTY	WALLACE TAYLOR ROAD	-	-	-	X	0.0	No	0	-
Transportation	Bridge @ OLD PRINCESS ANNE RD/KINGS CREEK	COUNTY	OLD PRINCESS ANNE RD/KINGS CREEK	-	-	-	AE	0.5	Yes	1	-
Transportation	Bridge @ RUMBLEY ROAD/TEAGUE CREEK	COUNTY	RUMBLEY ROAD/TEAGUE CREEK	21871	-	-	AE	1.8	Yes	1	-
Transportation	Bridge @ STEWART NECK ROAD/JONES CREEK	COUNTY	STEWART NECK ROAD/JONES CREEK	-	-	-	AE	2.2	Yes	1	-
Transportation	Bridge @ HANES POINT ROAD/SCOTTS COVE	COUNTY	HANES POINT ROAD/SCOTTS COVE	21821	-	-	AE	2.3	Yes	1	-
Transportation	Bridge @ SIGN POST ROAD/BACK CREEK	COUNTY	SIGN POST ROAD/BACK CREEK	-	-	-	AE	2.4	Yes	1	-
Transportation	Bridge @ BRYAN HALL ROAD/MARUMSCO CREEK	COUNTY	BRYAN HALL ROAD/MARUMSCO CREEK	-	-	-	AE	4.5	Yes	1	-
Transportation	Bridge @ COVENTRY PARISH ROAD/REHOBETH BRANCH	COUNTY	COVENTRY PARISH ROAD/REHOBETH BRANCH	-	-	-	AE	4.6	Yes	1	-
Transportation	Smith Island Heliport	COUNTY	SMITH ISLAND ROAD	-	-	-	AE	4.8	Yes	1	-
Transportation	Bridge @ MARSH ROAD/SHANKS CREEK	COUNTY	MARSH ROAD/SHANKS CREEK	-	-	-	AE	5.0	Yes	1	-
Transportation	Bridge @ SMITH ISLAND ROAD/EWELL	COUNTY	SMITH ISLAND ROAD/EWELL	-	-	-	AE	5.0	Yes	1	-
Transportation	Bridge @ LQ POWELL ROAD/EAST CREEK	COUNTY	LQ POWELL ROAD/EAST CREEK	-	-	-	AE	6.0	Yes	1	-
Transportation	Bridge @ MARUMSCO ROAD/MARUMSCO CREEK	COUNTY	MARUMSCO ROAD/MARUMSCO CREEK	-	-	-	AE	7.1	Yes	1	-
Transportation	Bridge @ WHITEHAVEN FERRY ROAD/WAUKAKI CREEK	COUNTY	WHITEHAVEN FERRY ROAD/WAUKAKI CREEK	-	-	-	AE	7.6	Yes	1	-
Transportation	Bridge @ HALL HIGHWAY/TRIB LITTLE ANNEMESSEX RIVER	COUNTY	HALL HIGHWAY/TRIB LITTLE ANNEMESSEX RIVER	-	-	-	AE	0.5	Yes	0	-
Transportation	Bridge @ CASH CORNER RD/JOHNSON CREEK	COUNTY	CASH CORNER RD/JOHNSON CREEK	-	-	-	AE	2.9	Yes	0	-
Transportation	Bridge @ CALVARY ROAD/JENKINS CREEK	COUNTY	CALVARY ROAD/JENKINS CREEK	-	-	-	AE	3.3	Yes	0	-
Transportation	Bridge @ RIVER ROAD/BIG ANNEMESSEX RIVER	COUNTY	RIVER ROAD/BIG ANNEMESSEX RIVER	-	-	-	AE	3.8	Yes	0	-
Transportation	Bridge @ FRENCHTOWN ROAD/GOOSE CREEK	COUNTY	FRENCHTOWN ROAD/GOOSE CREEK	21871	-	-	AE	4.3	Yes	0	-
Transportation	Bridge @ FRENCHTOWN ROAD/MINE CREEK	COUNTY	FRENCHTOWN ROAD/MINE CREEK	21871	-	-	AE	4.7	Yes	0	-
Transportation	Bridge @ STEWART NECK ROAD/KINGS CREEK	COUNTY	STEWART NECK ROAD/KINGS CREEK	-	-	-	AE	5.1	Yes	0	-

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Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Transportation	Bridge @ MILLARD LONG ROAD/BACK CREEK	COUNTY	MILLARD LONG ROAD/BACK CREEK	-	-	-	AE	6.3	Yes	0	-
Transportation	Bridge @ DEAL ISLAND ROAD/UPPER THOROFARE	COUNTY	DEAL ISLAND ROAD/UPPER THOROFARE	21821	-	-	VE	11.1	Yes	0	-
Transportation	Crisfield Airport	CRISFIELD	4784 JACKSONVILLE ROAD	21817	-	-	AE	3.3	No	1	\$205,800
Transportation	McCready Health Heliport	CRISFIELD	201 HALL HWY	21817	-	-	AE	4.3	No	1	-
Transportation	RR Crossing @ DR WILLIAM P HYTCHE BLVD	PRINCESS ANNE	DR WILLIAM P HYTCHE BLVD	21853	-	-	X	0.0	No	4	-
Transportation	RR Crossing @ ANTIOCH AVENUE	PRINCESS ANNE	ANTIOCH AVENUE	21853	-	-	X	0.0	No	0	-
Transportation	RR Crossing @ HAMPDEN AVENUE	PRINCESS ANNE	HAMPDEN AVENUE	21853	-	-	X	0.0	No	0	-
Transportation	State Highway Administration	PRINCESS ANNE	10980 MARKET LANE	21853	1961	2	X	0.0	No	0	\$373,400
Utility	Pumping Station	COUNTY	30435 CAMP ROAD	21871	-	-	X	0.0	No	4	-
Utility	Pumping Station	COUNTY	8920 CRISFIELD HWY	21871	-	-	X	0.0	No	4	-
Utility	Somerset Co. Landfill	COUNTY	8716 JAMES RING ROAD	21871	-	-	X	0.0	No	4	-
Utility	Water Tower	COUNTY	30280 REVELLS NECK ROAD	21871	-	-	X	0.0	No	4	-
Utility	Westover Transfer Station	COUNTY	8716 JAMES RING ROAD	21871	-	-	X	0.0	No	4	-
Utility	Crisfield Transfer Station	COUNTY	4941 CRISFIELD HWY	21817	-	-	X	0.0	No	3	-
Utility	Marion Electric Substation	COUNTY	6550 CRISFIELD HWY	21838	-	-	X	0.0	No	3	-
Utility	Communication	COUNTY	28927 IRENE WHITTINGTON ROAD	21838	-	-	X	0.0	No	2	-
Utility	Marion 911 Tower	COUNTY	25873 HUDSON CORNER ROAD	21838	-	-	X	0.0	No	2	-
Utility	Telecom Verizon Tower	COUNTY	5718 Tullis Corner Road	21838	-	-	X	0.0	No	2	\$7,900
Utility	Telecom Verizon Tower	COUNTY	KINGSTON LANE	21871	-	-	X	0.0	No	2	-
Utility	Telephone	COUNTY	5722 TULLS CORNER ROAD	21838	-	-	X	0.0	No	2	-
Utility	Verizon Telephone	COUNTY	10157 DEAL ISLAND ROAD	21821	-	-	X	0.0	No	2	-
Utility	Pumping Station	COUNTY	7972 TAWES CAMPUS DR	21871	-	-	AE	0.5	No	2	-
Utility	Well House	COUNTY	8340 UPPER HILL ROAD	21871	-	-	AE	1.6	No	2	\$5,300
Utility	Telephone	COUNTY	20884 CALEB JONES ROAD	21824	-	-	AE	1.7	No	1	-
Utility	Smith Island Incinerator	COUNTY	SMITH ISLAND ROAD	21824	-	-	AE	2.2	No	1	-
Utility	Pumping Station	COUNTY	8104 HALLS CREEK ROAD	21871	-	-	AE	2.6	No	1	\$22,300
Utility	Well House	COUNTY	27246 NEVETTE MUIR ROAD	21871	-	-	AE	2.7	No	1	\$8,600
Utility	Halls Creek Road WTP	COUNTY	7843 HALLS CREEK ROAD	21871	-	-	AE	2.8	No	1	\$50,200
Utility	Well House	COUNTY	25917 RUMBLEY ROAD	21871	-	-	AE	3.0	No	1	\$5,200
Utility	Well House	COUNTY	26760 RUMBLEY ROAD	21871	-	-	AE	3.0	No	1	-
Utility	WWTP	COUNTY	26760 RUMBLEY ROAD	21871	-	-	AE	3.0	No	1	\$307,100
Utility	Chance Transfer Station	COUNTY	24019 DEAL ISLAND ROAD	21821	-	-	AE	3.5	No	1	-
Utility	Telecom Tower	COUNTY	-	-	-	-	AE	4.5	No	1	\$5,200

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Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Utility	Costen Transfer Station	COUNTY	8405 WALLACE TAYLOR ROAD	21851	-	-	X	0.0	No	0	-
Utility	Pocomoke Electric Substation	COUNTY	33034 COSTEN ROAD	21851	-	-	X	0.0	No	0	-
Utility	Telecom Tower	COUNTY	31330 EDEN ALLEN ROAD	21822	-	-	X	0.0	No	0	-
Utility	Tylerton Transfer Station	COUNTY	Marshall Street	21866	-	-	AE	4.0	Yes	1	-
Utility	Pumping Station	COUNTY	21280 WHARF ROAD	21824	-	-	AE	4.9	Yes	1	\$60,000
Utility	WWTP	COUNTY	21280 WHARF ROAD	21824	-	-	AE	4.9	Yes	1	\$60,000
Utility	Ewell WWTP	COUNTY	3786 Smith Island Road	21824	1978	1	AE	5.0	Yes	1	\$61,500
Utility	Crisfield Electric Substation	CRISFIELD	4079 CRISFIELD HWY	21817	-	-	AE	0.5	No	2	-
Utility	Well House	CRISFIELD	26618 BILL GAYLON LANE	21817	-	-	AE	0.8	No	1	-
Utility	Water Tower	CRISFIELD	26450 SILVER LANE	21817	-	-	AE	1.2	No	1	\$80,000
Utility	WWTP	CRISFIELD	N 7TH STREET	21817	-	-	AE	2.0	No	1	-
Utility	Telephone & Wireless Tower	CRISFIELD	-	-	-	-	AE	2.1	No	1	-
Utility	Pumping Station	CRISFIELD	3631 FREEDOMTOWN ROAD	21817	-	-	AE	2.4	No	1	-
Utility	Pumping Station	CRISFIELD	199 GANDY LANE	21817	-	-	AE	2.4	No	1	-
Utility	Telephone	CRISFIELD	Charlotte Avenue	21817	-	1	AE	3.5	Yes	1	-
Utility	Princess Anne WWTP	PRINCESS ANNE	30353 LINDEN AVENUE EXT	21853	-	-	X	0.0	No	4	\$207,000
Utility	Pumping Station	PRINCESS ANNE	11950 STRICKLAND DRIVE	21853	-	-	X	0.0	No	4	-
Utility	Pumping Station	PRINCESS ANNE	30516 HICKORY ROAD	21853	-	-	X	0.0	No	4	-
Utility	Telephone	PRINCESS ANNE	Old Westover Marion Road	21853	-	1	X	0.0	No	4	-
Utility	Well House	PRINCESS ANNE	11780 CRISFIELD LANE	21853	-	-	X	0.0	No	4	-
Utility	Mt. Vernon Transfer Station	PRINCESS ANNE	29012 MOUNT VERNON ROAD	21853	-	-	X	0.0	No	3	\$5,000
Utility	Communication	PRINCESS ANNE	28490 DEAL ISLAND ROAD	21853	-	-	X	0.0	No	2	-
Utility	Well House	PRINCESS ANNE	11440 OCEAN HWY	21853	1970	1	X	0.0	No	2	\$95,200
Utility	Communication	PRINCESS ANNE	27440 MT VERNON ROAD	21853	-	-	AE	0.5	No	1	-
Utility	Princess Anne Electric Substation	PRINCESS ANNE	30726 PERRY ROAD	21853	-	-	X	0.0	No	0	-
Utility	Princess Anne Electric Substation	PRINCESS ANNE	12471 LORETTO ROAD	21853	-	-	X	0.0	No	0	-
Utility	Princess Anne Electric Substation	PRINCESS ANNE	31390 PEGGY NECK ROAD	21853	-	-	X	0.0	No	0	-
Utility	Pumping Station/Water Tower	PRINCESS ANNE	11735 GOVERNMENT LANE	21853	-	-	X	0.0	No	0	\$93,500

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Facility Type	Facility Name	Location	Address	Zip code	Year Built	# of Stories	Flood Zone	Flood Depth	SLR 2050	Surge Category	Improvement Value
Utility	State Police Telecom Tower	PRINCESS ANNE	30581 PERRY ROAD	21853	2004	1	X	0.0	No	0	\$1,403,600
Utility	Telecom Tower	PRINCESS ANNE	30939 MCCORMICK SWAMP ROAD	21853	2001	1	X	0.0	No	0	\$37,200
Utility	Telecom Tower	PRINCESS ANNE	31305 PEGGY NECK ROAD	21853	-	-	X	0.0	No	0	\$1,800
Utility	Telecom Tower	PRINCESS ANNE	12611 RECYCLE DR	21853	-	-	X	0.0	No	0	\$5,000
Utility	Telecom Tower	PRINCESS ANNE	9600 ARDEN STATION ROAD	21853	-	-	X	0.0	No	0	\$1,000
Utility	Telecom Verizon Tower	PRINCESS ANNE	30880 W POST OFFICE ROAD	21853	-	-	X	0.0	No	0	\$6,500
Utility	Telecom Verizon Tower	PRINCESS ANNE	11916 SOMERSET AVE	21853	-	-	X	0.0	No	0	-
Utility	Telephone	PRINCESS ANNE	11732 CHURCH ST	21853	-	-	X	0.0	No	0	-
Utility	Water Tower	PRINCESS ANNE	11745 GOVERNMENT LANE	21853	-	-	X	0.0	No	0	-
Utility	Water Tower	PRINCESS ANNE	10837 OLD PRINCESS ANNE ROAD	21853	-	-	X	0.0	No	0	-
Utility	Water Tower	PRINCESS ANNE	30590 HICKORY ROAD	21853	-	-	X	0.0	No	0	-
Utility	Well House	PRINCESS ANNE	30590 HICKORY ROAD	21853	-	-	X	0.0	No	0	-
Utility	Well House	PRINCESS ANNE	12508 LORETTO ROAD	21853	-	-	X	0.0	No	0	-
Utility	Telephone	-	Norris Harbor Dr	-	-	-	-	-	-	-	-
Utility	Electric Substation	-	33034 Flower Hill Church Road	-	-	-	-	-	-	-	-
Utility	Electric Substation	-	4079 Freetown Road	-	-	-	-	-	-	-	-
Utility	Electric Substation	-	Eden Allen Road	-	-	-	-	-	-	-	-
Utility	Electric Substation	-	Revells Neck Road	-	-	-	-	-	-	-	-
Utility	Well House	-	11360 Ocean Hwy	-	-	-	-	-	-	-	-
Utility	Telecom Tower	-	28490 Dublin Road	-	-	-	-	-	-	-	-
Utility	Ewell Comm. Center	-	Ewell	-	-	-	-	-	-	-	-

APPENDIX B

NFIP & CRS

OFFICIAL USE ONLY

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NATIONAL FLOOD INSURANCE PROGRAM & COMMUNITY RATING SYSTEM

Please note the Privacy Act protects the information within Appendix B of this plan. Therefore, Appendix B is for Official Use Only and not for public dissemination. If there is interest in the National Flood Insurance Program or Community Rating System, please contact:

Yvette S. Cross, Director
Somerset County Emergency Services
11916 Somerset Avenue Room 120
Princess Anne, MD 21853
www.somerset911.org
ycross@somersetmd.us
Voice: (410) 651-0707
Fax: (410) 651-3350

APPENDIX C

SAFE GROWTH

AUDIT

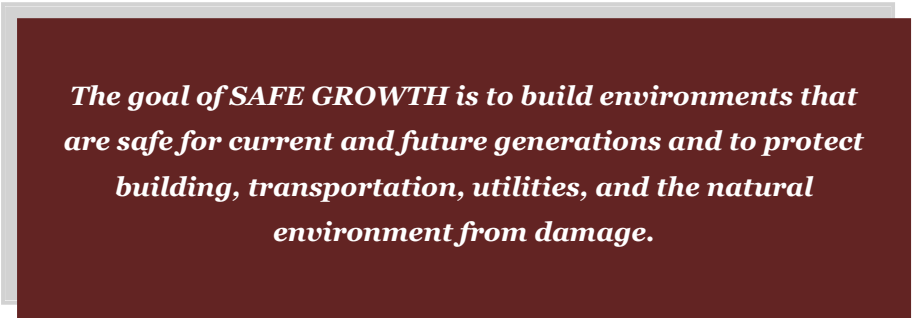
SAFE GROWTH AUDIT

INTRODUCTION

Generally described as the routine consideration and management of hazard risks in the community's existing planning framework – plan integration is the collection of plans, policies, codes, and programs that guide development in your community, how those are maintained and implemented, and the roles of people, agencies, and departments in evaluating and updating them. Effective integration of hazard mitigation occurs when your community's planning framework leads to develop patterns that do not increase risks from known hazards or leads to redevelopment that reduces risk from known hazards.

SAFE GROWTH AUDIT

During the preparation of the *2017 Somerset County Hazard Mitigation Plan Update*, a Safe Growth Audit was conducted. Performing a Safe Growth Audit is a way to assess how well the existing planning tools address hazard risks and community resiliency. Safe Growth Audit questions provide a systematic way to review local planning tools and identify the presence of, or need for, hazard-related actions.



The goal of SAFE GROWTH is to build environments that are safe for current and future generations and to protect building, transportation, utilities, and the natural environment from damage.

Local documents reviewed during the Safe Growth Audit include:

- 1996 Somerset County Comprehensive Plan;
- 2007 City of Crisfield Comprehensive Plan with 2010 Amendments;
- 2009 City of Princess Anne Comprehensive Plan;
- 2010 Somerset County Water Resource Element;
- 2017 Capital Improvement Program;
- Somerset County Zoning Ordinance; and
- Somerset County Subdivision of Land

<i>Plan</i>	<i>Location</i>
COMPREHENSIVE PLAN	
LAND USE	
Does the future land-use map clearly identify natural hazard areas?	<p>1996 Somerset County Comprehensive Plan No. Chapter 5 – Land use Pg. 25-32 Note: Somerset County Website redirected to: <i>Somerset County Chesapeake Watch – Somerset County Critical Area Program</i> 2009 Town of Princess Anne Comprehensive Plan Yes. Map 8 – Future Land Use 2007 City of Crisfield Comprehensive Plan with 2010 Amendments Yes. Maps provided in plan: Map – Crisfield Comprehensive Land Use Plan Pg. 33 Map – Crisfield Critical Area Pg. 13</p>
Do the land-use policies discourage development or redevelopment within hazard areas?	<p>1996 Somerset County Comprehensive Plan Yes. Chapter 11 – Environment 11.6 Critical Area Legislation 11.7 Land Use Management Areas Pg. 82-84 Appendix: Somerset County Critical Area Program Summary Pg. 111 2009 Town of Princess Anne Comprehensive Plan Yes Section 3 – Future Conditions 3.5 – Development Opportunities and Constraints Constraints – Sensitive Natural Areas Pg. 60 Section 5 – Comprehensive Plan Recommendations 5.3 Sensitive Natural Area: Long-Term Stewardship of the Environment Pg. 87-89 2007 City of Crisfield Comprehensive Plan with 2010 Amendments Yes. Section 3 – Development Opportunities and Constraints 3.1 Opportunities – Sensitive Natural Areas</p>

	<p>Throughout the City Pg. 26 3.2 Constraints – Sensitive Natural Areas Pg. 27 4.1 Redevelopment and Ecological Restoration Pg. 29-38</p>
Does the Plan provide adequate space for expected future growth in areas located outside natural hazard areas?	<p>1996 Somerset County Comprehensive Plan Yes. Chapter 2 – Goals and Objectives 1. Economic Development Goals 2. Land-Use and Community Development Goals Pg. 3-5 Chapter 6 – Community Development and Urban Form Pg. 33-36 2009 Town of Princess Anne Comprehensive Plan Yes. Chapter 3-Future Conditions 3.3 Future Land Uses 3.4 Impacts on Community Services and Roads 3.5 Development Opportunities and Constraints Pg. 53-62 Chapter 5- Comprehensive Plan Recommendations 5.7 Development in Balance with Regional Priorities Pg. 98-99 2007 City of Crisfield Comprehensive Plan with 2010 Amendments Yes. Section 3 – Development Opportunities and Constraints Pg. 26-27 Section 4 – The Comprehensive Plan Recommendations Pg. 28-47</p>
TRANSPORTATION	
Does the transportation plan limit access to hazard areas?	<p>1996 Somerset County Comprehensive Plan No. Chapter 9 – Transportation Pg.49-68 2009 Town of Princess Anne Comprehensive Plan No. Section 5 – Comprehensive Plan Recommendations 5.5 Transportation: Connections and Circulation Pg.93-95 2007 City of Crisfield Comprehensive Plan with 2010 Amendments</p>

	No. Section 2 – Existing Conditions Pg. 20-21
Is the transportation policy used to guide growth to safe locations?	1996 Somerset County Comprehensive Plan Yes 2009 Town of Princess Anne Comprehensive Plan Yes 2007 City of Crisfield Comprehensive Plan with 2010 Amendment Yes
Are movement systems designed to function under disaster conditions (e.g., evacuation)?	
ENVIRONMENTAL MANAGEMENT	
Are environmental systems that protect development from hazard identified and mapped?	Yes Somerset County Website redirected to: <i>Somerset County Chesapeake Watch – Somerset County Critical Area Program</i> Legislation & Maps
Do environmental policies maintain and restore protective ecosystems?	Yes Somerset County Website redirected to: <i>Somerset County Chesapeake Watch – Somerset County Critical Area Program</i>
Do environmental policies provide incentives to development that is located outside of protective ecosystems?	Yes Somerset County Website redirected to: <i>Somerset County Chesapeake Watch – Somerset County Critical Area Program</i>
PUBLIC SAFETY	
Are the goals and policies of the comprehensive plan related to the FEMA Local Hazard Mitigation Plan?	2009 Town of Princess Anne Comprehensive Plan Yes The 100-year floodplain limits are delineated by the Federal Emergency Management Agency (FEMA) as areas that have a one percent annual chance of being flooded. The limit of floodplain inundation is generally determined by the size of its watershed, local geology, and the pattern of surrounding land uses. Map 1: Sensitive Areas shows the floodplains in Princess Anne. The floodplains in Princess Anne are tidal floodplains; this means they are susceptible to flooding by high tides that can occur during hurricanes. 2007 City of Crisfield Comprehensive Plan with 2010 Amendments Yes The Somerset County Department of Emergency Services

	<p>prepares and periodically updates the emergency operations plan covering Crisfield in cooperation with the Maryland Emergency Management Agency and with FEMA.</p> <p>The Somerset County Department of Emergency Services prepares and periodically updates the emergency operations plan covering Crisfield in cooperation with the Maryland Emergency Management Agency and with FEMA.</p>
Is safety explicitly included in the plan's growth and development policies?	<p>1996 Somerset County Comprehensive Plan Yes</p> <p>2009 Town of Princess Anne Comprehensive Plan Yes</p> <p>Section 3 – Future Conditions 3.4 Impact on Community Services and Roads Public Safety and Emergency Services Pg. 56-58 Safety is included in the Goals, Objectives, and Guiding Principles throughout the document.</p> <p>2007 City of Crisfield Comprehensive Plan with 2010 Amendments Yes – Safety is included in the Goals, Objectives, and Guiding Principles throughout the document.</p>
Does the monitoring and implementation section of the plan cover safe growth objectives??	<p>1996 Somerset County Comprehensive Plan 2009 Town of Princess Anne Comprehensive Plan Yes</p> <p>5.7 Development in Balance with Regional Priorities Princess Anne will benefit from cooperation with State and federal agencies, Somerset County, UMES, and other concerned levels and units of government. This coordinated effort will help ensure Princess Anne's goals are implemented. Pg. 98-99</p> <p>5.8 Conclusion Noted below are the three most important measures that Princess Anne can take to implement this Comprehensive Plan over the long term. 1) Revise, supplement, and enforce the ordinances and regulations of Princess Anne to reflect the recommendations of this Plan. Implementation of land use recommendations relies heavily on a sound regulatory framework. This framework includes the zoning ordinance, subdivision regulations, floodplain ordinance, Forest Conservation Act, and Critical Area regulations. One of the first efforts that should get underway immediately upon adoption of the Plan is</p>

	<p>the comprehensive amendment of the zoning ordinance and map. The amendment process should focus on both streamlining existing development regulations and instituting new standards and guidelines that raise expectations for the quality of development.</p> <p>2) Achieve greater awareness, understanding, and participation of Princess Anne's residents in the continuing planning program.</p> <p>Community planning seeks to balance broad and diverse community interests. The success of an ongoing planning program requires the engagement of these interests, the participation of Town residents and officials in meetings and work sessions, and official support of the staff's efforts to reach out, inform, and involve the public. Achieving an involved community requires sustained public outreach.</p> <p>3) Obtain the assistance of the appropriate county, regional, and state agencies. Funding and expertise are available at all levels of government in Maryland. There are multiple types of grants for which Princess Anne is eligible, and outreach programs in State government are available to help realize the ideas contained in this Comprehensive Plan. Specifically, these agencies of State government include the Maryland Departments of Planning, Natural Resources, Environment, Transportation, Business and Economic Development, Housing and Community Development, and the Maryland Historic Trust.</p> <p><i>2007 City of Crisfield Comprehensive Plan with 2010 Amendments</i></p> <p>Yes</p> <p>Section 4 – The Comprehensive Plan</p> <p>Recommendations</p> <p>4.6 Implementation</p> <p>Implementation brings people together so that their interactions produce successful outcomes. A concerted effort at implementing the Comprehensive Plan in Crisfield would:</p> <ul style="list-style-type: none"> • Clarify varying development goals and the roles of the actors in community development. • Recognize the sources and direct the uses of political and technical input and support. • Help define priorities and guide the allocation of resources by eliminating conflicts and linking previously un-related efforts.
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	<ul style="list-style-type: none"> • Help yield structures and response systems, which can link the City with non-local public and private resources. <p>Cooperation on implementation can occur between the City and other agencies of government, its citizen volunteers and citizen groups and with private developers. Citizen involvement and leadership can be an important element of plan implementation.</p> <p>Pg. 46-48</p>
ZONING ORDINANCE	
Does the zoning ordinance conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas?	Refer to: Town of Princess Anne Zoning Ordinance Chapter 61: Critical Area Overlay Area
Does the ordinance contain natural hazard overlay zones that set conditions for land use within such zones?	Town of Princess Anne Zoning Ordinance Chapter 61: Critical Area Overlay Area
Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density use?	<p>Town of Princess Anne Zoning Ordinance Chapter 61: Critical Area Overlay Area § 61-10 Maximum permitted density.</p> <p>A. The maximum permitted density in the Princess Anne Critical Area shall be as shown in Table § 61-10A.</p> <p>B. Calculation of one-in-twenty-acre density of development. In calculating the one-in-twenty-acre density of development that is permitted on a parcel located within the Resource Conservation Area, Princess Anne:</p> <p>(1) Shall count each dwelling unit.</p> <p>(2) May permit the area of any private wetlands located on the property to be included under the following conditions:</p> <p>(a) The density of development on the upland portion of the parcel may not exceed one dwelling unit per eight acres; and</p> <p>(b) The area of private wetlands shall be estimated on the basis of vegetative information as designated on the state wetlands maps or by private survey approved by Princess Anne, the Critical Area Commission, and the Maryland Department of the Environment.</p>
SUBDIVISION REGULATIONS	
Do the subdivision regulations restrict the subdivision of land	Town of Princess Anne Zoning Ordinance Chapter 138: Subdivision of Land

within or adjacent to natural hazard areas?	138-27 Critical Area Overlay District Also see: Chapter 61: Critical Area Overlay Area
Do the regulations provide for conservation subdivision or cluster subdivisions in order to conserve environmental resources?	Town of Princess Anne Zoning Ordinance Chapter 138: Subdivision of Land 138-27 Critical Area Overlay District Also see: Chapter 61: Critical Area Overlay Area
Do the regulations allow density transfer where hazard areas exist?	Town of Princess Anne Zoning Ordinance Chapter 138: Subdivision of Land 138-27 Critical Area Overlay District Also see: Chapter 61: Critical Area Overlay Area
CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES	
Does the capital improvement program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan?	Yes
Does the capital improvement program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?	

Source: 2017 Somerset County Hazard Mitigation Planning Committee

PLAN INTEGRATION RECOMMENDATIONS

Following the completion of the Safe Growth Audit, the following recommendations should be considered for implementation:

- Amend the Somerset County Floodplain Ordinance No. 1084, Section 4.7 Manufactured Homes to include Coastal High Hazard Areas (A and/or AE) or Floodways.
- Amend the Somerset County Floodplain Ordinance No. 1084, Section 4.9 Critical and Essential Facilities to include Coastal High Hazard Areas (A and/or AE) or Floodways.
- Update the *1996 Somerset County Comprehensive Plan* to include hazard mitigation, specifically integrating the *2017 Somerset County Hazard Mitigation Plan Update*.
- Update the *2007 City of Crisfield Comprehensive Plan* with 2010 Amendments to include hazard mitigation, specifically integrating the *2017 Somerset County Hazard Mitigation Plan Update*.
 - Update Maps to reflect new FEMA FIRMs and Sea Level Rise projections.
 - Add Sea Level Rise as a future hazard.

- Include future conditions in goals, objectives and policies.
 - Consider hazards and future hazard condition in the Transportation Element.
- Update the *2009 City of Princess Anne Comprehensive Plan* to include hazard mitigation, specifically integrating the *2017 Somerset County Hazard Mitigation Plan Update*.
- Update the *2010 Somerset County Water Resource Element* to include hazard mitigation, specifically integrating the *2017 Somerset County Hazard Mitigation Plan Update*.
- Include hazard mitigation planning and projects into the Somerset County Capital Improvement Plan.

APPENDIX D

ROADS & BRIDGES

OF CONCERN

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Flooding Issues – Roads Princess Anne							
State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
Princess Anne	Mt Vernon Road @ Elm Street	No	SWM	Occasional	1	Stormwater and Heavy Rain Events	High
Princess Anne	Mt Vernon Road	No	Elevation	Repetitive	2	Tidal & Stormwater	High
Princess Anne	Somerset Avenue @ Fluers Lane	Yes	SWM	Repetitive	3	Tidal, Storm Events, and Evacuation Issues	High
	Note: Road (Somerset Avenue @ Fluers Lane) cuts town in half when flooded.						
Princess Anne	Stewart Neck Road @ Somerset Avenue	No	Elevation	Occasional	4	Storm Events	Medium
Princess Anne	Whitehaven Ferry Road	No	Elevation	Repetitive	5	Flooding	High
Princess Anne	Oyster House Road	No	Elevation	Occasional	6	Flooding	Medium
Princess Anne	Dorsey Road	No	Elevation	Repetitive	7	Flooding	Medium
Princess Anne	McIntyre Road	No	Elevation	Occasional	8	Flooding	Medium
Princess Anne	East Ridge Road	No	SWM	Occasional	9	Stormwater Management	Medium
Princess Anne	Peggy Neck Road	No	SWM	Occasional	10	Heavy Rain	High
Princess Anne	Champ Wharf Road	Yes	Elevation	Occasional	20	Flooding	Medium
Princess Anne	Crab Island Road	Yes	Elevation	Occasional	21	Flooding	Medium
Princess Anne	Dublin Road	Yes	SWM	Occasional	22	Swamp & Stormwater Management	High
Princess Anne	Clarence Barnes Road	Yes	SWM	Occasional	23	Tidal	Low

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Flooding Issues – Roads Crisfield							
State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
Crisfield	Ape Hole Road	Yes	Elevation	Occasional	40	Flooding	Medium
Crisfield	Calvary Road	Yes	Elevation	Repetitive	41	Flooding	High
Crisfield	Sackertown Road (Different section of road than #117)	Yes	Elevation	Repetitive	42	Flooding	High
Crisfield	Byrdtown Road	No	Elevation	Occasional	43	Flooding, Tidal, and Heavy Rain	Medium
Crisfield	Johnson Creek Road	No	Elevation	Occasional	44	Flooding	Medium
Crisfield	Boone Road	No	Elevation	Repetitive	45	Flooding, Tidal, and Heavy Rain	Medium
Crisfield	Tom Coulbourne Road	No	Elevation	Repetitive	47	Flooding, Tidal, and Heavy Rain	Medium
Crisfield	Stouty Sterling Road	No	Elevation	Repetitive	48	Flooding, Tidal, and Heavy Rain	Medium
Crisfield	Cash Corner Road	Yes	Elevation	Occasional	49	Flooding	Medium
Crisfield	Green Road	No	Elevation	Repetitive	50	Flooding, Tidal, and Heavy Rain	High
Crisfield	Williams Point Road	Yes	Elevation	Occasional	51	Flooding	Medium
Crisfield	Marumscro Road	No	Elevation	Repetitive	52	Flooding	Medium
Crisfield	Back Shelltown Road	No	Elevation	Occasional	53	Flooding, Tidal, and Heavy Rain	Medium
Crisfield	Rumbley Point Road	No	Elevation	Repetitive	54	Flooding	Low
Crisfield	Bryan Hall Road	Yes	Elevation	Repetitive	55	Flooding	High
Crisfield	Cornstack Road	No	Elevation	Occasional	56	Flooding	Medium

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Flooding Issues – Roads County and State Roads							
State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
County	Messick Road	No	Elevation	Occasional	11	Flooding	Medium
County	Long Point Road	Yes	Elevation	Repetitive	12	Flooding	High
County	Riley Roberts Road	Yes	Elevation	Repetitive	13	Flooding	High
County	Shores Road	Yes	Elevation	Repetitive	14	Tidal Flooding	High
County	Oriole Back Road	Yes	Elevation	Repetitive	16	Flooding	Medium
County	Jerusalem Road	No	Elevation	Occasional	17	Flooding	Medium
County	Earl Webster Road	No	Elevation	Occasional	18	Flooding, Tidal, and Heavy Rain	Medium
County	Hodson White Road	Yes	Elevation	Repetitive	19	Flooding, Tidal, and Heavy Rain	High
County	Turkey Branch Road	No	SWM	Occasional	24		Medium
County	Gordy Road	No	SWM	Occasional	25		Medium
County	Millard Long Road	No	Elevation	Repetitive	26	Flooding, Tidal, and Heavy Rain	Medium
County	Fishing Island Road	No	Elevation	Repetitive	27	Tidal Flooding	Medium
County	Maddox Island Road	No	Elevation	Repetitive	28	Tidal Flooding	Medium
County	Rumbley Road	Yes	Elevation	Occasional	29	Tidal	High
County	Frenchtown Road	Yes	Elevation	Occasional	30	Tidal/Flooding	High
County	Clifton Bozman Road	Yes	Elevation	Repetitive	31	Flooding, Tidal, and Heavy Rain	High
County	Lower Hill Road	Yes	Elevation	Occasional	32	Tidal Flooding	Medium
County	Nevette Muir Road	No	Elevation	Occasional	33	Flooding, Tidal, and Heavy Rain	Low
County	Catlin Road	No	Elevation	Occasional	34	Tidal Flooding	Low
County	Hewitt Ford Road	No	Elevation	Occasional	35	Tidal Flooding	Low
County	Claude Hall Road	Yes	Elevation	Repetitive	36	Flooding	High

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State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
County	Coulbourne Creek Road	Yes	Elevation	Occasional	37	Flooding	High
County	River Road	No	Elevation	Repetitive	38	Flooding & Tidal	Medium
County	Daughtery Town Road	Yes	Elevation	Repetitive	39	Tidal Flooding	High
County	William Maddox Road	Yes	Elevation	Repetitive	46	Tidal Flooding	Medium
County	Quindocqua Road	No	Elevation	Occasional	57	Flooding, Tidal, and Heavy Rain	Medium
County	Smith Island Roads - West	Yes	Elevation	Repetitive	58	Tidal	High
County	Smith Island Roads - East	Yes	Elevation	Repetitive	86	Tidal	High
State	Oriole Road	Yes	Elevation	Repetitive	15	Flooding	High

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Flooding Issues – New Roads Added							
State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
Princess Anne	Fluers Lane @ Somerset Avenue	N			59	Flooding	Low
Princess Anne	Kristwood Way	N		Never	61	Ditching and Stormwater Management	Low
Princess Anne	Drexwood Drive	N		Never	62	Ditching, Stormwater, and Heavy Rain	Low
Princess Anne	Antioch Avenue	N		Never	63	Stormwater and Heavy Rain	Low
Princess Anne	Pine Street @ Somerset Ave	N		Never	66	Stormwater and Drainage	Low
Princess Anne	Spruce @ Elm Street	N		Occasional	67	Stormwater	Low
Crisfield	South Somerset Avenue @ Old Calvery Road & Village Drive	N	Elevation	Occasional/Repetitive	73	Flooding	High
Crisfield	Cove Street @ South Somerset Avenue to South 3 rd Street	Y	Elevation	Repetitive	74	Flooding	High
Crisfield	West Main Street to end of Peninsula (Terminus of Road)	Y	Elevation	Repetitive	76	Flooding	High
Crisfield	Maryland Avenue extending to beginning of Blue Crab Scenic Byway	Y	Elevation	Repetitive	77	Flooding	High
Crisfield	Wynfall Avenue to Hall Highway	Y	Elevation	Repetitive	78	Flooding	High
Crisfield	Broadway	No	SWM	Repetitive	97	Flooding	High
Crisfield	1 st Street				98		
Crisfield	2 nd Street				99		
Crisfield	Charlotte Street				100		

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State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
Crisfield	Norris Harbor Drive				102		
Crisfield	Somers Cove				103		
Crisfield	Puppy Hole Court				104		
Crisfield	6 th Street				105		
Crisfield	Chesapeake Avenue				106		
Crisfield	E Main Street				107		
Crisfield	Potomac Street				108		
Crisfield	Tawes Drive				109		
Crisfield	Pear Street				111		
Crisfield	Locust Street				112		
Crisfield	Pine Street				113		
Crisfield	Walnut Street				114		
Crisfield	Crockett Avenue				115		
Crisfield	Columbia Avenue				118		
Crisfield	S. Somers				119		
Crisfield	N. Somers				120		
Crisfield	4 th Street				121		
Crisfield	Myrtle Street				122		
Crisfield	Riverview Road	Yes	Elevation	Occasional	123	Flooding & Tidal	High
County	Annie Hyland	N	SWM/Elevation	Occasional	60	Flooding	Medium
County	Calvery Road – North of Jenkins Creek	N/Y		Repetitive	68	Flooding	High

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State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
County	Walter Jones Road (Terminus)	N/Y	Elevation	Repetitive	69	Flooding	High
County	Old State Road @ Roland Tyler Road	N	Elevation	Occasional/Repetitive	72	Flooding	High
County	Intersection of Lawson Barnes Road and 667	N	Elevation	Occasional/Repetitive	75	Flooding	High
County	Skipjack Lane	N/Y	Elevation	Occasional/Repetitive	79	Flooding	High
County	Mt. Vernon Road – section between Firehouse Road & McIntyre Road	N/Y	SWM/Elevation	Occasional	80	Flooding	Medium
County	Deal Island Road (Bridge to Hotel Road)	Y	SWM/Elevation	Repetitive	82	Flooding	High
County	Deal Island Road (Southernmost End)	Y	SWM/Elevation	Repetitive	83	Flooding	High
County	Ballord Road	N/Y	SWM/Elevation	Repetitive	84	Flooding	High
County	Riverview Road @ Rumbley Road	Y	SWM/Elevation	Repetitive	85	Tidal	High
County	Peach Street				110		
County	Stouty Sterling Road	No	Elevation	Repetitive	116	Flooding, Tidal, and Heavy Rain	High
County	Sackertown Road (Different section of road than #42)	Yes	Elevation	Repetitive	117	Tidal Flooding	High
County	Jacksonville & Plantation – Airport Entrance	No	SWM	Occasional	124	Heavy Rain & Flooding	Medium
State	South Street @ Somerset & Bedford Avenue	N	SWM/Elevation	Occasional/Repetitive	64	Heavy Rain, Stormwater, and Drainage	High
State	Broad Street @ Hawks Landing	N	Yes, Parking Lot SWM	Occasional/Repetitive	65	Storm Events and Evacuation Issues	High
State	Hampden Avenue @ Progress Lane	N	SWM	Occasional/Repetitive	81	Heavy Rain, Stormwater, and Drainage Issues	High

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State, County, or Municipal	Flood Related Issue - Roads	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
State	Hall Highway	Yes	SWM/Elevation	Repetitive	86	Flooding	High
State	Broad Street	No	SWM	Repetitive	87	Flooding	High
State	Williams Street	No	SWM	Repetitive	88	Flooding	High
State	10 th Street	No	SWM	Repetitive	89	Flooding	High
State	Dock Street	No	SWM	Repetitive	90	Flooding	High
State	N 11 th Street	No	SWM	Repetitive	91	Flooding	High
State	Goodsell Alley	No	SWM	Repetitive	92	Flooding	High
State	Spruce Street	No	SWM	Repetitive	93	Flooding	High
State	9 th Street	No	SWM	Repetitive	94	Flooding	High
State	8 th Street	No	SWM	Repetitive	95	Flooding	High
State	7 th Street	No	SWM	Repetitive	96	Flooding	High
County/State	Byrd Road	Yes	Elevation	Repetitive	101	Tidal Flooding	High

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State, County, or Municipal	Flooding Issues – Bridges County and State						
	Flood Related Issue - Bridges	Evacuation Issue (Y/N)	SWM Elevation Problem	Flooding: Occasional or Repetitive	Map Location #	Hazard/Issue	Ranking (High, Medium, Low)
County	S-0016 Haines Point Rd.	N	SWM	Occasional	B16	Tidal Flooding	Low
County	S-0018 Rehobeth Rd.	N	SWM	Occasional	B17	Tidal Flooding	Low
County	S-0019 Bryan Hall Rd.	Y	Elevation	Repetitive	B18	Tidal Flooding	High
County	S-0020 Whitehaven Ferry Rd.	N	SWM	Occasional	B19	Tidal Flooding	Low
County	S-0021 Marsh Road/ Smith Is.	Y	Elevation	Repetitive	B20	Tidal Flooding	High
County	S-0022 Smith Island Rd.	Y	Elevation	Repetitive	B21	Tidal Flooding	High
County	S-0023 Old Princess Anne Rd	N	SWM	Occasional	B22	Tidal Flooding	Low
County	S-0024 Cathell Rd	N	SWM	Occasional	B23	Tidal Flooding	Low
County	S-0025 Apes Hole Rd.	Y	Elevation	Repetitive	B24	Tidal Flooding	High
State	Somerset Avenue	N/Y	Elevation	Occasional	B25	Tidal Flooding	High
State	Byrd Road	Y	Elevation	Repetitive	B26	Tidal Flooding	High

APPENDIX E

CAPABILITY MATRIX

CAPABILITY ASSESSMENT

	Somerset County	Princess Anne	Crisfield
Comprehensive Plan with Hazard Mitigation	Yes - Comprehensive Plan 1996	Yes - Comprehensive Plan 2009	Yes – Comprehensive Plan 2010
Land Use Plan	Yes - Comprehensive Plan 1996	Yes – Comprehensive Plan 2009	Yes – Comprehensive Plan 2010
Subdivision Ordinance	Yes	Yes – 10/6/1997	Yes – 1996
Zoning Ordinance	Yes - Somerset County Zoning Ordinance 2015	Yes – 2015 Update	Yes – Zoning Code (Ch. 17)
Flood Mitigation Assistance Plan (FMA)	No	N/A	N/A
Floodplain Management Ordinance	Yes	Yes	Yes
- # of Flood Insurance Policies	1,395 – NFIP Report	9 – NFIP Report	536 – NFIP Report
Stormwater Program	Yes	Yes - 9/13/2010	Yes – 6/14/2011
Building Code	Yes – International Building Code 2015	Yes - International Building Code 2015	Yes – International Building Code 2015
Building Official	Yes	Yes - Tracy Grangier	Yes – Dean Bozman
Inspections?	Yes	Yes	Yes
Warning-sirens?	Yes	Yes	Yes
NOAA Weather Radio?	Yes	Yes	Yes
Reverse 911?	Yes	No - County	No, but it is being considered
Natural / Cultural Resources Inventory	Yes	Historical District	Yes – Comprehensive Plan 2010
Erosion Control	Yes	Yes – with County	Yes – with County
Sediment Control	Yes	Yes – with County	Yes – with County
Public Information Program	Website, Social Media, and Press Releases	Website	Website, Email Blasts, Social Media, and Press Releases

APPENDIX F

FEDERAL & STATE FUNDING SOURCES

FEDERAL & STATE GRANT FUNDING SOURCES

Note: Updated June 2017

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.

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% Non-Federal - 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
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

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Increased Cost of Compliance	Maryland Emergency Management Agency 5401 Rue 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
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

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 (if percent of average fiscal year fire costs) on a single declared fire. After the State's out-of-pocket expenses exceed twice the average fiscal year costs, funds are made available for 100 percent of all costs for each declared fire.	Funds 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
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.

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

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	To perform activities prior to flooding or flood fight that would assist in protecting against loss of life and damages to property due to flooding.	No information	There must be an immediate threat of unusual flooding present before advance measures can be considered. Any work performed under this program will be temporary in nature and must have a favorable benefit cost ratio.	Governor of State must request assistance
Emergency Streambank and Shoreline Protection	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	Authorizes the construction of emergency streambank protection measures to prevent damage to highways, bridge approaches, municipal water supply systems, sewage disposal plants, and other essential public works facilities endangered by floods or storms due to bank erosion.	No information	Churches, hospitals, schools, and other non-profit service facilities may also be protected under this program. This authority does not apply to privately-owned property or structures.	TBD
Small Flood Control Projects	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	Authorizes the construction of small flood control projects that have not already been specifically authorized by Congress.	No information	There are two general categories of projects: structural and nonstructural. Structural projects may include levees, floodwalls, diversion channels, pumping plants, and bridge modifications. Nonstructural projects have little or no effect on water surface elevations, and may include flood proofing, the relocation of structures, and flood warning systems.	TBD
Flood: Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	To mitigate, before an event, the potential loss of life and damages to property due to floods.	No information	Assistance may consist of temporary levees, channel cleaning, preparation for abnormal snowpack, etc.	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)	USACE 441 G Street, NW, Washington DC 20314; 202-761-0011	Initiates a short reconnaissance effort to determine Federal interest in proceeding. If there is interest, a feasibility study is performed.	Federal - 65% Local- 35%	A local sponsor must identify the problem and request assistance. Small flood control projects are also available.	Anytime
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 5401 Rue Saint Lo Drive Reisterstown, MD 21136	Funds may be used for salaries, travel expenses, and other administrative cost essential to the day-to-day operations of State and Local emergency management agencies. Program also includes management processes that ensure coordinated planning, accountability for progress, and trained qualified staffing.	Federal - 50%	EMA funded activities may include specific mitigation management efforts not otherwise eligible for Federal funding. Management Assistance program funds may not be used for construction, repairs, equipment, materials or physical operations required for damage mitigation projects for public or private buildings, roads, bridges, or other facilities.	Anytime

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 1 st
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	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.	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 1 st

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	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
Green Infrastructure Resiliency Grant Program	Maryland Department of Natural Resources Chesapeake and Coastal Service (p) 410.260.8799 (f) 410.260.8739	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.	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 G

SOURCES

SOURCES

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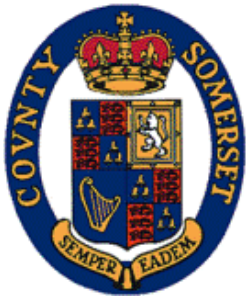
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APPENDIX H

PUBLIC MEETING

ANNOUNCEMENTS &

MINUTES



October 11, 2017

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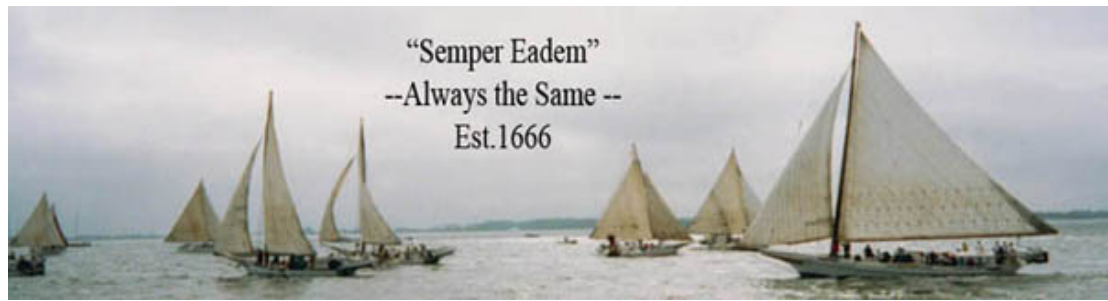
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Emergency Services

[Back to list of Agencies](#)

Emergency Preparedness

Being prepared before an emergency can ensure your safety and comfort throughout the event. No one is exempt from being affected by disasters either man made or natural. So its important to be ready for such events.

The links below contain information and questions you should ask yourself before an emergency happens. Somerset County cares about the safety of you and your family.

[Emergency Preparedness Brochure](#)

[Canine Needs List](#)

[Feline Needs List](#)

Hazard Mitigation

Somerset County has been awarded grant funding from the Federal Emergency Management Agency, to complete a countywide Hazard Mitigation Plan Update. The previous plan was completed and adopted by the Somerset Board of Commissioners, the City of Crisfield, and the Town of Princess Anne in 2012. Hazard mitigation is sustained action taken to reduce or eliminate the long-term to human life and property from hazards. Mitigation is the foundation of community resilience and touches all parts of a community: how floodplains and natural resources are managed, how a community builds, and where infrastructure and critical facilities are placed.

Somerset County may engage in mitigation efforts both before and after a disaster to become more resilient. This requires addressing not only the physical and environmental impacts of hazards, but also the economic and social impacts. To that end, a stakeholder committee has been identified to assist in the plan development process. **Stakeholder meetings are open to the public and have been scheduled on the following dates: June 7, 2017; July 12, 2017; and, August 2, 2017.** All meeting will start at 10:00 AM and be held in room #120 at 11916 Somerset Avenue in Princess Anne, Maryland

[Visit Our Website](#)

[Somerset County Office Complex](#)

Room #120
11916 Somerset Ave.
Princess Anne, Md. 21853
Phone: 410.651.0707
Fax: 410.651.3350
Email: [Yvette Cross](mailto:Yvette.Cross@somerset-emergency.com) -- Director
Website: [Somerset Emergency Services](http://www.somerset-emergency.com)



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[*Download a 911 Residential Emergency Information Form*](#)



ney Kristen Boston did not go forward on several other counts including malicious destruction of property and trespassing.

Previously dropped by the state were a charge of second degree felony arson, and one count related to this being a hate crime.

In reading the police report, Boston said Shuford and co-defendant D'Asia Perry "joked about ripping [the sign] down." Unable to do that Shuford went back to the Perry's car and retrieved a lighter, but told police when they left the scene it had not caught fire.

Defense attorney Craig Schoenfeld said, "They were cracking jokes about the sign," and when they got back into the car "they didn't believe anything happened." Nevertheless it did burn, causing the Princess Anne Volunteer Fire Company to respond to the outside fire, and the State Fire Marshal's Office to investigate.

"I do commend you for turning yourself in," the judge said. "It's what someone of good character does." She said the conviction "may change your life" but punishment is not just for the accused, but "for the community."

According to her lawyer, Shuford had no criminal record prior to this incident. She was a 2015 English Honors graduate of New Town High School in Baltimore County who enrolled at UMES but her grades were not up to par so she returned home for community college classes. She is reapplying for admission to UMES and wants to be a lawyer.

Shuford had nothing to say at sentencing.

Co-Defendant Perry, now age 20, was also in court but had her case postponed to June 26. Public Defender Erica Witz said there is video evidence she would like to review.

hold. "Galaxie was literally bred for me," Worley says in a promotional video for America's VetDogs.

"No matter what I'm doing, he matches my pace." Galaxie was trained at ECI by Gary Miller, inset photo, an incarcerated Vietnam veteran who served with the Marines from 1970-71. Currently there are 12 inmates working with six puppies at ECI, but more could be trained if community members would step in to be weekend puppy raisers. This gives the dogs a chance to get more acclimated to the real world outside of the prison such as interacting with children, going shopping or experiencing traffic. For more information about what it takes to handle one of these puppies on weekends, contact Lt. P.J. Stephenson at 410-845-4091 or 443-880-0963.

Defendant in cemetery assault gets time to report to prison

Crisfield-Somerset County Times

PRINCESS ANNE — A Crisfield man handcuffed and ready to be led out of the courtroom to start a 2½ year sentence for illegally possessing a shotgun successfully appealed to postpone his prison report date so he could help his girlfriend pack and re-settle in Pennsylvania where together they hope to make a new start.

Aaron N. Sterling, 28, had been involved in the Aug. 31 assault of another man inside a vehicle parked at the Asbury Church cemetery in Crisfield. On April 3 in Circuit Court he entered an Alford plea to possessing a shotgun as a disqualified person in exchange for the state dropping armed robbery, first degree assault and related charges.

Senior Circuit Court Judge Daniel M. Long ordered a pre-sentence investigation, and when Sterling was back in court on May 15 State's Attorney Dan Powell recommended the 2½ year sentence with credit for 133 days of time served.

Sterling and his attorney Kelley

McFadden appealed to the judge, reminding him that Sterling was cooperative in the case against Jamaal Taylor, who was sentenced to 10 years for two counts of reckless endangerment after shots were fired in the area of Second Street near Broadway in May 2016.

Sterling plans to leave Crisfield with his girlfriend and their children to live near Philadelphia where he has a landscaping job lined up. Sterling even reminded the judge that during a prior court appearance he was told to "get out of Crisfield."

"I was in the wrong place at the wrong time," Sterling said of the incident from last August, for which his Alford plea does not admit guilt but instead takes advantage of the state's offer of leniency. "Help me."

Judge Long said Sterling had a "horrible" record going back to his days as a juvenile, and that he must be consistent with sentencing. He said the state's recommendation was "fair" and was "not inclined" to offer him any days of freedom to get

See Jail Sentence — Page 7

Local hazard mitigation plan due for update

PRINCESS ANNE — Are you prepared for the next storm? Are you familiar with Somerset County's Hazard Mitigation Plan?

Hazard mitigation is the action you take to reduce or eliminate in the long-term hazards to human life and property. It can occur before or after a disaster. The last plan adopted by Somerset County and its two municipal governments was in 2012 and the Federal Emergency Management Agency (FEMA) has awarded Somerset County a \$30,000 grant so it can be updated.

"Mitigation is the foundation of community resilience and touches

all parts of a community," said an Emergency Services spokesperson. It includes "how floodplains and natural resources are managed, how a community builds, and where infrastructure and critical facilities are placed.

The plan addresses the physical and environmental impacts of disasters, plus the economic and social impacts. A stakeholder committee has formed to assist with the development of a new plan. For more details, visit the Somerset County Emergency Services page at www.somersetmd.us/agencies/emergency.html.

Play Pals. 10-11 a.m. Somerset County Library, 11767 Beechwood St., Princess Anne. A play group for 0 to 3 year olds and their parents. Presented by Judy Center. For more information, call 410-651-0852.

GED Classes. 4:30-6:45 pm. Somerset County Library, 100 Collins St., Crisfield. Preparation for the GED test and National External Diploma Program. Call 410-677-4261 to register.

Art Exhibit Closing Reception. 5-6 p.m. Mosely Gallery, University of Maryland Eastern Shore, Princess Anne. The "Senior Show" featuring portfolio pieces from May graduates of the Department of Fine (visual) Arts. For more information, call 410-651-7770 or visit www.moselygallery.com.

Friday, May 26

Quilters, Stitchers, & More. 10 a.m.-noon. Somerset County Library, 11767 Beechwood St., Princess Anne. Interested in hand-crafting? Join this group of creative minds. For more information, call 410-651-0852.

Saturday, May 27

First day of the Cruising Season for Smith Island Cruises.

Memorial Day Deck Party. 8 p.m.-midnight. Arby's Dockside Grill & Bar, 8954 Deal Island Road, Wenona. Come out and enjoy a night on the docks, karaoke, and dance the night away. No cover. Hosted by LJ the DJ.

Sunday, May 28

Soft Shell Festival. Noon-4 p.m. City Dock, 1300 West Main Street, Crisfield. Seafood, sides, beverages, kids' activities, arts and crafts, entertainment, demonstrations, Watermen's Hall of Fame, fresh crab cake and soft crab sandwiches. Sponsored by the Crisfield Lions and Lioness Clubs of Crisfield. For more information, call Pat Hanley at the Crisfield Area Chamber of Commerce 410-968-2500 or 800-782-3913 or office@crisfieldchamberofcommerce.com

Tuesday, May 30

Play Pals Presented By The Judy Center. 10-11 a.m. Somerset County Library, 100 Collins St., Crisfield. A play group for 0 to 3 year olds and their parents. For more information, call 410-968-0955.

Somerset receives funds for hazard plan

SUBMITTED ARTICLE

Somerset County has been awarded grant funding from the Federal Emergency Management Agency to complete a countywide Hazard Mitigation Plan Update.

The previous plan was completed and adopted by the Somerset Board of Commissioners, the City of Crisfield and the Town of Princess Anne in 2012.

Hazard mitigation is sustained action taken to reduce or eliminate the long-term to human life and property from hazards. Mitigation is the foundation of community resilience and touches all parts of a community: how floodplains and natural resources are managed, how a community builds, and where infrastructure and critical facilities are placed.

Somerset County may engage in mitigation efforts both before and after a disaster to become more resilient. This requires addressing not only the physical and environmental impacts of hazards, but also the economic and social impacts. To that end, a stakeholder committee has been identified to assist in the plan development process.

To obtain more information about the Somerset County Hazard Mitigation, visit the Somerset County website's Emergency Services page at www.somersetmd.us/agencies/emergency.html.

Crisfield house blaze spurs \$250K in damage

DELMARVANOW STAFF REPORT

A faulty dishwasher was being blamed for a Crisfield house fire than caused \$250,000 in damages, investigators said.

The 10:16 a.m. house fire on May 15 on Mariners Road took 50 firefighters from Crisfield two hours to control, according to the Maryland Fire Marshal's Office.

No one was hurt in the fire, officials said. The cause of the fire has been ruled as accidental.



WINTER QUARTERS GOLF COURSE

Nestled on the banks of the Pocomoke River, this 9 hole course is open all year.

Winter Quarters is a terrific choice for your regular rounds of golf or a new destination for you and friends when visiting Pocomoke City.

Daily greens fees are reasonable, and annual passes are available.

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APPENDIX I

HMPC MEETING

MINUTES

Somerset County Hazard Mitigation Plan Update Staff Meeting

Date: April 26, 2017

Time: 10:00 am

Location: Somerset County EOC

The initial planning meeting to organize resources was held on April 26, 2017. Meeting attendees included:

- Yvette Sterling Cross, Director of Emergency Services;
- Vicky Lloyd, Emergency Planner; and
- Virginia Smith and Michele King, Smith Planning and Design.

During the meeting, the composition of the 2017 Hazard Mitigation Planning Committee (HMPC) was discussed and determined. Many of the 2011 HMPC members will be returning as well as newly identified members representing agencies, organizations, and communities. In addition, regional partners/groups were identified. In fact, the Quarterly Eastern Shore Planners Committee held a meeting April 17, 2017. Vicky Lloyd, Somerset County Emergency Planner, discussed the update of the hazard mitigation plan with the group. Many of the group's participants have either completed or are in the process of completing their plan updates. Discussing the hazard mitigation plan process within this group, has proven beneficial.

Meeting attendees discussed 2011 Hazard Identification. A new hazard, Epidemic, has been added and will be discussed with HMPC members at the Kick-Off Meeting. In addition, Sea Level Rise will be included under Coastal Hazards. Next, Public Outreach was discussed. To initiate this process, a press release will be disseminated via several media outlets. Finally, a review of 2011 Mitigation Actions and Projects was conducted. Handouts will be prepared for the Kick-Off Meeting to provide reference information and generate discussion.

HMPC meeting dates are scheduled as follows:

- June 7, 2017 – Kick-Off Meeting;
- July 12, 2017 – Mitigation Ideas Workshop; and
- August 2, 2017 – Mitigation Prioritization and Implementation Planning.

Somerset County, Maryland Hazard Mitigation Planning Committee

Minutes

Meeting:	2017 Hazard Mitigation Planning Committee Kick-Off		
Date of Meeting:	June 7, 2017	Time:	10:00 am – 12:00 pm
Meeting Facilitator:	Yvette Cross – Department of Emergency Services	Location:	EOC – Room #120 11916 Somerset Avenue Princess Anne, MD 21853

Meeting Topics Discussed

Agenda Topics

- ✓ What Is Hazard Mitigation?
- ✓ Previous Plans Adopted By Somerset County
- ✓ Review Of 2017 Hazard Planning Process
- ✓ Review Hazard Identification
- ✓ Mitigation Status Report – Review Of 2011 Mitigation Actions
- ✓ Safe Growth Audit
- ✓ Next Steps

Attendees

Name	Organization		Name	Organization
Anthony Sofo	United States Coast Guard		Ralph Taylor	Somerset County Administrator
Mike Tabor	Crisfield Police Department		Tracy Grangier	Town of Princess Anne
Mark Tyler	UMES Police Department		Tim Bozman	Princess Anne Police Department
Mark Konapelsky	Somerset County Planning & Zoning, City of Crisfield Commissioner, Disaster Assessment		Joyce Cottman	Somerset County Social Services
Liz Tyler	MNRP		Michael McIntyne	Somerset County Health Department
Jeff Howard	MNRP		Danny Thompson	Economic Development
John Redden	Somerset County Public Works		Andrew Beauchamp	I.T.
Victoria Lloyd	Somerset County Emergency Services		Donald Ford	Fire Services
Yvette Cross	Somerset County Emergency Services		Virginia Smith	Smith Planning & Design

Patrick Metzger	MSP – Princess Anne		Michele King	Smith Planning & Design
Ronnie Howard	Somerset County Sheriff's Office		Krista Brady	Smith Planning & Design
Gary Powell	Somerset County DRS			

- **What Is Hazard Mitigation?**
- **Previous Plans Adopted By Somerset County**
- **Review of 2017 Hazard Planning Process**

Yvette Cross, Department of Emergency Services opened the meeting with introductions. All meeting participants were introduced including the consulting firm hired by Somerset County to complete the Hazard Mitigation Plan Update, Smith Planning and Design (SP&D). Yvette Cross informed the committee members that the Press Release announcing that the Plan update process is underway has been placed in local Somerset County Newspaper(s).

The 2017 Somerset County Hazard Mitigation Plan is in the plan update process. In order to complete the Plan update, various stakeholders, including the two municipalities were invited to participate in the process. Plan Update information will be distributed throughout the planning process.

Meeting participants were provided with handouts detailing the planning process, terms and definitions, descriptions of flood zones, and hazard rankings (attached).

The following planning committee meetings have been scheduled in order to complete a draft hazard mitigation plan.

- Kick-Off Meeting-June 7, 2017
- Mid-Point Meeting-July 12, 2017
- Mitigation Prioritization and Implementation Planning Meeting: August 2, 2017

In order to facilitate municipal participation Plan Updates, materials and requests for information will be distributed via email to each of the municipal points of contact.

• **Review Hazard Identification**

Meeting participants reviewed and discussed the hazards identified and ranking results from the *2012 Somerset County Hazard Mitigation Plan, as well as, the preliminary 2017 Planning Committee results*. Results of the process were reviewed by meeting participants. All hazards previously identified remains. Changes included Earthquake risk reduced from medium-low to low hazard ranking. Also, Epidemics, including Opioid & Zika will be added as an additional chapter in the Plan.

In addition, SP&D provided data on past hazard occurrences for committee review and discussion. A separate Hazard Identification and Ranking form was given to each municipality. This information will be included within the municipal perspective portion of the Plan Update.

- **Flooding Issues Table (Repetitive Roads)**
- **Mitigation Status Report – Review Of 2011 Mitigation Actions**

SP&D provided a Flooding Issues Table for the County, as well as, for the Towns of Princess Anne and Crisfield for review and discussion. The committee was asked to review and provide any updates. No

County projects have been completed since the last 2012 update. John Redden from Public Works agreed to do further research to insure accuracy. It was stated that since Hurricane Sandy, many mitigation projects have been completed and flooding on roads in Crisfield has decreased since the installation of new flood gates. SP&D will bring large quadrant maps (individual maps for Crisfield and Princess Anne) with roads to reassess repetitive flooding issues on Somerset County roadways to the next planning committee meeting.

Mitigation actions and projects identified in the *2012 Somerset County Hazard Mitigation Plan* were reviewed and discussed by committee members during the meeting. Each action item will need a status update for inclusion into the 2017 Plan. An Adobe Fillable PDF will be emailed, which will provide planning committee members with an opportunity to provide status updates for any of the mitigation action items. Results will be compiled and presented at the next meeting.

Virginia Smith explained the Community Rating System process. The City of Crisfield and the County indicated that they would like more information on the Community Rating System (CRS). At our next meeting, SP&D will review steps for achieving CRS points thru the Hazard Mitigation Plan.

Shoreline Erosion mitigation projects have been completed on Smith Island & Deal Island thru DNR. Information will be added to the 2017 Plan.

New FEMA Flood Insurance Rate Maps (FIRM) were discussed. A potential new project for 2017 Plan is to locally identify areas that contradict FEMA FIRM maps. SP&D will provide John Redden, Public Works with additional information.

Projects identified as New Projects in the 2012 Plan labeled as Projects A thru F were reviewed and discussed. Additional information on these projects will be collected. The projects discussed were as follows:

- A. **Community Rating System** – No progress, carryover
- B. **Commodity Flow Study** – No progress, may use UMES interns. Railroad request for information on data will need to come directly from the County.
- C. **Shelter Design and Assessment** – Red Cross conducted a full assessment and capabilities – 2015.
- D. **Natural Resources Planning** - Open
- E. **Tidal Flooding Prevention** – Closed, but keep open. More flood gates needed.
- F. **Mitigation Roadway Flooding** – Additional information being collected.

The HMPC was asked to provide any additional mitigation projects that have been completed since 2012 and any new mitigation ideas to be added to the 2017 Plan update.

• **Safe Growth Audit**

A new Chapter entitled "*Plan Integration*" will be added to the 2017 Update. This chapter will include the results of the Safe Growth Audit. The new *State of Maryland Hazard Mitigation Planning Guidance* request that all local hazard mitigation plans updates include plan integration as a topic within the Plan. Recommendations for integration with other County planning documents will be included as part of the 2017 Plan.

• **Next Steps**

- Completion of Hazard Identification & Ranking Process from municipalities;
- Mitigation Status Report Results;
- Update of Critical & Public Facility Database;
- Results of the Safe Growth Audit and Recommendations;
- Mitigation Ideas Workshop Meeting

• **Meeting Date(s)**

- Mitigation Ideas Workshop Meeting Date: **July 12, 2017**
Location: Somerset County
Emergency Operation Center
11916 Somerset Avenue
Princess Anne, MD 21853
Time: 10:00 A.M.

Somerset County, Maryland

Hazard Mitigation Planning Committee

Minutes

Meeting:	2017 Hazard Mitigation Planning Committee Meeting #1		
Date of Meeting:	July 12, 2017	Time:	10:00 am
Meeting Facilitator:	Yvette Cross – Department of Emergency Services	Location:	EOC – Room #120 11916 Somerset Avenue Princess Anne, MD

Meeting Topics Discussed

Agenda Topics

- ✓ Review June 7th Meeting Minutes
- ✓ New Chapters
- ✓ Repetitive Roadway Flooding Issues
- ✓ Coastal Flooding Assessment
- ✓ Critical & Public Facility Inventory
- ✓ Critical Facilities Vulnerability Assessment
- ✓ Next Steps

Attendees

Name	Organization	Name	Organization
John Redden	Somerset County Public Works	Ken Sterling	McCready Heath
Victoria Lloyd	Somerset County Emergency Services	Bruce Parkinson	Somerset County Detention Center
Yvette Cross	Somerset County Emergency Services	Gary Beauchamp	Somerset County Roads Department
Patrick Metzger	MSP – Princess Anne	Barbara Logan	Somerset County Health
Ronnie Howard	Somerset County Sheriff's Office	Tim Bozman	Princess Anne Police Department
Gary Powell	Somerset County DRS	Joyce Cottman	SC Department of Social Services
Michael McIntyre	Somerset County Health Department	Virginia Smith	Smith Planning & Design
Tracy Grangier	Town of Princess Anne	Michele King	Smith Planning & Design
Brian Holloway	I.T.		

2017 HMP New Chapters

Three new chapters were added to the Hazard Mitigation Plan (HMP) Update and include:

1. Earthquake
2. Epidemic-Infectious Disease & Opioid Crisis
3. Cyber Attack

Repetitive Roadway Flooding Issues

Large 32 X 40 maps were placed around the room. Small groups were formed for the six (6) map areas under review. Attendees were encouraged to join the group around the map area they were most familiar with, the area they either live and/or work. Attendees labeled segments of roadway and bridges that are known to experience flooding frequently. For each problem area, attendees added notes explaining cause/source of flooding, detailed location information, and other specific information. These areas will be digitized on mapping, along with critical facility point data, for further analysis. The associated repetitive roadway flooding data table will be updated to correspond with mapping products for inclusion into the plan document.

Coastal Flooding Assessment

Michele King, SP&D presented coastal flooding assessment results to meeting attendees. Results included critical facilities, FEMA flood zones, depth of flooding at lowest adjacent grade, hurricane storm surge, and 2050 mean sea level rise. The PowerPoint slideshow handout containing Ms. King's presentation materials is attached for review.

Critical & Public Facility Inventory and Assessment

SP&D coordinated with Emergency Management staff to ensure the accuracy on the inventory. This inventory is used throughout the planning process, as a primary focus of the plan entails the identification and assessment of hazard risk, vulnerability, and mitigation strategies for critical facilities.

Meeting Date(s)

- Meeting Date: **August 9, 2017**
Location: Somerset County
Emergency Operation Center
11916 Somerset Avenue
Princess Anne, MD 21853
Time: 10:00 A.M.

Somerset County, Maryland Hazard Mitigation Planning Committee

Minutes

Meeting:	2017 Hazard Mitigation Planning Committee Meeting #2		
Date of Meeting:	July 12, 2017	Time:	1:00 pm
Meeting Facilitator:	Yvette Cross – Department of Emergency Services	Location:	EOC – Room #120 11916 Somerset Avenue Princess Anne, MD 21853

Meeting Topics Discussed

Agenda Topics

- ✓ FEMA Digital Flood Insurance Rate Map (DFIRM) Effective February 4, 2015
- ✓ Participation on the Community Rating System

Attendees

Name	Organization	Name	Organization
John Redden	Somerset County Public Works	Ralph Taylor	Somerset County Administrator
Victoria Lloyd	Somerset County Emergency Services	Tracy Grangier	Town of Princess Anne
Yvette Cross	Somerset County Emergency Services	Mary Phillips	Somerset DTCS
Rick Pollitt	City of Crisfield	Mark Konapelsky	City of Crisfield, Somerset County DTCS
Michele King	SP&D	Gary Powell	Somerset County Emergency Services
Virginia Smith	SP&D		

DFIRM

The Somerset County DFIRM's and Flood Insurance Study (FIS) effective February 4, 2015 contain a few potential errors identified by the county. These errors require further review and analysis, specifically the lines on the mapping shown as the Limit of Moderate Wave Action (LiMWA). The LiMWA indicates the extent and/or end of the **Coastal** AE Flood Zone. Mary Phillips will provide additional information to SP&D and a project will be developed for inclusion in the HMP Update. In addition, this information will be discussed with the State NFIP Coordinator, Dave Guignet.

LiMWA QUICK FACTS: A line on the map showing the LiMWA, which is the inland limit of the area expected to receive 1.3-foot or greater breaking waves during the 1-percent –annual-chance flood event. Waves of 1.5 feet or higher have been shown to cause significant damage to structures. A

LiMWA line is shown on some FIRMs for areas along coastlines.

Community Rating System

SP&D distributed a CRS Overview Sheet and the FEMA CRS Application Letter of Interest and Quick Check Instructions for review and discussion. The county is interested in pursuing CRS and making application. Both Princess Anne and Crisfield expressed interest, as well. Working together, the county and the two municipalities will be able to make application concurrently. SP&D will include information that will earn CRS points within the HMP Update.

• Meeting Date(s)

- Meeting Date: **TBD**
Location: Somerset County
Emergency Operation Center
11916 Somerset Avenue
Princess Anne, MD 21853
Time: TBD

Somerset County, Maryland

Hazard Mitigation Planning Committee

Minutes

Meeting:	2017 Hazard Mitigation Planning Committee Meeting		
Date of Meeting:	September 13, 2017	Time:	10:00 am
Meeting Facilitator:	Yvette Cross – Department of Emergency Services	Location:	EOC – Room #120 11916 Somerset Avenue Princess Anne, MD

Meeting Topics Discussed

Agenda Topics

- ✓ NFIP & CRS Appendix J – New 2017 HMP Update
- ✓ NFIP & CRS – Power Point Presentation
 - Guest Speaker – Kevin Wagner, Natural Resources Planner, State NFIP Coordinating Office from the Maryland Department of the Environment

Attendees

Name	Organization	Name	Organization
John Redden	Somerset County Public Works	Gary Pusey	Somerset County Planning & Zoning
Victoria Lloyd	Somerset County Emergency Services	Rick Pollitt	City of Crisfield
Yvette Cross	Somerset County Emergency Services	Tracy Grangier	Town of Princess Anne
Mark Konapelsky	Somerset County Planning & Zoning	Virginia Smith	Smith Planning & Design
Mary Philipps	Somerset County Department of Technology & Communication Services	Michele King	Smith Planning & Design
Gary Powell	Somerset County DRS	Ralph (Doug) Taylor	Somerset County Commissioner

NFIP & CRS

As part of the update process, the repetitive loss listing for Somerset County was obtained from the Maryland NFIP Coordinating Office. This list is a valuable planning tool and has been used during the Hazard Mitigation Plan Update process. There are thirty-seven (37) repetitive loss properties located in the unincorporated area of Somerset County. Additionally, one

repetitive loss property is within the municipal boundaries of Princess Anne, while fifteen (15) are within the City of Crisfield. Of the fifty-three (53) repetitive loss properties, there are three (3) commercial, three (3) condos, and forty-seven (47) single-family structures. There are no severe repetitive loss structures located within Somerset County.

The new Appendix, Appendix J – NFIP & CRS was added during the update. Committee members discussed and reviewed the new Appendix during the meeting.

Guest Speaker – Kevin Wagner

A guest speaker, Kevin Wagner, Natural Resources Planner, State NFIP Coordinating Office, with the Maryland Department of the Environment presented a Power Point presentation on the NFIP & CRS to those in attendance. Presentation attached.

Next Steps

Somerset County will submit CRS letter of intent to FEMA. In addition, the county will seek staff support within the next few months to assist in the CRS application process.