RESOLUTION NO. 3185

A RESOLUTION OF THE CITY OF SALISBURY, MARYLAND ADOPTING THE WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN.

WHEREAS, the City of Salisbury, a municipality in Wicomico County, Maryland, recognizes the risk natural hazards pose to people and property; and

WHEREAS, an adopted 2022 Wicomico County Hazard Mitigation & Resilience Plan is required as a condition of future funding for hazard mitigation projects; and

WHEREAS, the City of Salisbury, participated jointly in the planning process with other local units of government within the County to prepare a 2022 Wicomico County Hazard Mitigation & Resilience Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Salisbury City Council hereby adopts the 2022 Wicomico County Hazard Mitigation & Resilience Plan as an official plan; and

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

THE ABOVE RESOLUTION was introduced and read and passed at the regular meeting of the Council of the City of Salisbury held on this 12th day of September, 2022 and is to become effective immediately upon adoption.

ATTEST:

Kimberly R. Nichols

Kimberly R. Nichols, City Clerk

John R. Heath

John R. Heath, City Council President

Approved by me, this 14th day of OCT, 2022.

Jacob R. Day, Mayor

HAZARD MITIGATION & RESILIENCE PLAN

WICOMICO COUNTY, MD

2022

WICOMICO COUNTY DEPARTMENT OF EMERGENCY SERVICES
411 NAYLOR MILL ROAD
SALISBURY, MD 21802

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CHAPTER 1-INTRODUCTION

Updates to the Wicomico County Chapter 1 Introduction included the following:

- Updated Planning Process
- New FEMA Grant Program- Building Resilient Infrastructure and Communities (BRIC)
- New and Expanded Hazard Mitigation Planning Committee (HMPC): Table 1.1
- New and Expanded HMPC- Municipal Representatives: Table 1.2
- New Project Website & Public Survey
- Expanded Public Involvement
- Expanded Planning, Training, and Outreach Initiatives
- Updated Plan Organization

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

CHAPTER 1-INTRODUCTION

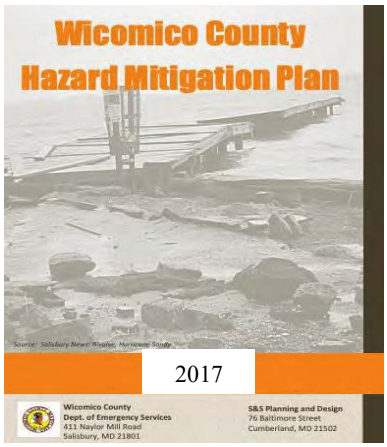
1.1 INTRODUCTION AND PURPOSE

The **2021 Hazard Mitigation & Resilience Plan** has been prepared for Wicomico County, Maryland, and its eight incorporated communities. The purpose of this plan is to identify, plan, and implement cost-effective hazard mitigation measures through a comprehensive approach known as hazard mitigation planning. This document is the result of participation from a cross-section of community members including County and municipal officials, residents, business owners and other agencies. Participation in the plan update was increased to include additional stakeholders. The 2021 Hazard Mitigation Planning Committee was comprised of ninety-four (94) members including municipal representatives, an increase of more than fifty (50) percent from that in 2016. In addition, training and outreach initiatives were held throughout the plan update process and included various methods of delivery and target audiences. For this plan update Wicomico County and their stakeholders have chosen to add resiliency. **Resiliency** is the ability of the community to bounce back after a disaster. Resiliency has been discussed from a hazard perspective and integrated throughout the plan update.

Hazard Mitigation is any action taken to permanently reduce or eliminate long-term risk to people and their property from the effects of hazards.

Natural hazard mitigation provides the nation $6 in benefits for every $1 invested.

The **2021 Hazard Mitigation & Resilience Plan** is an update of the previous plan document approved by FEMA and adopted by the Wicomico County in 2016. In addition, the City of Salisbury and the Towns of Delmar, Fruitland, Hebron, Sharptown, Pittsville, Willards, and Mardela Springs adopted the plan.



The *2016 Wicomico County Hazard Mitigation Plan* was available throughout the previous planning cycle for review on the County website under the Department of Emergency Services.

Updates to the 2016 plan and along with new plan elements have been detailed on each chapter cover sheet herein.

Wicomico County Hazard Mitigation & Resilience Plan Overview

The Hazard Mitigation & Resilience Plan forms the foundation for Wicomico County and its municipality's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The purpose of this plan is to identify, plan, and implement cost-effective hazard mitigation measures through a comprehensive approach known as hazard mitigation planning. The 2021 plan is an update to the 2016 Wicomico County Hazard Mitigation Plan. The Federal Emergency Management Agency (FEMA) requires hazard mitigation plans to be updated every five years.

1.2 PLANNING REQUIREMENTS

The **2021 Wicomico County Hazard Mitigation & Resilience Plan** forms the foundation for Wicomico County and its municipality's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. In order for municipalities to be covered under the Wicomico County HMRP, municipalities must participate throughout the planning process. All eight (8) municipalities have participated in the plan update process.

To that end, in December of 2020, Smith Planning and Design (SP&D) was contracted to update the *2016 Wicomico County Hazard Mitigation Plan* and develop the **2021 Wicomico County Hazard Mitigation & Resilience Plan**, in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, and 44 CFR Part 201-Hazard Mitigation Planning.

As an incentive for State and local governments to develop hazard mitigation plans, the federal government requires mitigation plans to be updated every (5) years as a component of eligibility for hazard mitigation grant funding.

Hazard mitigation grant programs are authorized by the following laws.

- 1968: National Flood Insurance Act
- 1979: Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act)
- 2000: Disaster Mitigation Act of 2000
- 2018: Disaster Recovery Reform Act (DRRA)
    - This amended the Stafford Act and expanded the grant-eligible mitigation activities for FEMA's grant programs including HMGP Post Fire and Building Resilient Infrastructure and Communities.

Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program.

The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

The BRIC program aims to categorically shift the federal focus away from reactive disaster spending and toward proactive investment in community resilience. FEMA funds BRIC with a 6% set-aside from federal post-disaster grant funds, such as public assistance and Individuals Assistance grants. As a competitive grant program, applicants must apply on a yearly basis.

1.3 2021 PLAN UPDATE HIGHLIGHTS

Following the review of the *2016 Wicomico County Hazard Mitigation Plan*, a workplan was developed to address update items and the integration of new plan elements. New plan elements have been highlighted below:

- A new Hazard Identification Risk Assessment (HIRA) was completed. The HIRA included twelve natural hazards. Pandemic and Emerging Infectious Disease was added as a new hazard for this planning cycle. The new HIRA results, data tables, and methodology has been included in Appendix A, Chapter 3, and as applicable throughout the plan update document.
- In addition to natural hazards, technological and man-made hazards (i.e., transportation accident, hazardous material incident, dam failure, fire and explosion, mass power outage) identified in the previous plan version have been updated. Active Assailant has been added as a threat. A Threat Hazard Identification Risk Assessment (THIRA) was completed for this hazard.
- A new project website www.wicomicohazards.org was developed and new content was periodically added over the course of the plan update. The public launch of the website occurred on February 4, 2021.
- A new Hazard Risk Survey Online Survey was provided to Hazard Mitigation Planning Committee (HMPC) members in January 2021 and the public in February 2021 on the project website.
- A Mitigation Status Report was completed using a Fillable PDF populated by HMPC members. The full report has been included in Appendix B.
- In addition to the larger stakeholder, HMPC meetings, targeted small group meetings were held throughout the plan update, such as public health, active assailant, and social vulnerability.
- Integrated comments provided by the Vulnerable Population Task Force
- Added new Capability Assessment information to Chapter 13. Recommendations for how these various capabilities could be expanded and improved to reduce risk were provided.

The 2021 Plan update process included a comprehensive review and integration of the following:

- *2016 Wicomico County Hazard Mitigation Plan*;
- *2017 Wicomico County Comprehensive Plan;*
- *2010 Wicomico County Comprehensive Water and Sewerage Plan*;
- *Zoning Codes;*
- *Wicomico County Critical Area Program and Ordinance;*
- *Wicomico County Critical Area Implementation Ordinance;*
- *2016 Maryland Greenhouse Gas Reduction Plan;*
- *2020 Climate Action Plan: Maryland Commission on Climate Change;*
- *2018 Maryland Climate and Adaptation Plan;*
- *2020 Nuisance Flood Plan;*
- *2021 Maryland State Hazard Mitigation Plan;*
- *Delmarva Avian Influenza Task Force Interim Guidance for Implementation; and,*
- *The Chesapeake Bay Critical Area Resource Protection Publication.*

Please see *Appendix F: Sources* for additional documents referenced throughout the plan.

1.4 PLANNING PROCESS

In compliance with hazard mitigation planning requirements, extensive public participation was sought and encouraged throughout the mitigation plan update process. A new Hazard Mitigation Planning Committee (HMPC) was formed in January 2021, and was comprised of various County agencies, non-profit organizations, private sector representatives, and representatives from each of the participating municipalities. The new HMPC was increased significantly to ensure that a broad cross-section of committee members were included in the **2021 Hazard Mitigation & Resilience Plan**. The new committee included representatives from key County departments such as Emergency Services, Recreation and Tourism, Planning and Zoning, Public Works, Health Department, Board of Education, Sheriff's Office, Detention Center, Airport, Civic Center, and representatives from the Towns of Delmar, Mardela Springs, Hebron, Pittsville, Sharptown, Willards, and the cities of Salisbury and Fruitland. Additionally, non-governmental representatives were included on the Planning Committee and include: Peninsula Regional Medical Center- Tidal Health, Chesapeake Utilities, Perdue Farms, Pepco, Coraluzzo Petroleum Transport, Greater Salisbury Committee, Chamber of Commerce, and Fire Chiefs Association. While many of the entities listed were represented on the previous hazard mitigation planning committee, additional participation was extensively sought, and new committee members were added during the Plan update process. In addition, SP&D provided technical support for the Plan update process.

Figure 1.1 – Organizing Resources

Source: SP&D Planning and Design and FEMA Guide

A series of regular large HMPC meetings as well as small topical group meetings resulted in the development of an effective and current Countywide Hazard Mitigation and Resilience Plan.

The HMPC was actively involved in reviewing previously identified hazards within the *2016 Wicomico County Hazard Mitigation Plan* and in the review of the new hazard data gathered during the Plan update process. Hazard data coupled with local knowledge from committee members and the public was utilized to assess the County's vulnerabilities to hazards. Following this assessment, the Committee reviewed the status of the 2016 Mitigation Strategies recommendations to reduce and prevent potential damage from these hazards. Mitigation action items identified in the 2016 Plan were reviewed and updated bi-annually during the 2015-2020 planning cycle. Following the Mitigation Strategies review, the HMPC then worked together to update, review, and select the most appropriate and feasible mitigation measures to address the County's hazards for the 2021 Hazard Mitigation & Resilience Plan.

The planning process commenced in January 2021 and a draft plan was submitted to the State for review in November 2021.

The following listing includes the members of the committee and the agencies they represent. Please note that HMPC representatives from municipalities have been included on Table 1.1.

Table 1.1 – Wicomico County, Maryland Hazard Mitigation Planning Committee

HAZARD MITIGATION PLANNING COMMITTEE MEMBERS	
Member Name	**Agency/Department**
David Fitzgerald	Wicomico County Department of Emergency Services
David Shipley	Wicomico County Department of Emergency Services
Edward Werkheiser	Wicomico County Department of Emergency Services
Lorenzo Cropper	Wicomico County Department of Emergency Services
Steve Garvin	Wicomico County Department of Emergency Services
Lori Brewster	Wicomico County Health Department
Babe Wilson	Wicomico County Sheriff
Gary Baker	Wicomico County Sheriff
Mike Lewis	Wicomico County Sheriff
Tod Richardson	W Wicomico County Sheriff
W. David Owens	Wicomico County Public School
John Psota	Wicomico County Acting Executive
Laura Hurley	Wicomico County Council Administrator
Jamie Dykes	State's Attorney Office
Larry Dodd	Wicomico County Council President
Tony Rudy	Wicomico County Airport
Warden Colbourne	Wicomico County Department of Corrections
Chuck Rousseau	Wicomico County Civic Center
Antonio Fascelli	Wicomico County Department of Public Works
Chris Classing	Wicomico County Department of Public Works
Mark Whitelock	Wicomico County Department of Public Works
Lee Outen	Wicomico County Department of Public Works
Mark Rickards	Wicomico County Parks and Recreation
Keith Hall	Wicomico County Planning, Zoning, and Community Development
Brian Soper	Wicomico County Planning, Zoning, and Community Development
Lori Carter	Wicomico County Planning, Zoning, and Community Development
Marilyn Williams	Wicomico County Planning, Zoning, and Community Development
Greg Grey	Wor-Wic College
Michele Ennis	Tri Community Mediation
Leisl Ashby	Wicomico County Board of Education
Robert Souza	Wicomico County Board of Education
Casey Asbury	Private Schools
Kathy Fiddler	PRMC-Tidal Health
Steve Schweikert	PRMC-Tidal Health
Rochelle Tyler	PRMC-Tidal Health
Casey Asbury	Private Schools
Kelly Leo	The Nature Conservancy
John Petito	Pepco
Bill Chambers	Industry
Frank Cruice	Perdue
Richard Hoppes	Industry
Sand Hoffman	Industry
Tim Emge	Industry
Donna Smith	MAC Maintaining Active Citizens, Inc.
Roy Brewington	MD DHS Social Services
John Chatham	MD Natural Resources Police - WC Supervisor
Scott Simmons	MD Natural Resources Police - Area Commander

Member Name	Agency/Department
Geoff Donahue	MDE HazMat
Patrica Williams	MDE HazMat
William Hildebrand	MDEM
Jalessa Tate	MDEM
Kayhla Cornell	MDEM
Michael Parsons	MIEMSS
Michael Rickard	MSP Asst. Barrack Commander
Chris Davala	MSP Barrack Commander

Source: SP&D Planning and Design & Wicomico County Department of Emergency Services

1.5 REVIEW OF THE PLAN AND REVISIONS

Various plan elements and working draft chapters were distributed to the HMPC members for review throughout the plan update process. Both the New Hazard Mitigation Risk Assessment (HIRA) and the Mitigation Status Report was distributed in the Spring or 2021 to HM&RP committee members. The Threat Hazard Identification Risk Assessment (THIRA) for the Active Assailant threat was developed, reviewed, and completed in the Summer of 2021. In August through October working draft chapters were distributed weekly for HMPC committee review and comment. Upon completion of all plan chapters, a cohesive draft plan was distributed for final review and comment by HMPC members in November 2021. Comments and modifications were made to the Plan prior to submittal to the Maryland Department of Emergency Management in November 2021. Please see *Appendix E: Wicomico County Hazard Mitigation Planning, Training, and Outreach Initiatives* for details.

1.6 MUNICIPAL INVOLVEMENT

Municipal packets of plan update information including a questionnaire and request for data was distributed. In addition to the HMPC committee meetings, small group meeting were held with representatives from each of the eight (8) municipalities. Participating municipalities provided hazard rankings, capabilities, municipal level data and perspective. This participation culminated into municipal mitigation action items and projects. Various plan elements and working draft chapters were distributed to the municipal representatives for review throughout the plan update process. Upon completion of all plan chapters, a cohesive draft plan was distributed for final review and comment by municipal representatives in November 2021.

Table 1.2 – Wicomico County, Maryland Hazard Mitigation Planning Committee- Municipal Representatives

HAZARD MITIGATION PLANNING COMMITTEE MEMBERS- MUNICIPAL	
Member Name	**Agency/Department**
Lisa Ellis	Chamber of Commerce- Delmar
Katherine McAllister	Chamber of Commerce- Fruitland President
Joseph Mangini	Chamber of Commerce- Pittsville
William Chambers	Chamber of Commerce- Salisbury
Amanda Pollack	City of Salisbury
Andy Kitzrow	City of Salisbury
Heather Lankford	City of Salisbury
Jack Heath	City of Salisbury
Julia Glanz	City of Salisbury
Alyssa Hastings	City of Salisbury DPW
Barbara Duncan	City of Salisbury
David Meienschein	City of Salisbury

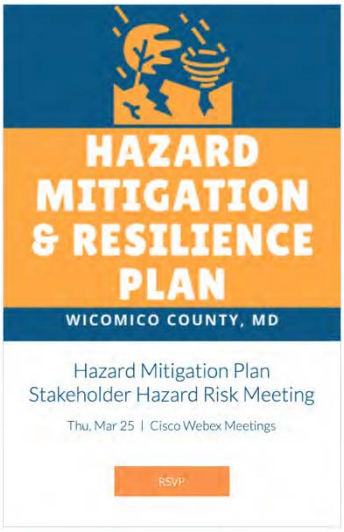
Member Name	Agency/Department
Chris Truitt	City of Salisbury Fire
David Black	City of Salisbury Fire
John Tull	City of Salisbury Fire Chief
Darrin Scott	Salisbury Fire Operations
Christopher Shockley	Salisbury University Police
Ed Lashley	Salisbury University Police
Joel Davies	Salisbury University Police
Cori Cameron	City of Salisbury- Water Works
Mike Dunn	Greater Salisbury Committee
Erica Galeone	The Salisbury School
Mark Evans	The Salisbury School
Ivan Barkley	Town of Delmar
Wade Alexander	Town of Delmar
Shari Donaway	Town of Delmar EMS
Joe Morris	Fire Chief's Association - Delmar
Karen Wells	Town of Delmar
Sara Bynum-King	Town of Delmar
Robert Harris	Town of Pittsville
Joseph Mangini	Town of Pittsville
Brian Swafford	City of Fruitland
Dan Holland	City of Fruitland
Darlene Kerr	City of Fruitland
Marc Henderson	City of Fruitland
Raye Ellen Taylor Thomas	City of Fruitland
Joseph Mangini	Town of Sharptown
Phillip Gosnell	Town of Sharptown
Sheila Adkins	Town of Sharptown
Billy White	Sharpstown VFD & President of Chiefs Association
Melinda Stafford	Town of Hebron
Rick Dwyer	Town of Hebron
Kortney Robinson	Town of Mardela Springs
Stanford Robinson	Town of Mardela Springs
Joseph Mangini	Town of Willards
Margaret White	Town of Willards

Source: SP&D Planning and Design & Wicomico County Department of Emergency Services

1.7 PUBLIC INVOLVEMENT

In order to conduct a robust planning process, stakeholder and public involvement throughout the update process was crucial. As this planning process commenced during the COVID-19 pandemic, the planning team decided to develop a project website at www.wicomicohazards.org.

The Wicomico County Hazard Mitigation & Resilience Plan is a project that aims to ensure the County is prepared for various hazards. The Department of Emergency Services placed special emphasis on understanding citizens' concerns regarding hazards. Community input was deemed incredibly valuable. Therefore, an online survey was used to collect community insight and perspective. The survey consisted of 9 questions to obtain community's level of concern for hazards that have the potential to impact the county.



Hazard Mitigation Planning Committee (HMPC) meetings were announced on the project website and were open to the public.

Meeting notes from HMPC stakeholder meetings were posted for review following each meeting.

A "Contact Us" sign-up form was included on the project website. Those who either RSVP for meetings and/or signed up under "Contact Us" were added to the project distribution email listing.

Website content was added periodically through the plan update process. The following table indicates web content updates to the project website. Please see *Appendix E: Wicomico County Hazard Mitigation Planning, Training, and Outreach Initiatives* for details.

Wicomico County Hazard Mitigation Planning, Training, and Outreach Initiatives				
Date	Meeting, Training, or Outreach Activity	Target Audience	Materials Provided	Comments/Input
10-Feb-21	Website Link on County Website & New Release	Public	Link to Project Website & News Release	Public Survey
5-Mar-21	Website Content	Public	Added HIRA Results Table and PDF to project website.	New Content
17-Mar-21	Website Content	Public	Stakeholder Meeting # 2 Agenda	The agenda is under the meeting box with sign-up.
24-Mar-21	Social Equity Mtg. and Hazard Mitigation	Lower Shore Vulnerable Populations Workgroup	Public Survey	Language workgroup provided suggested modifications for public survey; using more consise language
9-Jun-21	Website Content	Public	Added NWS Baltimore/Washington En Espanol Link	Additional Reources Tab
9-Jun-21	Website Content	Public	Arc GIS StoryMap Link- MD Coast Smart Climate Ready Action Boundary	Additional Hazard Risk & Vulnerability Tab- Conveying Flood Risk Beyond the Floodplain
28-Jul-21	Website Content	Public	MD Climate Action Ready Boundary (CRAB) Info Added	Website tab- under "Hazard Risk & Vulnerability" tab
28-Jul-21	Website Content	Public	Resources Info Graphics Added	Website tab- under "Additional Resources" tab
28-Jul-21	Website Content	Public	Flood Info Graphic Added	Website tab- under "Hazard Risk & Vulnerability" tab
29-Jul-21	Website Content	Public	Flood Insurance FAQs in Spanish- MD Insurance Administration Flyer	Website tab- under "Additional Resources" tab
19-Aug-21	Website Content	Public	My Coast Pop-Up and sign-up instructions	Website tab- under "Additional Resources" tab
18-Oct-21	Website Content	Public	Added Centers for Disease Control & Prevention (CDC) WC Social Vulnerability Index	Website tab- under "Hazard Risk & Vulnerability" tab.
18-Oct-21	Website Content	Public	Added Maryland Historical Trust Hazard Mitigation Planning for historic and cultural	Website tab- under "Prevention & Adaption" tab.
18-Oct-21	Website Content	Public	Added University of Maryland Center for Environmental Science (UMCES) public	Website tab- under "Additional Resources" tab.

In addition, press releases have been sent via the Acting County Executive's office with some small articles in the local papers.

Outreach on the Wicomico County homepage:
www.wicomicocounty.org

Dedicated page for the Hazard Mitigation webpage and survey:
https://www.wicomicocounty.org/CivicAlerts.aspx?AID=592

Department of Emergency Services page:
https://www.wicomicocounty.org/133/Emergency-Services

Regular Posts on county Facebook which is linked to other county social media:
https://www.facebook.com/WicomicoDES

PAC14 our local PEG/PAC channel is promoting via their channel and media/web links

You Tube Video posted:
https://youtu.be/Y_Bl_D-Wwqc

1.8 PLANNING, TRAINING, AND OUTREACH INITIATIVES

Planning, training, and outreach initiatives were documented throughout the plan development process and included the following examples.

- Website updates were conducted monthly. The project website was updated a total of fourteen times.
- Social media posts and news releases specific to hazard mitigation and the plan update were issued over the course of the plan development.
- The Hazard Mitigation & Resilience Planning Committee met a total of three times during the planning process. The committee met on the following dates: January 21, 2021; May 25, 2021; and October 28, 2021.
- Small group meetings were conducted throughout the planning process. A total of seven meetings were held.
- The Threat Hazard Identification Risk Assessment (THIRA) group held two meetings.
- Five municipal specific meetings were held.
- Regional collaboration, mitigation related trainings and workshops attended or hosted by one or more HMPC members and reported during committee members included.
    - Lower Eastern Shore Planner's Meeting- January 7, 2021
    - Flood Insurance Webinar- April 13, 2021
    - FEMA Hurricane Workshop- June 24, 2021
    - MD 2021 Risk Reduction Consultation- July 14, 2021
- Social Vulnerability & Equity meetings including hazard mitigation and the plan development process were held.
    - Social Equity Meeting and Hazard Mitigation- March 2, 2021
    - Vulnerable Population Task Force Morning Meeting- March 3, 2021
    - VPTF-Language Workgroup Afternoon Session- March 3, 2021
    - Lower Shore Vulnerable Populations Workgroup- Social Equity Meeting and Hazard Mitigation- May 24, 2021

Appendix E: Wicomico County Hazard Mitigation Planning, Training, and Outreach Initiatives contains the detailed listing of all planning, training and outreach initiatives conducted during this planning cycle.

1.9 REGIONAL COORDINATION

Coordination with neighboring jurisdictions occurred during the plan development process. Lorenzo Cropper, Deputy Director of the Wicomico County Department of Emergency Services, is part of the Lower Eastern Shore Emergency Planners Group. Mr. Cropper updated the group on January 7, 2021, informing them that Wicomico County was engaged in the Hazard Mitigation Plan Update process and that a project website tracking the planning process would be deployed. Each member in attendance was provided project website address. In addition, Mr. Cropper attended the State Hazard Mitigation Plan Update meeting on July 14, 2021.

Other regional collaboration related to the Hazard Mitigation Plan Update attended or hosted by one or more HMPC members and reported during committee members included.

- Eastern Shore Emergency Management Planner's Meeting- January 7, 2021

- Flood Insurance Webinar- April 13, 2021
- Lower Shore Vulnerable Populations Workgroup- Social Equity Meeting and Hazard Mitigation- May 24, 2021
- FEMA Hurricane Workshop- June 24, 2021
- MD 2021 Risk Reduction Consultation- July 14, 2021
- Eastern Shore Emergency Management Planner's Meeting- August 17, 2021
- Eastern Shore Emergency Management Planner's Meeting – February 3, 2022

Eastern Shore Emergency Management Planner's Meeting is held periodically throughout the year. At these meetings jurisdictions discuss the status of their hazard mitigation plans and grants. An example of discussion topics are included in Appendix E.

1.10 AGENCY REVIEW

The Maryland Department of Emergency Management (MDEM) serves as the State review agency and clearing house. The following agencies also received a draft of the plan for review and comment:

- Federal Emergency Management Agency (FEMA), Region III;
- Maryland Department of Natural Resources (DNR);
- Maryland Institute of Emergency Medical Services;
- Maryland State Police- Salisbury Barrack;
- Maryland Department of Health-Wicomico County;
- Maryland Department of Human Services- Wicomico County Social Services; and,
- Maryland Department of the Environment (MDE).

The Maryland Department of Emergency Management conducted the State review of the **2021 Wicomico County Hazard Mitigation Plan** in November of 2021.

1.11 ORGANIZATION OF THE REPORT

The following chapters comprise the **Wicomico County Hazard Mitigation Plan**. Chapter 2 includes the County Profile, while Chapter 3 details the Hazard Identification and Ranking Assessment (HIRA), while the detailed report and methodology are included in Appendix A. Chapters 4-12 comprise the Vulnerability Analysis for those hazards identified by the 2021 Hazard Mitigation Planning Committee. New chapters added during the update process include Chapter 11 Pandemic and Emerging Infectious Disease. Chapter 13 - Community Capability and Resilience and Chapter 14 - Mitigation Strategies were updated and new information was added. Chapter 14 provides a Mitigation Action Status report of actions and projects completed during the planning cycle. Also, goals, objectives vulnerability assessment methodology, and 2021 mitigation action items along with the HMPC priority ranking for each action. There are ten (10) appendices, which include information from the meetings, questionnaires, Hazus reports to even a detailed description of potential project funding sources.

Active Assailant, identified and added as a “new” threat/hazard has been included as Appendix J. This new appendix is for “Official Use Only” and is not included in the public version of the **Wicomico County Hazard Mitigation Plan.**

1.12 IMPLEMENT THE PLAN AND MONITOR PROGRESS

Since the 2016 adoption of the plan, the Local Emergency Planning Committee annually reviewed the mitigation actions and provided status updates, as available. In addition, annual requests for mitigation action status updates were requested by the Department of Emergency Services to responsible entities including municipalities. The Mitigation Status Report completed during this plan update has been included in Appendix B.

Plan maintenance and implementation was discussed at the October 28th Hazard Mitigation & Resilience Planning Committee Meeting. Questions were posed regarding who is responsible to ensure that the plan is being maintained and that actions items and/or projects are being reviewed for status updates. The Department of Emergency Services will continue to be the lead agency for coordinating the hazard mitigation plan maintenance and implementation. However, the establishment of a formalized group will occur by Spring 2022. This group will be in addition to the Local Emergency Planning Committee (LEPC), who reviewed and maintained the plan during previous planning cycles. The new group will be designated by the County Executive and will meet, at a minimum, two times per year to review, evaluate, and when appropriate update the plan. DES staff will schedule and facilitate all plan review and maintenance meetings. The new group (name to be determined) will lead the plan update process. Information for the annual review and plan evaluation will be compiled and the results will be distributed. Plan status updates will be provided to the public on the Department of Emergency Services website along with the plan document. The Department of Emergency Services will also continue to post on social media, promoting the Hazard Mitigation Plan and status reports.

CHAPTER 2- WICOMICO COUNTY PROFILE

Updates to Chapter 2 - Wicomico County Profile included the following:

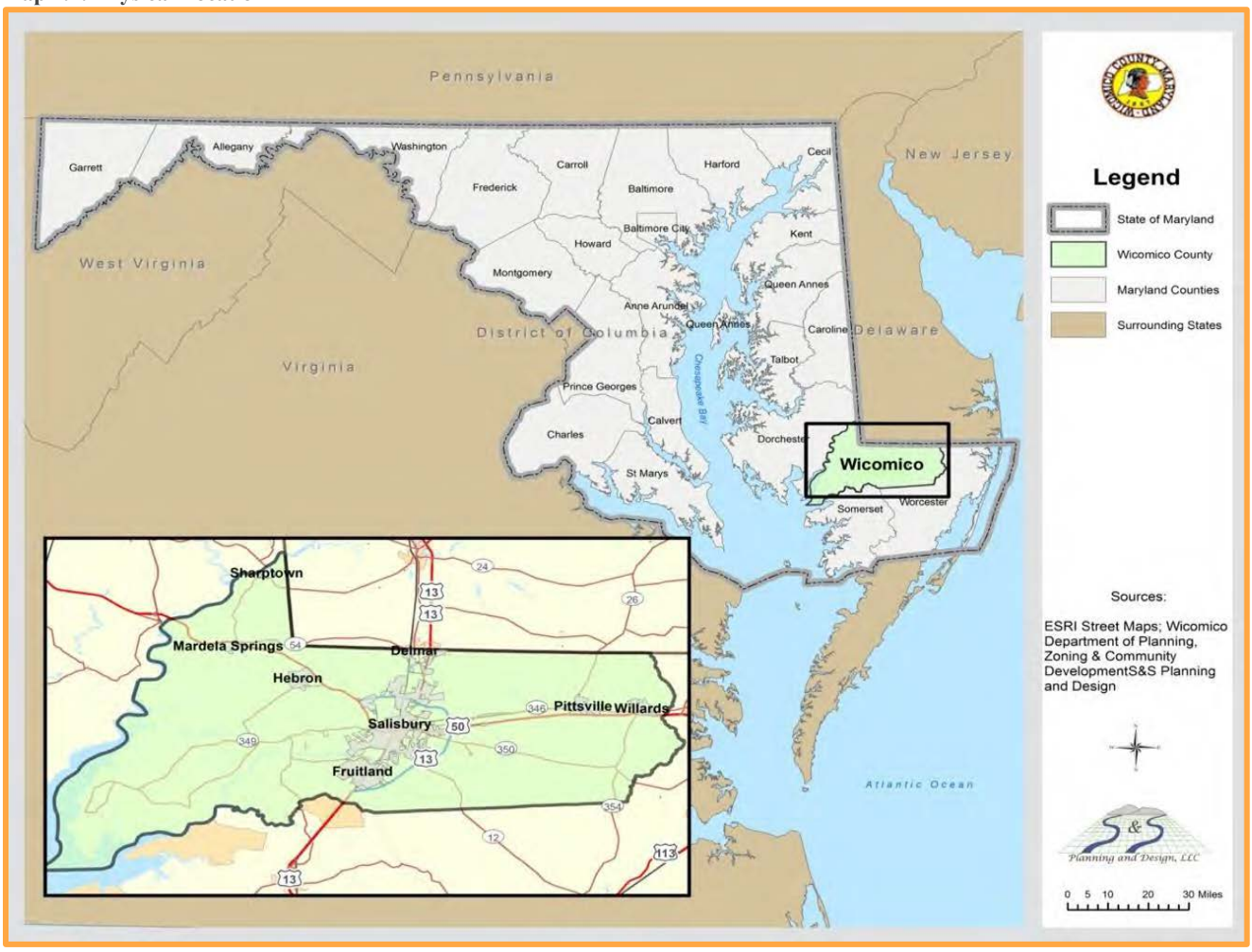
- Updated Population Data
- Updated Climate Data
- Updated County and Municipal Permit Data
- Updated History including Event Timeline

CHAPTER 2 - WICOMICO COUNTY PROFILE

2.1 LOCATION

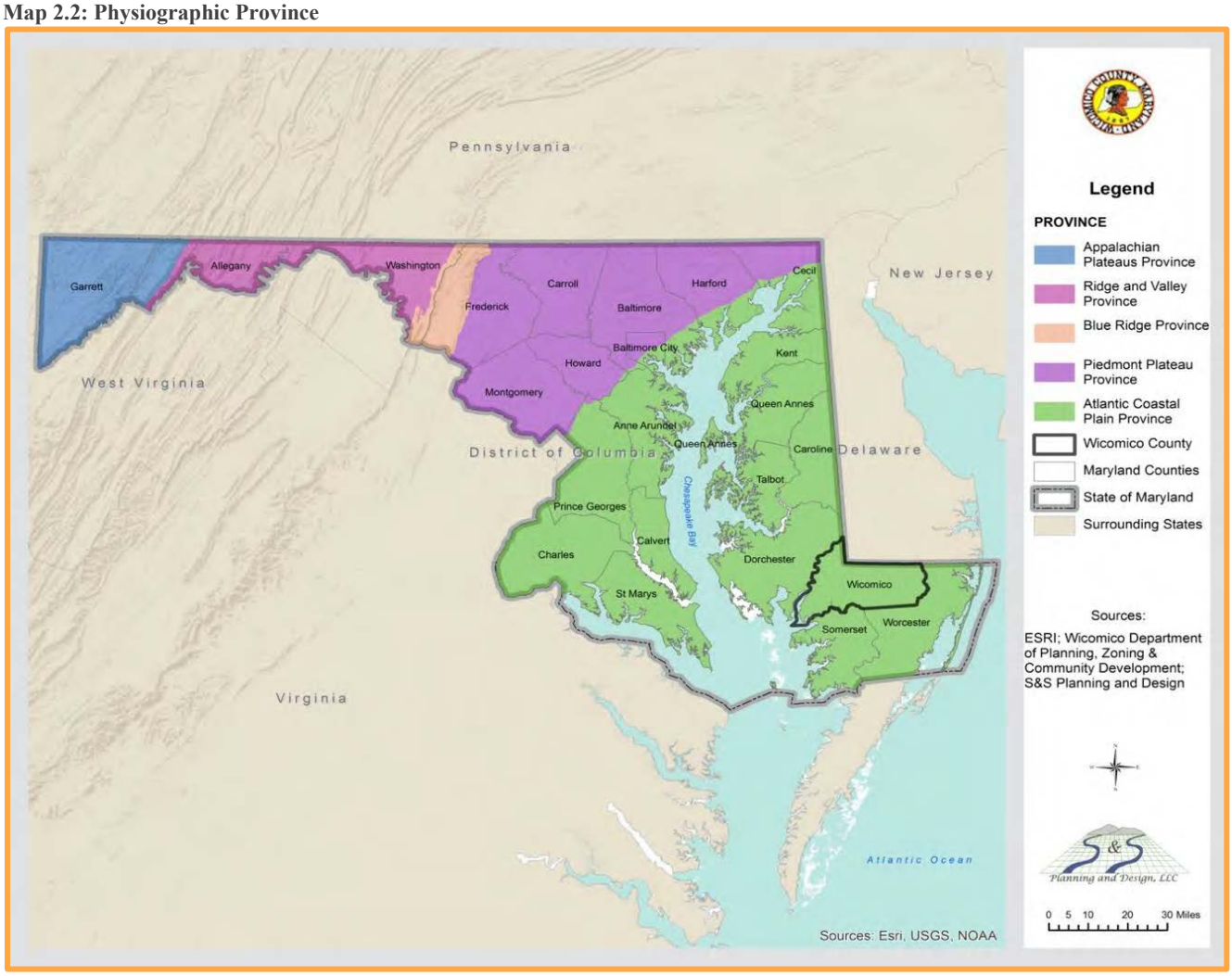
Wicomico County is located in the southern part of Maryland's eastern shore and is adjacent to Dorchester, Somerset, and Worcester Counties in Maryland, and Sussex County, Delaware. Wicomico is one of the smaller counties in Maryland, containing 400 square miles of land, and 23 square miles of water, including the Nanticoke and Wicomico Rivers, and the Chesapeake Bay. The County contains two incorporated cities: Salisbury and Fruitland, and six incorporated towns; Delmar, Hebron, Mardela Springs, Pittsville, Sharptown, and Willards. The City of Salisbury serves as the county seat of Wicomico County. The counties adjacent to Wicomico County are Dorchester, Somerset, and Worcester Counties in the State of Maryland, and Sussex County in the State of Delaware.

Map 2.1: Physical Location



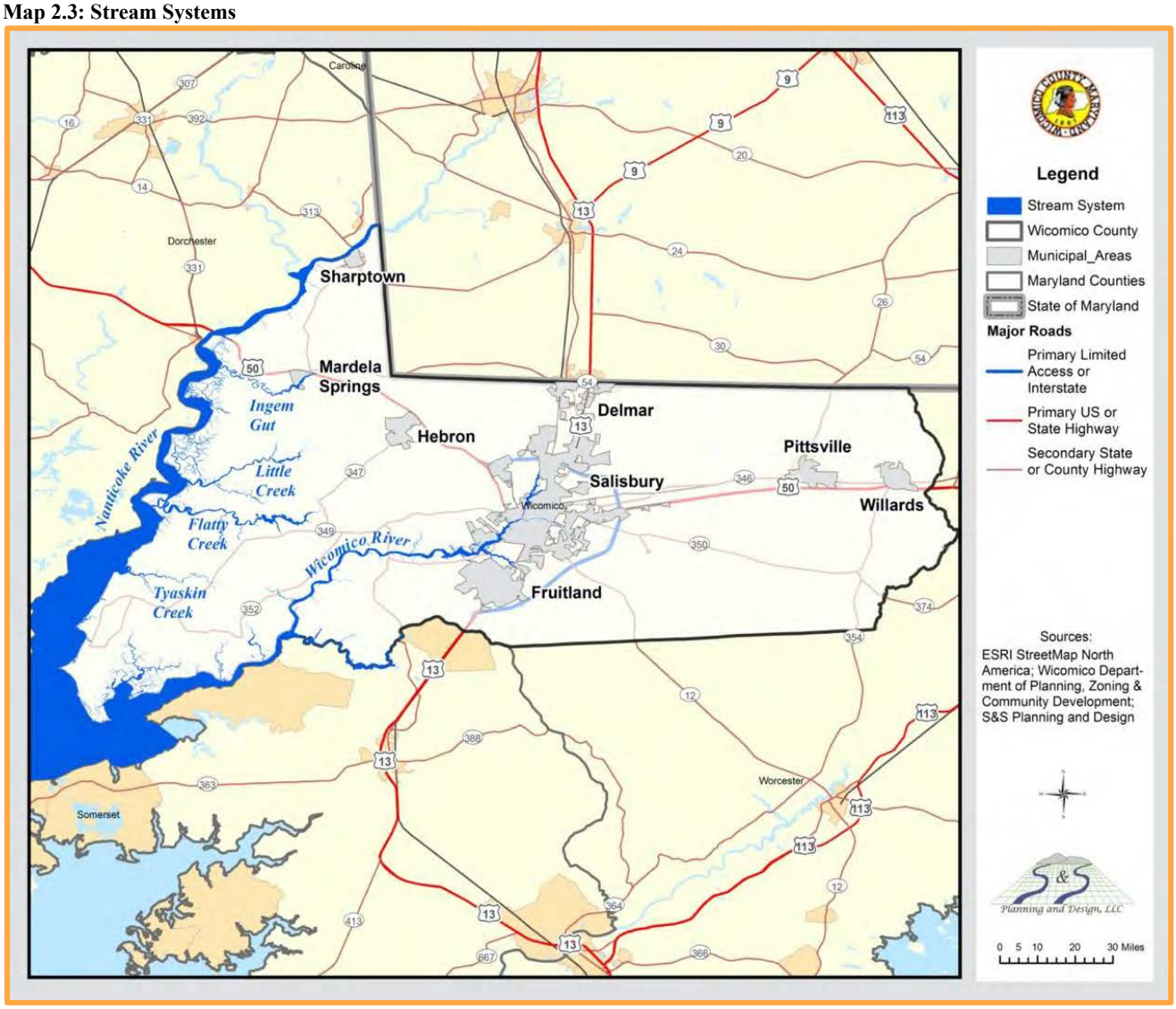
Wicomico County is located within the Delmarva Peninsula Region of the Coastal Plain Physiographic Province.

Map 2.2: Physiographic Province



Wicomico County is situated between the Nanticoke River, which runs along the western border of the County; the Wicomico River and Wicomico Creek, which portions of these waterbodies run along the southern border of the County; and the Pocomoke River that forms the eastern boundary of the County. The County is named after the Wicomico River and the Native American words "*wicko mekee*", meaning "a place where houses are built," referring to a small Native American town on the banks of the river.

Map 2.3: Stream Systems



2.2 HISTORY

Wicomico County was founded in 1867, created from neighboring Somerset and Worcester Counties. Wicomico County's seat, Salisbury, dates back to 1732. Below are only some of the major points in Wicomico County's history, including municipal incorporation and a few hazard events:

1608, June: Capt. John Smith sailed up the Nanticoke and Wicomico rivers.

1732: Salisbury Town laid out by commissioners.

1854: Salisbury incorporated.

1859: Delmar founded as a railroad terminal.

1860: Fire destroyed business section of Salisbury.

1867: Wicomico County created from parts of Somerset and Worcester counties

1874: Sharptown incorporated.

1886, Oct. 17-18: Fire destroys 22 acres of downtown Salisbury.

Source:1886 Fire. Image courtesy of the Wicomico County Historical Society Collection, Nabb Research Center

1897: The basis of Peninsula General Hospital (now Peninsula Regional Medical Center) opened by Dr. George W. Todd with six beds in an old home.

1906: Mardela Springs incorporated.

1906: Pittsville incorporated.

1906: Willards incorporated.

1909, May 28: Humphrey's Dam burst, flooded Salisbury.

1925, September: State Normal School at Salisbury opened (now Salisbury University).

1931: Hebron incorporated.

1936: Courthouse enlarged at Salisbury.

1947: Fruitland incorporated.

1964: Charter form of government adopted.

1975, June: Wor-Wic Community College established in Salisbury.

1981: Salisbury Route 13 Bypass complete.

2002: Salisbury Route 50 bypass complete.

Source: https://www.delmarvanow.com/story/news/2017/09/14/wicomico-150th-timeline-history/635453001/

2.3 CLIMATE

The topography of Wicomico County consists of nearly level terrain and low elevations ranging from sea level to 75 feet. The County is susceptible to high winds and rain during summer thunderstorms and to damage from storm surge and wind during the passage of nor'easters either on or near the eastern shore. Precipitation averages 45.68 inches annually. Average snowfall is 9 inches per year with snowfall mainly resulting from the passage of an occasional mid-latitude winter storm. Due to its southern location and proximity to the Atlantic Ocean, Wicomico receives less snowfall on average than counties to the north and west. The average high temperature for Salisbury, Maryland is 66°F and the average low temperature is 46°F.

Table 2.1: Average Temperature by Month (°F)

SALISBURY, MARYLAND: AVERAGE TEMPERATURE BY MONTH											
Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
46 H	49 H	57 H	67 H	76 H	83 H	87 H	85 H	80 H	70 H	60 H	50 H
28 L	30 L	37 L	44 L	54 L	63 L	68 L	67 L	60 L	48 L	40 L	32 L
2021 HMP UPDATE											
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
44H	47H	55H	65H	74H	82H	87H	84H	78H	68H	59H	48H
27L	28L	35L	43L	52L	62L	67L	65L	58L	46L	38L	30L

Source: U.S. Climate Data - http:www.usclimatedata.com

2.4 POPULATION

According to the US Census Bureau, the 2020 Population for Wicomico County indicates a total population of 103,588 persons. This is an increase of 4,855 persons or 4.9% from the 2010 US Census figures. In addition, the Maryland Department of Planning projections indicate that the County's population will increase to 127,650 persons by the year 2040, an increase of 23% from the 2020 US Census figures.

The following table details the 2010 US Census, the 2020 US Census figures, and the 2017 Wicomico County Comprehensive Plan municipality's population projections for the eight incorporated communities within Wicomico County.

Table 2.2: Population Figures – 2021 HMP Update

Census	Delmar	Fruitland	Hebron	Mardela Springs	Pittsville	Salisbury	Sharptown	Willards
2010 Census	3,003	4,866	1,084	347	1,417	30,343	651	958
2020 Census	3,798	5,534	1,113	357	1,636	33,050	691	963
Rate of Change 2010-2020	+795	+668	+29	+10	+219	+2,707	+40	+5
% of Change 2010-2020	↑ 26%	↑ 14%	↑ 3%	↑ 3%	↑15%	↑9%	↑6%	↑0.5%
2030 Populations Projections	4,975	7,300	1,575	542	1,625	40,085	900	1,405
% of Change 2020-2030	↑ 31%	↑ 32%	↑ 42%	↑ 52%	↓ 0.7%	↑ 21%	↑ 30%	↑ 46%

Source: US Census Bureau, 2010 Census and 2020 Census, PL 94-171 release & 2017 Wicomico County Comprehensive Plan

Population projections indicate that most of the municipalities within Wicomico County will experience an increase in population. The Towns of Hebron, Mardela Springs, and Willards, and the City of Fruitland are projected to experience the highest percent of population change between the years 2020 to 2030. According to the data, the Town of Pittsville has already attained the projected 2030 population by the year 2020.

2.5 PLANNING, ZONING, AND COMMUNITY DEVELOPMENT

Wicomico County and the City of Salisbury have conducted joint planning activities since 1943. In the early 1960's, the two jurisdictions established the only joint Planning & Zoning Commission in the State, and a joint planning office to provide assistance to both the city and the county. In 1989, in response to increased growth and change, the Planning Office was re-designated as the Department of Planning, Zoning & Community Development. In 2003, the City of Salisbury joined with the State of Maryland, Wicomico County, and the Towns of Delmar and Fruitland to establish the federally recognized Salisbury/Wicomico Metropolitan Planning Organization (MPO). This Department was designated as the MPO agency and the administrator of related regional transportation planning funds. In December of 2011, a reorganization of certain county departments resulted in the transfer to this Department of permitting, inspection and development related functions from the Department of Public Works.

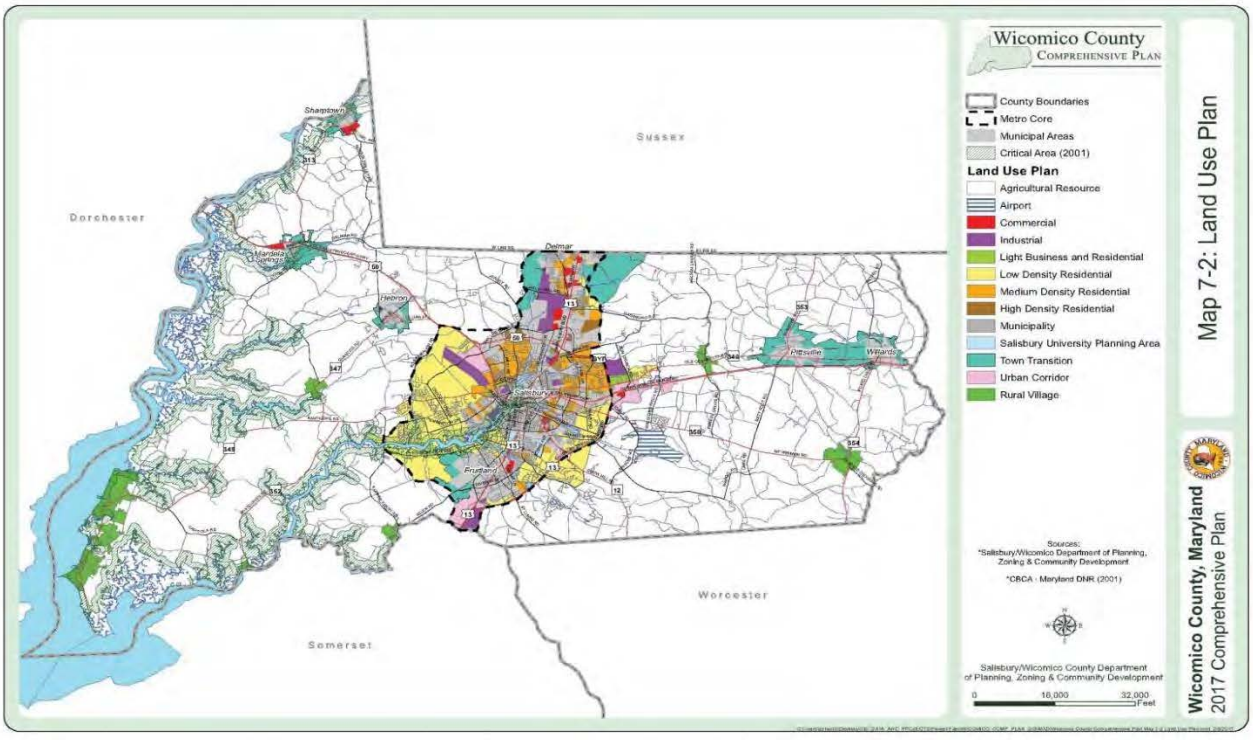
Development policies are determined by the Mayor and Council for the City of Salisbury and the Executive and Council for Wicomico County. The Planning & Zoning Commission and the MPO Council have policy roles as designated by the governing bodies. The Department is an agency of county government and follows the county administrative policies and procedures. It is funded by the county, with regular financial support from the City of Salisbury and grant support a available.

The State of Maryland entrusts local jurisdictions with land use planning authority to guide growth and development through the Land Use Article of the Maryland Annotated Code. The Land Use Article delegates planning and land use regulatory authority to all non-charter counties and all incorporated municipalities, except for Montgomery and Prince George's counties and some of their jurisdictions. Chapter 13 – Community Capabilities & Plan Integration included detailed information on planning and regulatory capabilities for both the county and municipalities. Floodplain ordinances are specified within the Table 13.1.

2.6 LAND USE

The adopted *2017 Wicomico County Comprehensive Plan* is available and was reviewed during this plan update process. According to the Department of Planning and Zoning, "Designated Growth Areas" continue to be those areas in and around the eight existing communities. A special emphasis for designated growth continues to be the areas within or in close proximity to the cities of Salisbury and Fruitland known as the "Metro Core".

Figure 2.1: Map 7-2: Land Use Plan Map from Comprehensive Plan



Source: 2017 Wicomico County Comprehensive Plan

By concentrating growth in previously developed communities, primarily Salisbury, Fruitland, and Delmar, the vast majority of land in Wicomico County will remain in one of the following land use categories: agriculture, forest use, or wetland.

2.7 DEVELOPMENT TRENDS

Permit data has been obtained from the Wicomico County Department of Planning, Zoning and Community Development. As shown on the table below, the number of residential building permits issued in Wicomico County remained fairly consistent since 2010, with slight increases in 2015 and 2017. Commercial building permit issuances have remained consistent since 2015. For the 2021 Plan Update, data was obtained for the years 2016 to 2020.

Table 2.3: Permit Data

WICOMICO COUNTY PERMIT DATA		
YEAR	RESIDENTIAL	COMMERCIAL
2004	340	67
2005	296	67
2006	215	52
2007	131	62
2008	101	49
2009	61	58
2010	70	3
2011	79	1
2012	64	4
2013	76	2
2014	78	4
2015	109	29
2021 HMP UPDATE		
2016	79	32
2017	107	38
2018	80	32
2019	75	29
2020	*	*

Source: Wicomico County Department of Public Works

In 2021, permit data was provided by the following Wicomico County municipalities and towns: Salisbury, Pittsville, Hebron, Willards*, Sharptown*, Fruitland, and Mardela Springs. The County processes permits for the Towns of Pittsville, Hebron and Mardela Springs. Therefore, updated permit data for these municipalities is included in Table 2.4.

Table 2.4: Municipal Permit Data

Year	Type	City of Salisbury	Town of Pittsville	Town of Hebron	Town of Willards	City of Fruitland	Town of Sharptown	Town of Delmar	Town of Mardela Springs
2010	**Commercial**	6	0	0	0	0	0	6	0
	Residential	19	0	0	1	51	1	36	0
2011	**Commercial**	6	0	0	0	2	0	14	0
	Residential	12	0	0	1	22	1	35	0
2012	**Commercial**	6	0	0	0	1	0	6	0
	Residential	13	4	0	2	22	0	37	1
2013	**Commercial**	12	0	0	1	1	0	2	1
	Residential	29	3	0	3	31	0	39	1
2014	**Commercial**	6	0	0	0	0	0	3	0
	Residential	11	1	2	5	30	1	59	1
2015	**Commercial**	4	0	0	0	0	0	2	0
	Residential	12	1	0	4	10	0	81	0

Year	Type	City of Salisbury	Town of Pittsville	Town of Hebron	Town of Willards	City of Fruitland	Town of Sharptown	Town of Delmar	Town of Mardela Springs
2021 HMP UPDATE									
2016	Commercial	9	0	0	*	0	*	0	0
	Residential	15	12	15	*	24	*	8	4
2017	Commercial	10	1	0	*	7	*	0	1
	Residential	38	17	28	*	4	*	10	1
2018	Commercial	6	5	1	*	5	*	1	0
	Residential	75	17	20	*	16	*	17	3
2019	Commercial	7	1	0	*	3	*	0	0
	Residential	73	18	10	*	12	*	100	4
2020	Commercial	10	0	0	*	6	*	0	0
	Residential	126	12	15	*	82	*	34	4

**Permit data not obtained by the time of Draft Plan compilation.*
Source: Wicomico County Department of Planning, Zoning and Community Development, Cities of Salisbury and Fruitland, and the Town of Delmar

As shown on Table 2.4, according to the residential and commercial permit data received, in general, the issuance of building permits has neither significantly increased nor decreased during the time period since 2015, with some variation for spikes during individual years. The Cities of Salisbury and Fruitland account for the majority of both commercial and residential permits issued during the plan update period, with the City of Salisbury showing an increasing trend for the issuance of residential permits. The Town of Delmar indicated a significant increase in residential permits in 2019; likewise, the City of Fruitland showed a significant increase in residential permits in 2020.

In terms of permits issued within the Special Flood Hazard Area (F+SFHA) during this plan update, Wicomico County permits including the Towns of Pittsville, Hebron and Mardela Springs totaled 38. The following provides permit details:

- 2 Commercial
- 34 New Single-Family Dwellings
- 2 Replacement Mobile Homes
- All permits issued within the AE Zone
- Highest annual total - 2018

2.8 TRANSPORTATION

U.S. Route 50 is the major east-west highway corridor through Wicomico County and connects the area with Cambridge, Easton, and the Chesapeake Bay Bridge to the west and Ocean City to the east. U.S. Route 13 is the major north-south corridor through Wicomico County and connects the area with Dover, Delaware to the north and Princess Anne and Pocomoke City to the south. This highway also connects the eastern shore of Maryland and Delaware with the Philadelphia area to the north and with Virginia and the Norfolk area through the Chesapeake Bay-Bridge Tunnel to the south. Both U.S. Route 50 and U.S. Route 13 are complemented by a number of other state highways and County roads, which connect Salisbury with smaller communities.

Other transportation routes include the Norfolk Southern rail line which runs parallel to U.S. Route 13 through Delaware, Maryland and Virginia. The Salisbury-Ocean City: Wicomico Regional Airport, also

known as the Salisbury Regional Airport (SBY), which serves the County and surrounding region, is located south and east of Salisbury off the U.S. Route 13 bypass on U.S. Route 50.

CHAPTER 3 – HAZARD IDENTIFICATION AND RISK ASSESSMENT

Updates to the Wicomico County Chapter 3 – Hazard Identification and Risk Assessment included the following:

- Updated Planning Process
- New FEMA Grant Program- Building Resilient Infrastructure and Communities (BRIC)
- New and Expanded Hazard Mitigation Planning Committee (HMPC): Table 1.1
- New and Expanded HMPC- Municipal Representatives: Table 1.2
- New Project Website & Public Survey
- Expanded Public Involvement
- Expanded Planning, Training, and Outreach Initiatives Table
- Updated Plan Organization

CHAPTER 3 – HAZARD IDENTIFICATION & RISK ASSESSMENT

3.1 HAZARD IDENTIFICATION PROCESS

As part of the plan update process, a Hazard Identification Risk Assessment (HIRA) has been completed for Wicomico County, Maryland. Results from the Hazard Risk Survey completed by Stakeholders have been integrated into the updated HIRA.

A **risk** is the chance, high or low, that any hazard will occur and the severity or impact from that hazard.

Twelve (12) natural hazards have been identified and a hazard risk has been assigned to each. Only natural hazards are included in this assessment as they lend themselves better to data collection related to geographic extent than technological and man-made hazards. A separate risk assessment will be conducted for the technological and man-made hazards (i.e., transportation accident, hazardous material incident, dam failure, fire and explosion, mass power outage) identified in the previous plan version.

Table 3.1: Natural Hazard Identification and Risk Assessment Ranking Results

Hazards	2016 Hazard Ranking	2021 Hazard Ranking	2021 Composite Score
***Flood (Flash/Heavy Rain)**	Medium	Medium-High	20.5
Drought	Medium	Medium	17
Tornado	Medium	Medium-Low	13
Thunderstorm	Medium	**High**	**26**
High Wind	Medium-High	Medium	19
Wildfire	Medium	Medium	18
Earthquake	Low	Medium-Low	9
Extreme Cold – Cold/Wind Chill	Medium	Medium-Low	14.5
Winter Storm	Medium-High	Medium-Low	14.5
Extreme Heat	Medium	Medium	15.5
Coastal Storm and Flooding	Medium-High	Medium-High	22
Pandemic and Emerging Infectious Diseases	No 2016 Ranking	**High**	**28**

**This hazard was identified as "Flood (Riverine & Flash)" in the 2016 Plan Update.*

The methodology and data used to complete this HIRA has been included on the following pages, which will comprise Appendix A of the Plan Update.

3.2 MUNICIPAL PERSPECTIVE

Results from the hazard perspective survey were extrapolated for municipalities. The top hazards of concern, defined by a ranking of "Very Concerned " and "Concerned" for each of the incorporated municipalities are listed below.

Table 3.2: Municipal Hazard Ranking

	Fruitland	Delmar	Willards	Hebron	Salisbury	Sharptown	Pittsville	Mardela Springs
Coastal Storms	X	X	X	X	X		X	X
Climate Change	X							
Sea Level Rise & Shoreline Erosion		X						X
Severe Weather	X	X	X	X	X		X	X
Flooding		X	X	X			X	X
Winter Weather			X	X	X			
Extreme Heat, Drought & Wildfires								
Man-Made Hazards	X							
Pandemic & Emerging Infectious Diseases			X	X	X			X
Active Assailant	X	X			X		X	

Source: 2021 Hazard Perspective Survey

3.3 HAZARD MITIGATION & RESILIENCE PLAN PUBLIC SURVEY

Public input was collected to determine the level of concern regarding various hazards. The Department of Emergency Services was interested in knowing what residents thought and the survey was a tool used during this plan update to inform their understanding. Survey results closely matched those gathered from the hazard mitigation & resilience planning committee.

Figure 3.1 depicts the public's level of concern for each hazard.

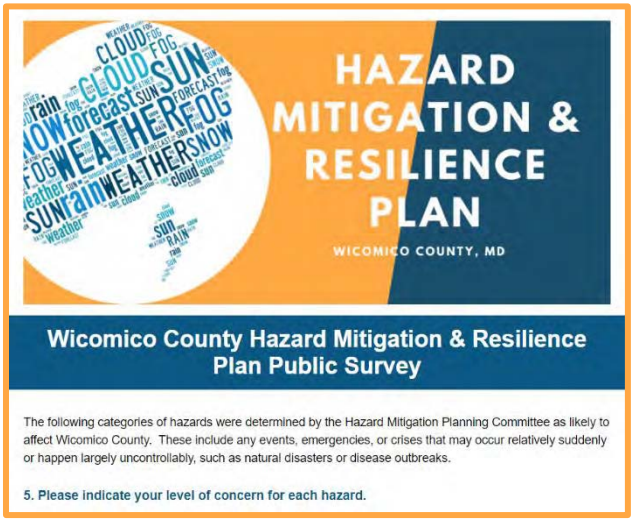
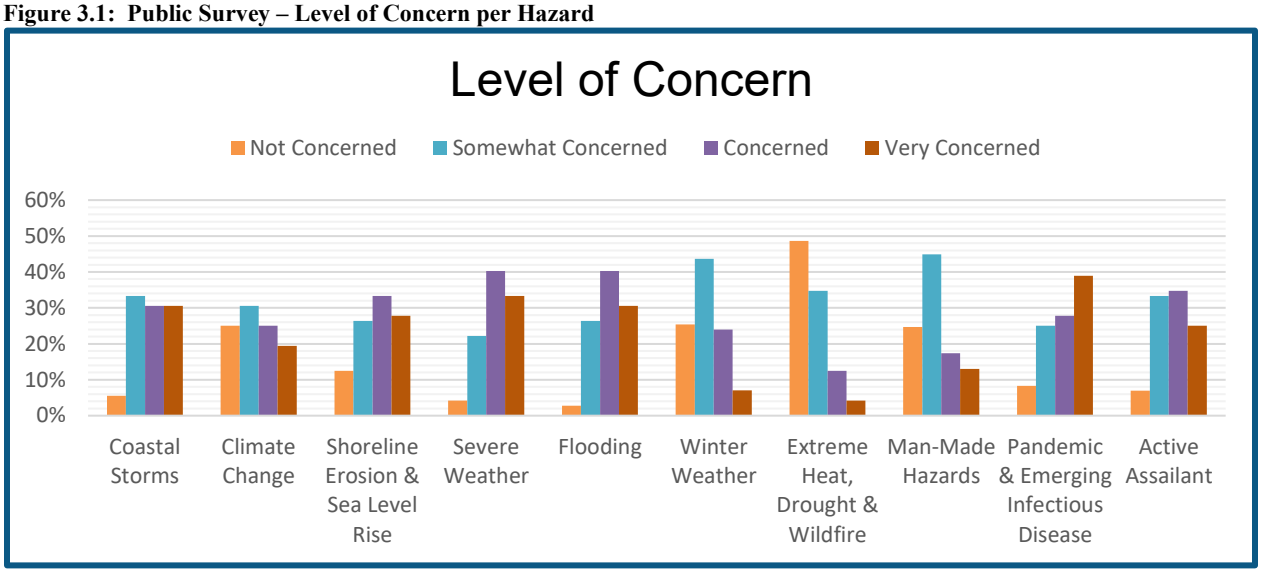


Figure 3.1: Public Survey – Level of Concern per Hazard



Source: 2021 Hazard Perspective Survey

3.4 STATE PERSPECTIVE

The current State Hazard Mitigation Plan was published in August 2021 by the Maryland Department of Emergency Management (MDEM). This Plan included the probability and impact of various hazards that occur across the state.

Table 3.3: State Hazard Ranking

HAZARD	High	Medium High	Medium	Medium Low	Low
Coastal Storms		X			
Climate Change				X	
Sea Level Rise		X			
Shoreline Erosion				X	
Severe Weather			X		
Flooding			X		
Winter Weather		X			
Extreme Heat				X	
Drought		X			
Wildfires			X		
Man-Made Hazards			X		
Pandemic & Emerging Infectious Diseases		X			
Active Assailant			X		

Source: *2021 State Hazard Mitigation Plan*

While the *2021 State Hazard Mitigation Plan* was completed to provide a comparison assessment and analysis of Maryland's vulnerability to the natural hazards, this same process was conducted at a county level in order to assess and analyze Wicomico County's vulnerability to natural hazards from a local perspective.

3.5 PROBABILITY AND IMPACT

The information obtained from available hazard event data pertaining to frequency and probability of future events, their impact, and factors that may affect severity were reviewed for hazards that have impacted Wicomico County in the past. Therefore, data availability for past occurrences was readily available for analysis (Flood, Coastal Storm, Tornado, Winter Storm, High Wind, Thunderstorm, Drought, and Wildfire). This assessment of probability and impact results in the determination of a composite risk score for each hazard identified, as shown on the table below.

Table 3.4: Composite Score for Hazards with Past Occurrences

HAZARD	Events/ Year Risk Rating	Impact Rating	Composite Score
Flood	2	5	**7**
Coastal Storm	2	5	**7**
Tornado	2	5	**7**
Winter Weather	3	3	**6**
High Wind	2	3	**5**
Severe Weather	2	1	**3**
Drought	1	3	**4**
Wildfire	4	1	**5**

Source: NCDC Data

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

***Impact Rating**
The impact rating was determined by the potential damage and losses that would result from each hazard event.
1 = Low Impact
3 = Medium Impact
5 = High Impact
*****Composite Scores: 7-10 High; 5-6 Medium; 1-4 Low*****

Sea Level Rise and Shoreline Erosion were part of the Coastal Hazard category and were ranked by the HMPC on Table 3.1. Considering Climate Change is linked to Sea Level Rise and Shoreline Erosion, the HMPC was in consensus to include this hazard in the Plan Update. The future probability and impacts from Sea Level Rise, Shoreline Erosion, and Climate Change were analyzed as well, however, data availability for past occurrences is not as readily available. All three (3) hazards are likely to impact Maryland, specifically Wicomico County. The impacts of these hazards include:

Table 3.5: Future Hazards Probability and Impacts

HAZARD	Sea Level Rise	Shoreline Erosion	Climate Change
Probability	Likely: Hazard event is likely to occur less than every 5 years, but more often than once every 30 years.		
Types of Impacts	• Urban Development • Increase in Storm Surge • Loss of Bays, Peninsulas & Islands • Loss of Coastal Habitats	• Urban Development • Increased Risk of Flooding • Water Quality Degradation	• Average Temperature Increases • Rain Event Increases Coastal Flooding Event Increases • Sea Level Rise Increase • Environmental & Economic

Source: Smith Planning and Design, 2021 Maryland State Hazard Mitigation Plan

3.6 SOCIAL VULNERABILITY

The Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) uses fifteen (15) U.S. Census variables to calculate SVI scores that can help local officials identify communities within the county that may need additional support before, during, and/or after disasters.

An important aspect relating to the health, safety, and welfare of Wicomico County's communities is social vulnerability. Wicomico County recognizes that identifying socially vulnerable populations is an important step in mitigating for natural disaster events. According to the CDC, social vulnerability refers to "the negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreak." Reducing social vulnerability can decrease both human suffering and economic loss.

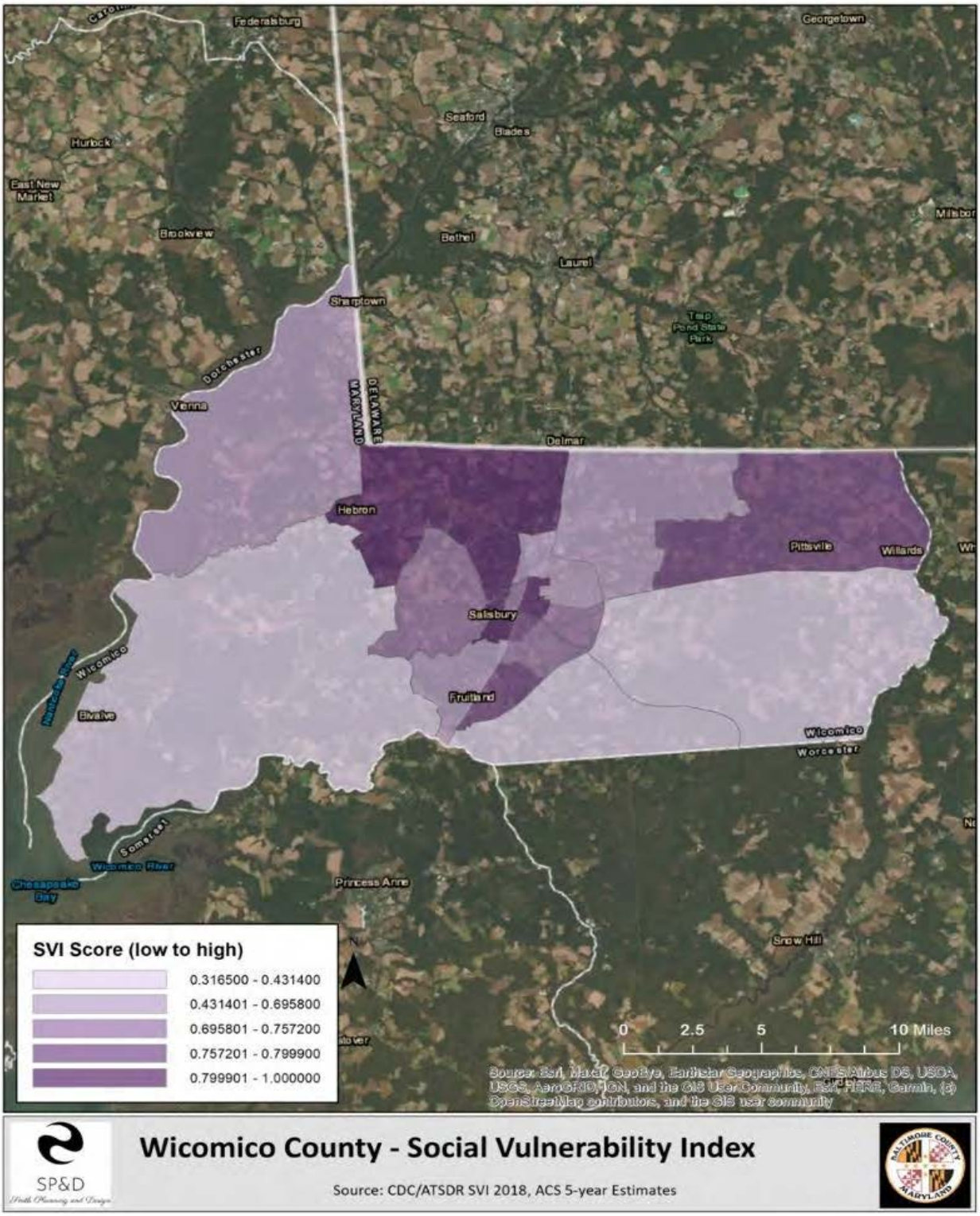
The CDC developed a Social Vulnerability Index (SVI) to help local jurisdictions determine their level of vulnerability based on fifteen (15) indicators that are routinely utilized to measure social vulnerability. These indicators are as follows:

- **Socioeconomic Status**
    1. Below Poverty
    2. Unemployed
    3. Income
    4. No High School Diploma
- **Household Composition & Disability**
    1. Aged 65 or Older
    2. Aged 17 or Younger
    3. Civilian with a Disability
    4. Single-Parent Households
- **Minority Status & Language**
    1. Minority
    2. Speaks English "Less than Well"
- **Housing Type & Transportation**
    1. Multi-Unit Structures
    2. Mobile Homes
    3. Crowding
    4. No Vehicle
    5. Group Quarters

The SVI has been conducted for Wicomico County at the census tract level and is mapped on the follow page. The SVI utilizes ACS 5-year estimates. The darker census tracts indicate areas of higher social vulnerability while the lightest tracts indicate relatively low social vulnerability. The SVI results have been mapped alongside hazards identified in Chapters 4-12 to aid in determining areas of concern where hazard mitigation activities might make the most sense due to increased vulnerability. Areas of concern are locations where high social vulnerability and hazards overlap. Measuring social vulnerability at the census tract level is meant to help guide further planning. Investigation at the neighborhood level is required to fully identify vulnerable populations.

Map 3.1 was developed for the plan update and provides a visual depiction of the SVI scores, by shaded zones, for Wicomico County. Higher social vulnerability regions are indicated by dark purple shading.

Map 3.1: Wicomico County Social Vulnerability Index



3.7 CONCLUSION

Based on the hazard history and hazard profiles discussed in the following chapters the aforementioned hazards have been ranked as low, medium, or high priority. The hazards that have a high frequency of occurrence and have caused significant damage to the area will be assessed in the following chapters as a part of the County's Hazard Vulnerability Analysis.

Chapters include: Coastal Storm, which is part of the Coastal Hazard category and discuss Hurricane/ Tropical Storm, Coastal Flooding and Storm Surge; Climate Change; Shoreline Erosion and Sea Level Rise; Severe Weather, which discusses thunderstorms, tornados, lightning, hail and wind; Flooding; Winter Storms, Extreme Heat, Drought and Wildfires; and Man-Made Hazards, which discusses dams, transportation and fix-site HazMat, major transportation, and Pandemic and Emerging Infectious Disease.

CHAPTER 4 – COASTAL STORM

Updates to the Wicomico County Chapter 4 - Coastal Storm included the following:

- Added New Nuisance Flooding Section
- Updated Historic Event Tables
- Updated Hurricane Storm Surge Inundation Areas Maps
- Reviewed and Updated Community Lifelines & Public Facilities At Risk to Hurricane Storm Surge Inundation Areas
- Added New At-Risk Community Lifelines and Public Facilities Mapping
- Added New Section – Facilities At Risk – Municipalities Of Wicomico County
- Added New At-Risk Municipal Owned Facilities Mapping
- Added New Hurricane Storm Surge Inundation Area Mapping for each Municipality
- Review and Updated Loss Estimations for Community Lifelines and Public Facilities as well as Municipal Owned Facilities
- Added Loss Estimations for New Construction
- Added New Limit of Moderate Wave Action Vulnerability Section
- Added New Section – Social Vulnerability
- Added New Section – Recent Mitigation Efforts
- Added New Conclusion Section

CHAPTER 4 – COASTAL STORM

4.1 INTRODUCTION

The coastal storm hazard was ranked as a "medium-high" risk in both 2016 and 2021. Factors used to compute risk rankings in 2021 included eight (8) parameters: death, injury, annualized events, geographic extent, property damage, crop damage, future probability, and community perspective. For more detail information on hazard ranking, refer to *Appendix A: Hazard Identification and Risk Assessment*.

To adequately access the vulnerability of Wicomico County to the coastal storm risk, four (4) probable hazards were analyzed. These include:

1. Hurricane Wind;
2. Storm Surge;
3. Coastal Flood; and,
4. Nuisance Flooding.

Note: Coastal flooding occurs when intense offshore storm systems push ocean water inland above the normal tide level. The rise in water is the storm surge. A storm surge can occur in just a few minutes. Riverine and flash flooding are profiled within Chapter 8 Flood.

For each of the four (4) probable hazards associated with coastal storm, a section within this chapter has been developed. Each section includes, at a minimum, the following topics:

- Hazard Characterization;
- Hazard Risk & History;
- Vulnerability; and,
- Facilities At Risk.

The eye of Hurricane Isabel approaches North Carolina's Outer Banks in this true-color Moderate Resolution Imaging Spectroradiometer (MODIS) image captured by the Terra satellite on September 18, 2003, at 11:55 am US Eastern time.

4.2 HURRICANE WIND

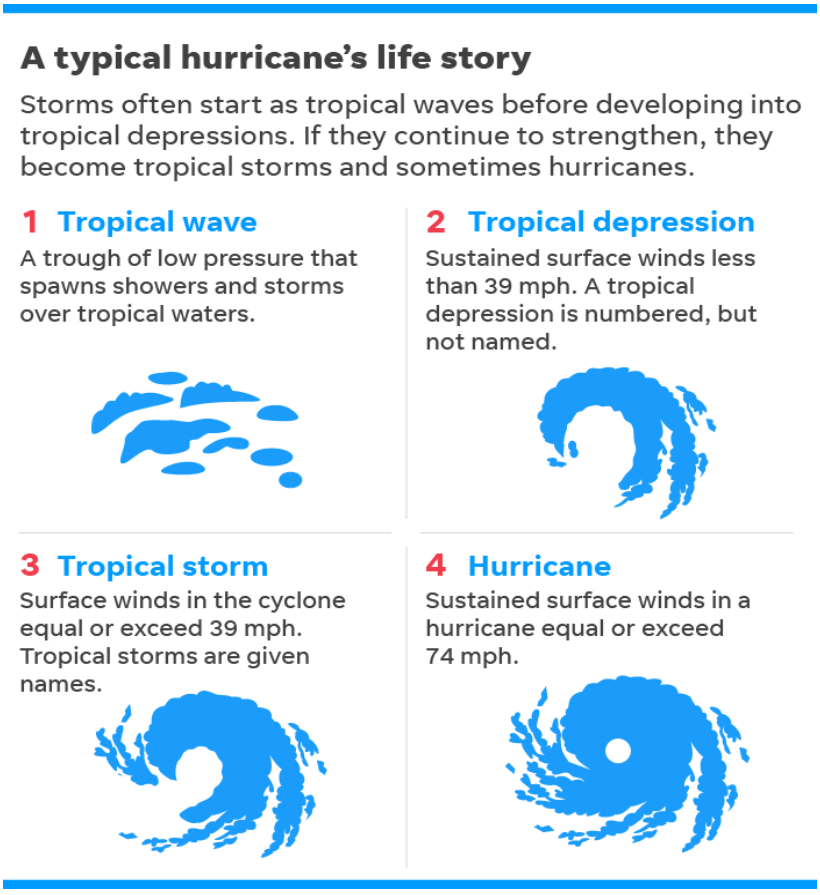
HAZARD CHARACTERIZATION

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

Tropical Depression: An organized system of clouds and thunderstorms with a define circulation and maximum sustained winds 38 mph (33 knots) or less.

Tropical Storm: An organized system of strong thunderstorms with a define circulation and maximum sustained surface wind speed from 39-73 mph (34-63 knots).

Hurricane: An intense weather system of clouds and thunderstorms with a define circulation and maximum sustained surface wind speed exceeds 73 mph



Source: Weather Jamaica, Twitter

Hurricane winds are rated for intensity by using the Saffir-Simpson Scale, which provides an estimate of the potential damage that a hurricane wind 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 wind speeds from 74-95 mph and pressure greater than 980 mb, while a Category Five hurricane may have wind speeds in excess of 157 mph and pressure of less than 920 mb. Table 4.1 depicts the five categories of hurricane strength.

Table 4.1: Saffir-Simpson Hurricane Wind Scale

Saffir-Simpson Hurricane Wind Scale	
Category Wind Speed	**Effects**
Category 1 74-95 mph	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, 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 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

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, Irene in 2011, Sandy in 2012, Hermine in 2016, and Isaias in 2020.

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

Various factors point to the potential for increased danger from severe tropical cyclones in Maryland such as, population growth and continuing near-shore development, which is increasing the risk of human injury and property loss. Additionally, there is a widespread agreement among climatologists that gradual global warming is occurring. Potential effects include the melting of polar ice, expansion of the oceans, and an overall rise in sea levels. The slow sinking of land in the Chesapeake region (subsidence), due to the combined effects of ground water withdrawal and post-glacial rebound, effectively doubles the global rate of sea

level rise in Maryland's coastal areas. These factors increase the vulnerability to potential long storm hazards such as: sea level rise, erosion, and increased storm activity and severity.

HAZARD RISK & HISTORY

Wicomico County has been affected over the years by the passage of recent hurricanes, tropical storms and tropical cyclones as shown in Table 4.2. Older hurricanes that have occurred in the County include unnamed hurricanes of 1929, 1934, 1936 and Hurricane Connie in 1955. Hurricanes can affect Wicomico County from either the Gulf of Mexico or the Atlantic Ocean. Normally the greatest damage results from hurricanes that come ashore in the Tidewater area of Virginia and/or the Carolina Capes as was the case with Hurricane Isabel.

On August 17, 1955, Hurricane Diane induced tides 1.5 to 2.5 feet above normal. The full force of the hurricane missed the Delmarva Peninsula and Wicomico County (*The Banner*). Hurricane Donna struck on September 16, 1960, causing minor wind and water damage (*Star Democrat*). Tropical Storm Agnes brought winds up to 55 miles per hour during late June 1972 (*The Banner*). Some local flooding occurred but damage was primarily restricted to crops.

In 2018, remnants of Tropical Storm Michael caused major flooding in Wicomico County, specifically Salisbury. Residents of Canal Woods community were ordered to evacuate their homes due to flooding. More recently, Tropical Storm Isaias generated a tornado that touched down in Mardela Springs, moving a home 40 feet off its foundation. A second tornado reported touched down just north of Girdletree.

Table 4.2: Recent Hurricane Events

Storm Event	Date	Event Narrative	Property Damage	Crop Damage
Hurricane Bertha	July 13, 1996	The highest wind speed recorded was 23 mph at Salisbury. 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	$15,000
Hurricane Fran	September 6, 1996	The highest sustained wind speed recorded was 22 mph at Salisbury with the highest gust at 35 mph. Many roads were flooded with some homes receiving water damage at the time of high tide. In some locations, nearly 10 feet of shore was lost due to surge effects.	$1 Million	Not Available
Tropical Storm Josephine	October 8, 1996	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	Not Available
Hurricane Floyd	September 15-September 16, 1999	The highest sustained wind speed recorded at Salisbury was 32 mph. The highest gusts recorded were 48 mph at Salisbury. Few trees and power lines were blown down across the Lower Maryland Eastern Shore resulting in scattered power outages. 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	$575,000

Storm Event	Date	Event Narrative	Property Damage	Crop Damage
Tropical Storm Isabel	September 18 - September 19, 2003	The highest sustained wind speed recorded was 37 mph at Salisbury. The wind 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. Storm surge values near 4-to-5-foot surge values reported on the Wicomico and Nanticoke Rivers. Rainfall amounts ranged from 1 to 3 inches across the Lower Maryland Eastern Shore. There were more than 15 deaths indirectly attributed to the storm.	$2.5 Million	Not Available
Tropical Storm Hanna	September 6, 2008	Few trees were downed. Rainfall amount of 2.32 inches was recorded about three miles north of Vienna. Storm total rainfall ranged from around 1 to 3 inches. Coastal storm tides of 1 to 3 feet were common, with only minor beach erosion reported. 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.	$500,000	Not Available
Tropical Storm Irene	August 27-August 28, 2011	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. The highest sustained wind of 40 knots (46 mph) with a peak gust of 53 knots (61 mph) was recorded by SBY (Salisbury-Wicomico Airport). Storm total rainfall generally ranged from six to ten inches.	$100,000	$1,000,000
Tropical Cyclone Sandy	October 29-October 30, 2012	Tropical Cyclone Sandy moved northward well off the Mid Atlantic Coast then northwest producing very strong northeast winds which caused coastal flooding. Water levels reached 3-4 feet above normal. Salisbury experienced the worst flooding due to the combination of storm surge and excessive rainfall runoff. A number of privately owned docks and bulkhead were damaged or destroyed in the Nanticoke area.	$250,000	$0
2021 HMP Update				
Tropical Storm Hermine	September 2-5, 2016	Tropical Storm Hermine moving northeast along the Southeast Coast then off the Mid Atlantic Coast produced a few tropical storm force wind gusts, minor coastal flooding, and locally heavy rainfall across portions of the Lower Maryland Eastern Shore from Friday evening, September 2nd into early Monday morning, September 5th.	$0	$0
Tropical Storm Isaias	August 4, 2020	The center of Tropical Storm Isaias tracked north just inland of the Middle Atlantic Coast from late Monday night, August 3rd through Tuesday morning, August 4th. The tropical storm produced tropical storm force winds and associated wind damage across portions of the Lower Maryland Eastern Shore.	$250,000	$0

Source: NWS, NCDC (NOAA)

In terms of number of occurrences, as listed in Table 4.2, the National Weather Service - National Climatic Data Center listed a total of 10 hurricane and tropical storm events affecting Wicomico County from the years 1996-2020. Therefore, according to the data, Wicomico County experiences on average 0.4 hurricane and tropical storm events per year.

VULNERABILITY

An Enhanced HAZUS Analysis for hurricane wind was conducted. The storm track used in the hurricane wind analysis was modified to increase the impact to Wicomico County. Using the increased storm condition for the Enhanced HAZUS hurricane wind analysis accounts for the potentially increasing storm severity of future conditions.

The Hurricane Model allows practitioners to estimate the economic and social losses due to hurricane winds. The information provided by the model will assist state and local officials in evaluating, planning for, and mitigating the effects of hurricane winds. The Hurricane Model provides practitioners and policy makers with a tool to help reduce wind damage, reduce disaster payments, and make wise use of the nation's emergency management resources.

Although the software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that even with state-of-the-art techniques, uncertainties are inherent in any such estimation methodology. The next major hurricane to affect Wicomico County may be quite different than any "scenario hurricane" anticipated as part of a hurricane loss estimation study. Hence, the results of a scenario analysis should not be looked upon as a *prediction,* but rather as an indication of what the future may hold.

HAZUS provides different levels of analysis based on the level of effort and expertise employed by the user. Users can improve the accuracy of HAZUS loss estimates by furnishing more detailed data about their community, or engineering expertise on the building inventory. An Enhanced HAZUS analysis provides a more accurate loss estimates due to the inclusion of detailed information on local hazard conditions and/or by replacing the national default inventories with more accurate local inventories of buildings, essential facilities, and other infrastructure. The Enhanced HAZUS Analysis, conducted by Smith Planning and Design, utilized integrated user-supplied data in order to yield more accurate loss estimates and risk assessments.

County data including community lifelines used in Table 4.3 were reviewed and updated during this planning process. This table illustrates the discrepancy between the HAZUS default data, and the County data utilized in this Enhanced HAZUS Analysis. As shown, the accuracy of results are exponentially increased by utilizing County data and running the Enhanced HAZUS Analysis.

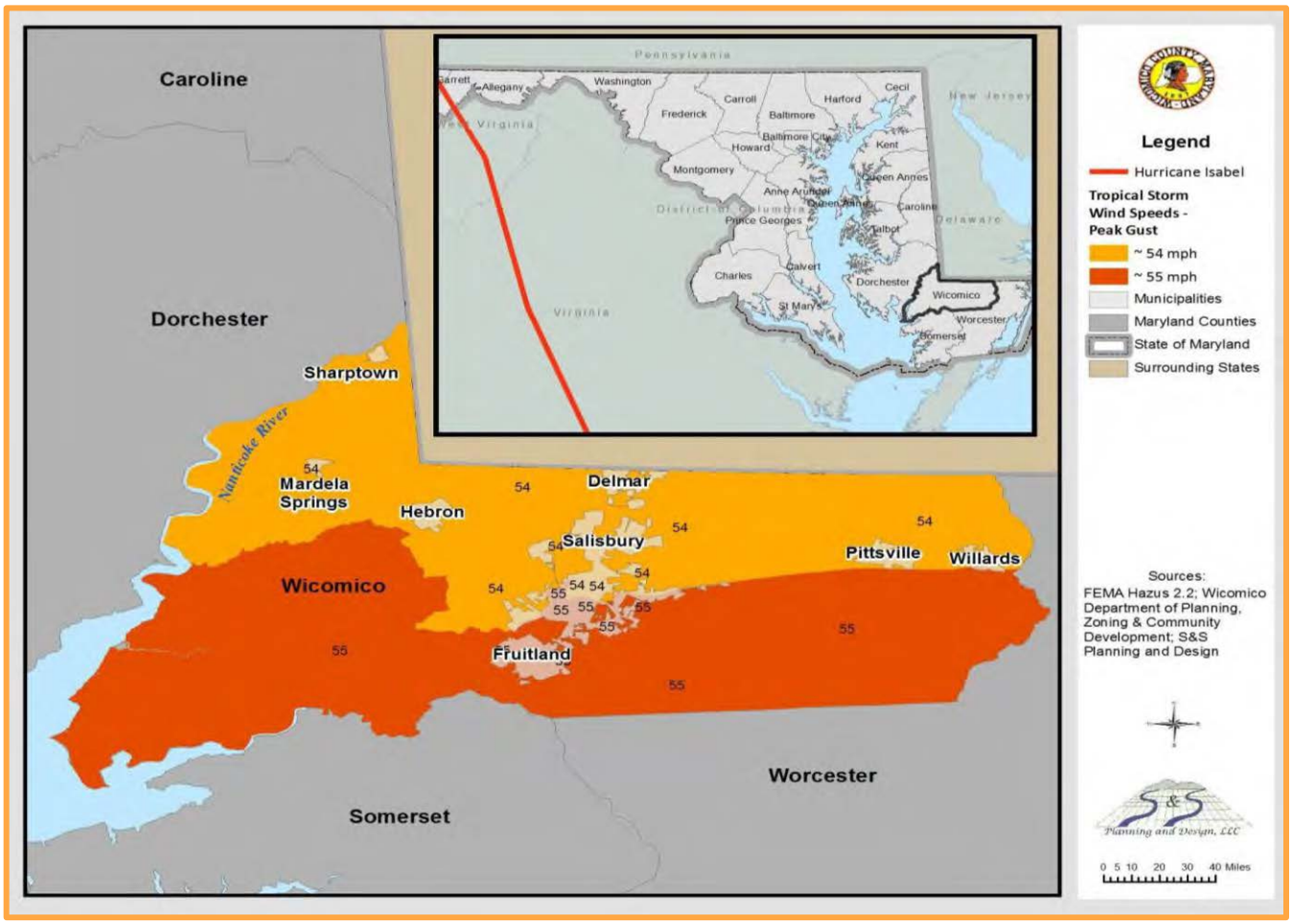
Table 4.3: HAZUS Default and County Data

Critical Facility Type	HAZUS Default Data	County Data Utilized for Enhanced HAZUS Analysis
Fire stations/EMS	9	13
Police Stations	4	7
Schools	42	45
EOC	0	1
Medical	3	27

Source: FEMA, Wicomico County and Smith Planning and Design

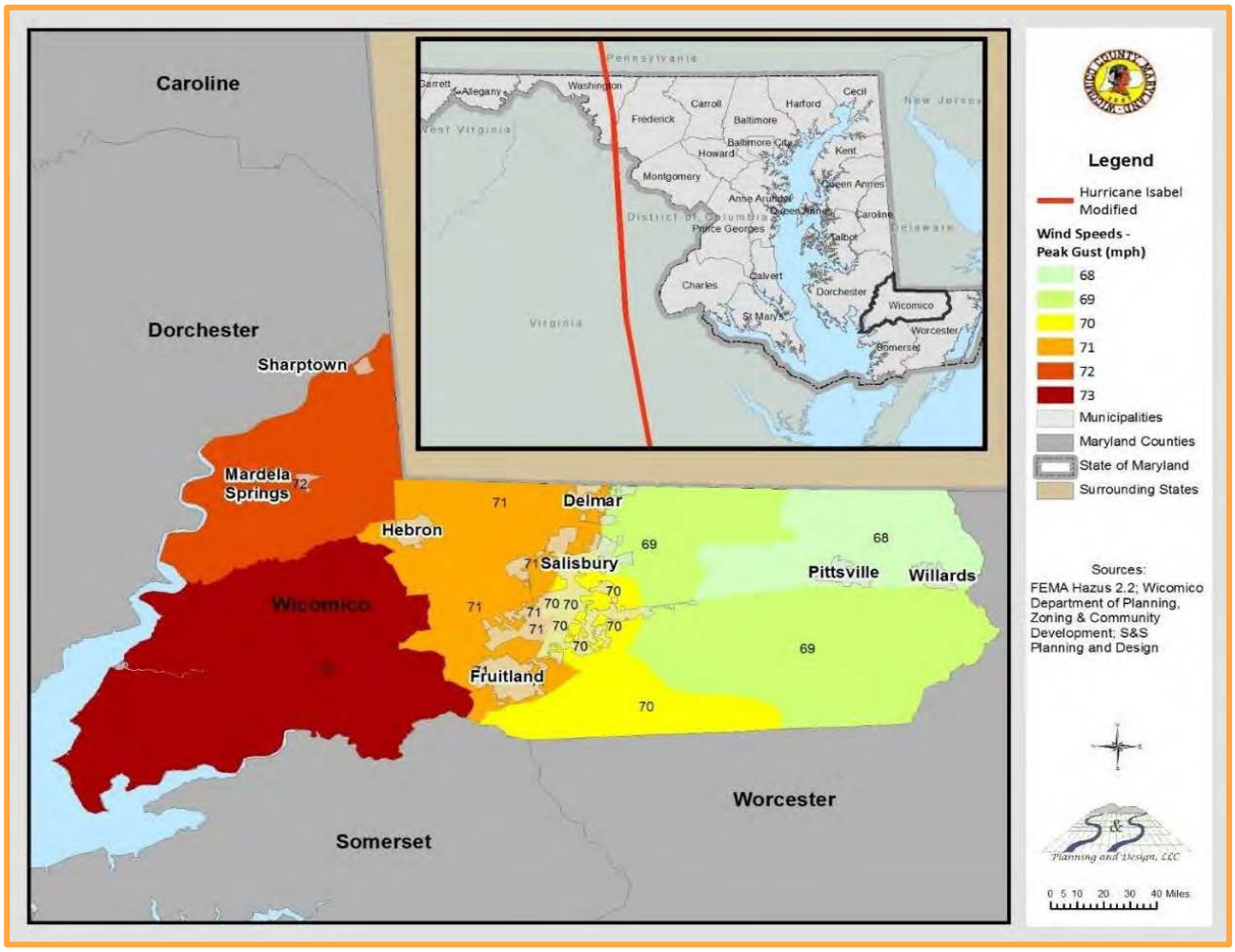
For the Hurricane Wind – Enhanced HAZUS Analysis, a historical storm analysis was initially modeled. In 2003, Hurricane Isabel impacted Maryland significantly and was Presidenitally Declared a disaster on September 19, 2003. Individual and public assisstance was provided in Wicomico County. Considering the severity of damage and impact Hurricane Isabel had on Wicomico County, this storm was utilized as the baseline storm for the Huricane Wind – Enhanced HAZUS Analysis. Map 4.1: Hurricane Isabel Wind Speeds – Peak Gust illustrates the wind speeds used in the baseline model.

Map 4.1: HAZUS Hurricane Analysis –Hurricane Isabel Wind Speeds - Peak Gusts



Modifications to the storm track were made to increase the impact to Wicomico County for further analysis. These modifications included alterations to the coordinates so the hurricane track was in closer proximity to Wicomico County, additionally, the severity of the storm was increased from a Tropical Storm to a Hurricane Category One. Peak wind gusts for tropical storms are 55 mph, while peak gusts for the Category One storm are 73 mph. Map 4.1 depicts the historic Hurricane Isabel model, while Map 4.2 illustrates the modified Hurricane Isabel used in the analysis.

Map 4.2: HAZUS Hurricane Analysis –Hurricane Isabel Modified Wind Speeds – Peak Gusts

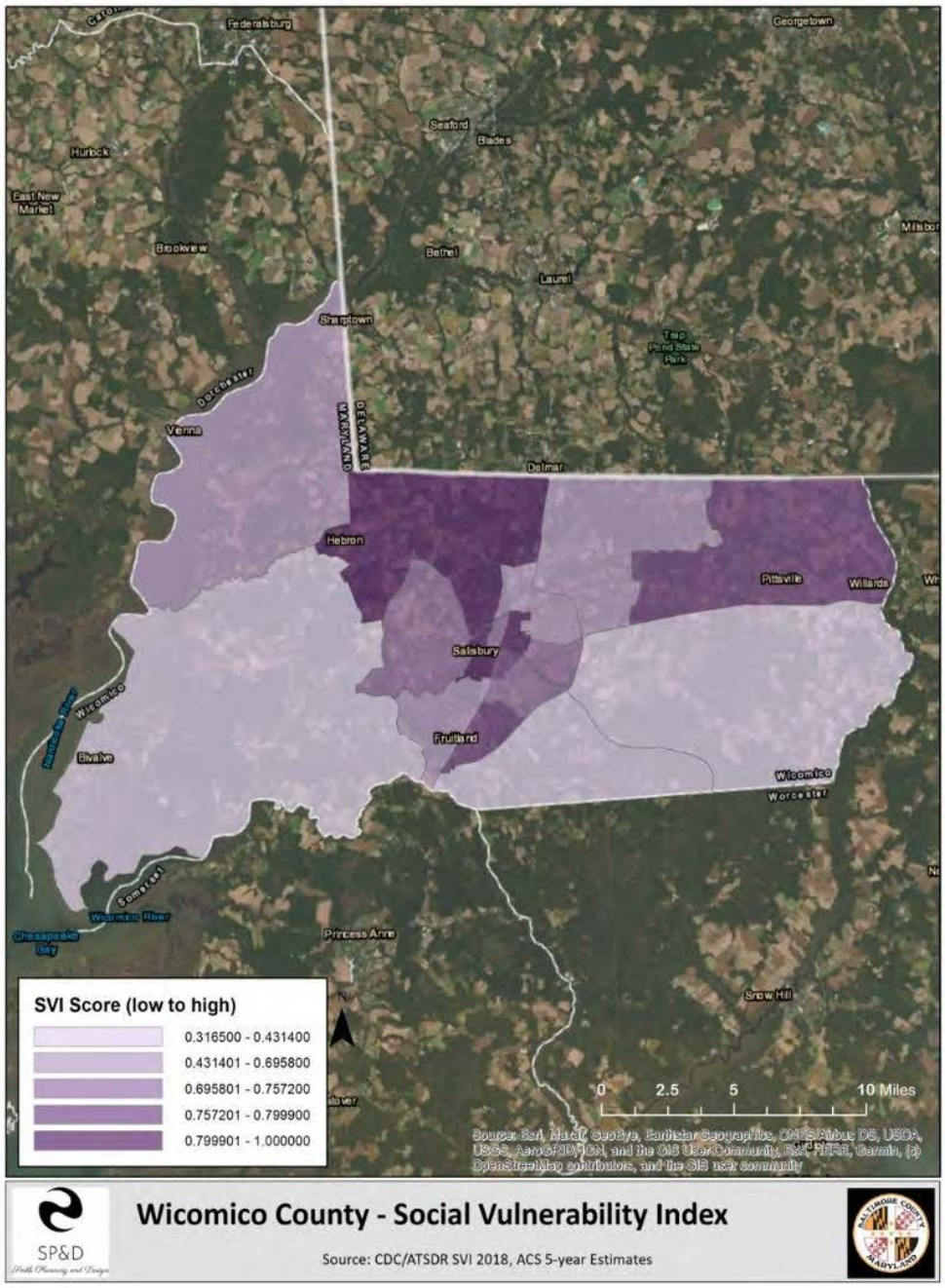


The western portion of Wicomico County, the area containing both the Wicomico and Nanticoke River, is the most vulnerable to hurricane wind. As shown on the map above, Hurricane Isabel Modified Wind Speeds – Peak Gusts could be up to 73 mph in this area. In addition to the unincorporated areas shown in darker shades of orange, the municipality of Mardela Springs is within the hurricane wind high-risk zone.

SOCIAL VULNERABILITY

The Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) was developed to assist local officials identify communities within the county that may need additional support before, during, and/or after disasters. The SVI is discussed in further detail in Chapter 3 – Hazard Identification & Risk Assessment on page 3-6. The SVI has been conducted for Wicomico County at the census tract level and is depicted on map 4.3. The darker census tracts indicate areas of higher social vulnerability while the lightest tracts indicate relatively low social vulnerability.

Map 4.3: Wicomico County Social Vulnerability Index

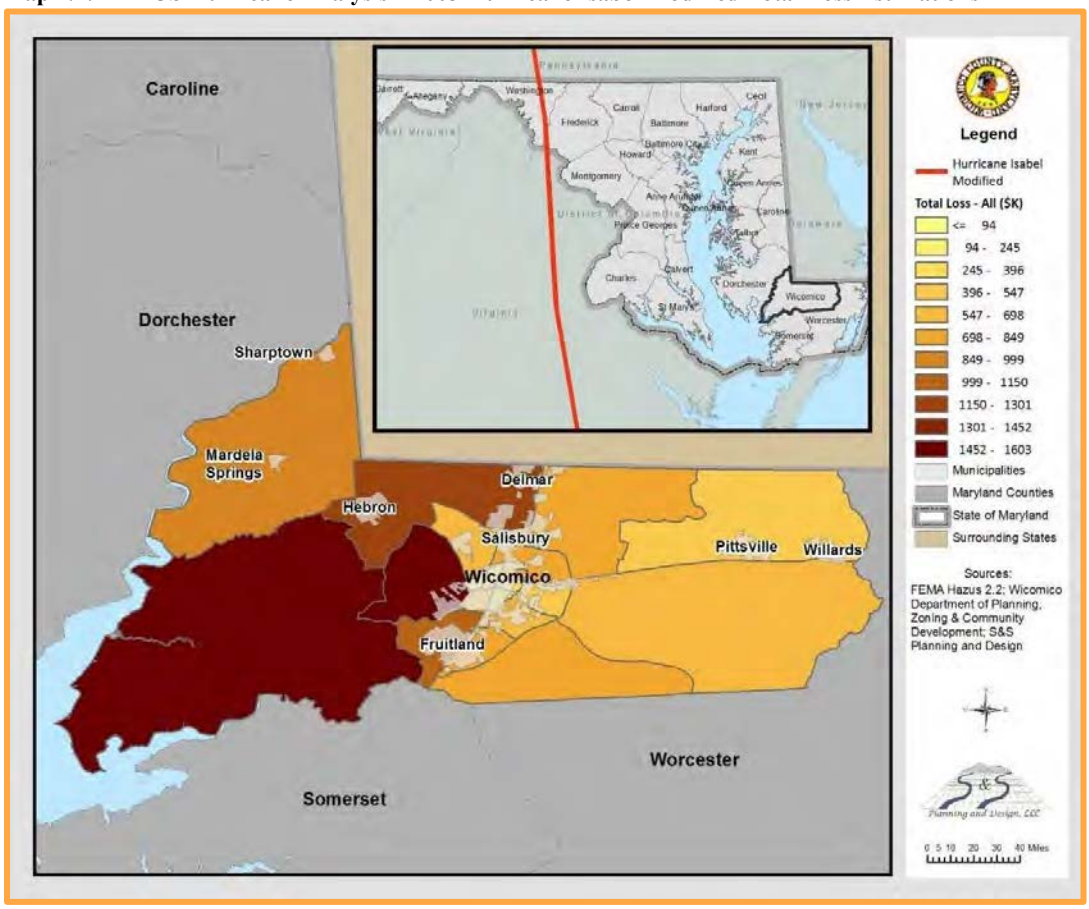


Using the information depicted on both Maps 4.2 and 4.3, the intersecting or overlapping areas of SVI score census blocks and Hurricane Isabel Modified Peak Gusts can be determined. Areas with higher social vulnerability index score as indicated on Map 4.3 by dark purple shading overlap with the orange shading indicating peak gusts of 73 mph as shown on Map 4.2. This area includes the Towns of Hebron and Delmar, the City of Fruitland, and portions of the City of Salisbury.

FACILITIES AT-RISK & LOSS ESTIMATIONS

Results of the Enhanced HAZUS Analysis determined residential structures would be affected by the hurricane more so than other occupancy types such as commercial or industrial facilities. Also, wood as a building material is more susceptible to damage than masonry, concrete or steel. There are over 35,000 buildings in the County with an estimated replacement value of approximately $11.2 million dollars. The economic loss for this event is approximately $13.7 million with 98% of this loss consisting of residential occupancy loss. Map 4.4 illustrates total loss estimations.

Map 4.4: HAZUS Hurricane Analysis – 2003 Hurricane Isabel Modified Total Loss Estimations



The HAZUS Hurricane Wind analysis estimates that approximately 4 residential structures will be moderately damaged due to wind during an event such as this. A total of 113 residential structures and 4 commercial structures are expected to experience minor building damage (Appendix I – HAZUS Hurricane Wind Report, page 6). Table 4.4 details the total estimated loss specific to Hurricane Wind for Wicomico County if a hurricane event of this magnitude occurred.

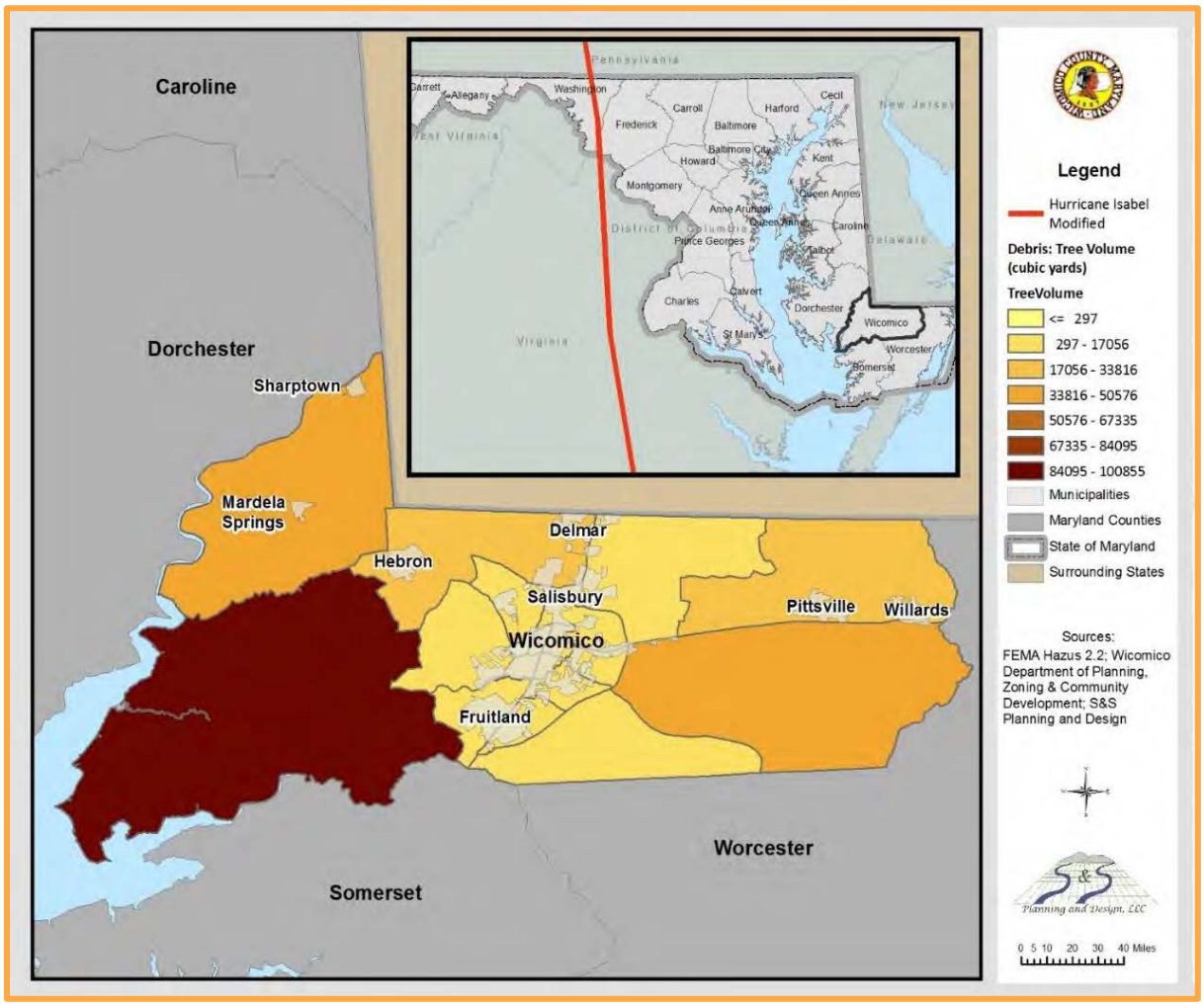
Table 4.4: HAZUS Hurricane Analysis – 2003 Hurricane Isabel Modified – Building-Related Loss Estimations

Building Type	Loss Estimations
Residential	$10,419,570.00
Commercial	$193,990.00
Industrial	$31,290.00
Other	$41,150.00
Total	**$10,686,000.00**

DEBRIS GENERATION

In terms of debris, the model estimates that a total of 27,837 ton of debris will be generated. If debris tonnage is converted to an estimated number of truckloads, it would require 28 truckloads (@25 tons/truck) to remove the debris generated by the hurricane. Additionally, 3,442 tons of debris is categorized as eligible tree debris, which could be chopped and/or chipped.

Map 4.5: HAZUS Hurricane Analysis – 2003 Hurricane Isabel Modified Debris



4.3 HURRICANE STORM SURGE

HAZARD CHARACTERIZATION

The National Weather Service (NWS) defines storm surge as "Storm surge is abnormal rise of water generated by a storm, over and above the predicted astronomical tide. It's the change in the water level that is due to the presence of the storm. Since storm surge is a difference between water levels, it does not have a reference level."

According to NOAA, storm surge is generated by water being pushed toward the shore by the force of the winds moving cyclonically around the storm. The impact on surge of the low pressure associated with intense storms is minimal in comparison to the water being forced toward the shore by the wind.

Wind and Pressure Components of Hurricane Storm Surge

HAZARD RISK & HISTORY

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 experiencing shoreline submergence that has been ongoing since the last glacial period when sea level was approximately 400 feet lower than today. While the process has been continuing for approximately 10,000 years, sea level is still rising at a rate of plus one foot or so every century. This rise in sea level will certainly affect the relative height of future storm surge events.

Hurricane Floyd caused widespread flooding in the northern portions of Maryland's Eastern Shore on September 16, 1999 (MDE). Remnants of Hurricane Isabel caused widespread tidal surge flooding on September 18-19, 2003 (MDE) causing the worst recorded flooding in the County's history. Hurricane Isabel produced four-to-five-foot storm surges on the Wicomico and Nanticoke Rivers and caused 15 deaths statewide. A large storm event in June 2006 dropped 3 to 6 inches of rain in most of Wicomico County between June 22 and June 30, 2006 (NWS), which caused widespread flooding. In 2012, Salisbury experienced the worst flooding with water levels reaching 3-4 feet above normal. This was due to the combination of storm surge and excessive rainfall runoff during Tropical Storm Sandy.

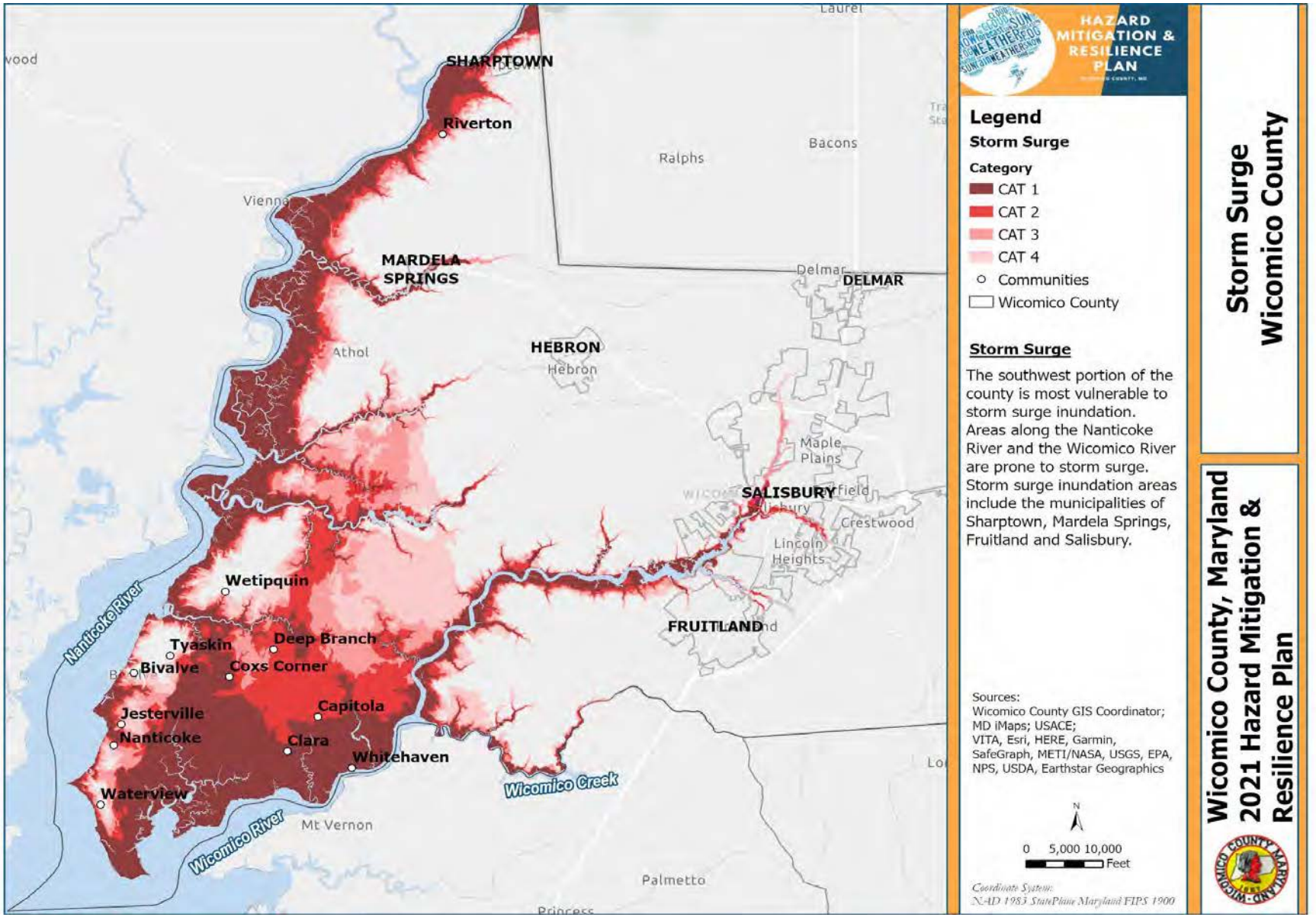
VULNERABILITY

Wicomico County is in southeastern Maryland and is bordered by Delaware. The southwest portion of the county is most vulnerable to storm surge inundation. Areas along the Nanticoke River and the Wicomico River are prone to storm surge. Storm surge inundation areas include the unincorporated areas of the county and the municipalities of Sharptown, Mardela Springs, Fruitland and Salisbury.

Several techniques are utilized to model storm surge including one technique involving the use of the National Weather Service's (NWS) Sea, Lake and Overland Surges from Hurricanes (SLOSH) model. This model is used to predict storm surge heights based on hurricane categories. The classification of the surge inundation area is based on the hurricane category causing the flooding. As the category of the storm increases, more land area will become inundated. Storm surge is a major component of nor'easter storms along the East Coast of the U.S. since winds are moving in a north and/or eastward direction. These winds move across the ocean towards the shore and generate large waves.

Storm surge data utilized for analysis reflects areas with a risk of storm tide flooding from hurricanes, based on potential storm tide heights calculated by the National Weather Service's SLOSH Model. The SLOSH Basin used for mapping was Chesapeake Bay (CP5); this data was prepared by the U.S. Army Corps of Engineers (USACE), Baltimore District, Planning Division. SLOSH storm tide elevations used for the mapping were based on the Maximum of Maximums (MOM) SLOSH output dataset. The MOM output elevations represent the highest calculated storm tide values based on thousands of SLOSH simulations using different combinations of approach direction, forward speed, landfall point, astronomical tide, and intensity (Category 1 through Category 4). Categories 1 through 4 refer to the Saffir-Simpson scale of hurricane intensity. Hurricane storm surge inundation areas are depicted in Map 4.6 below.

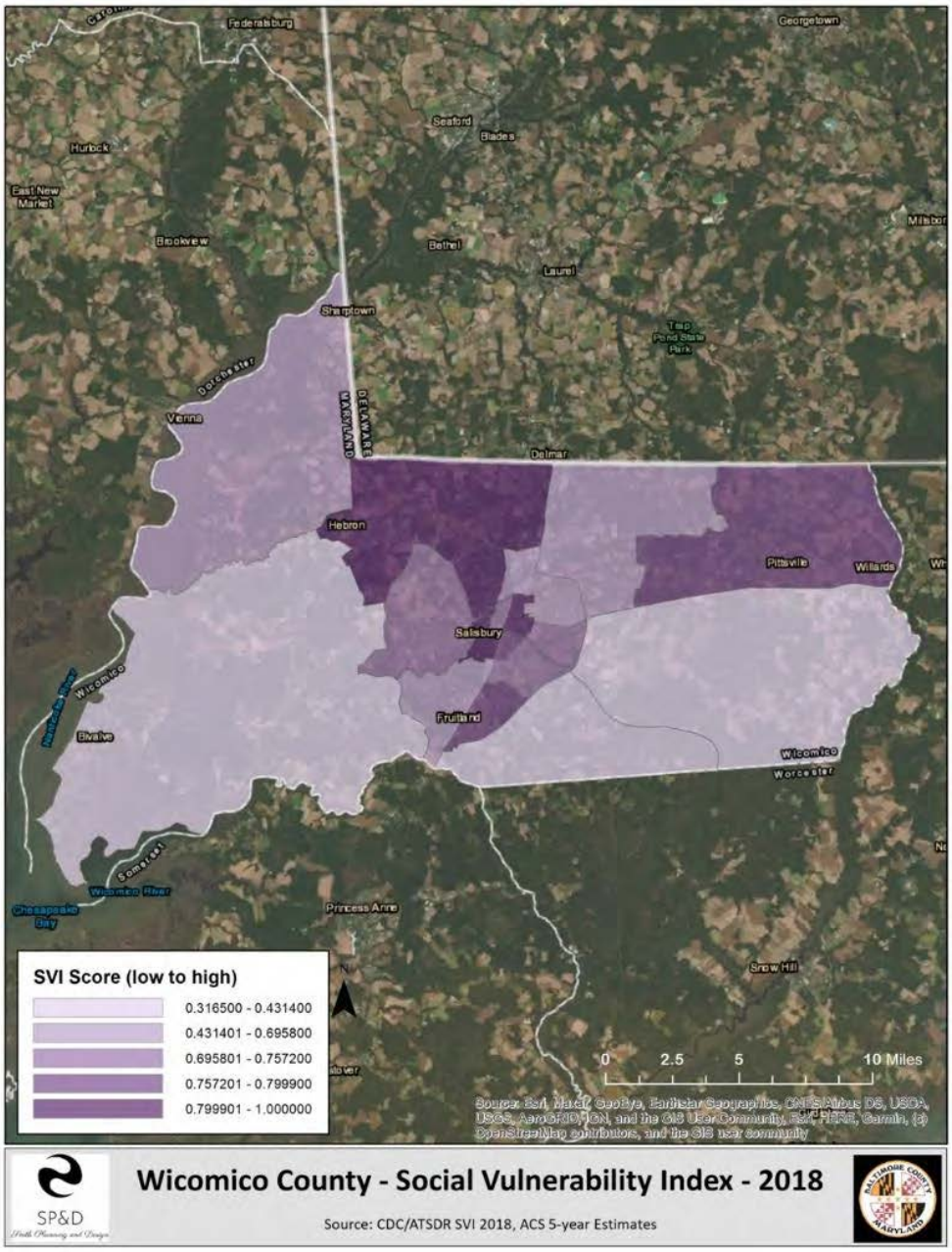
Map 4.6: Hurricane Storm Surge Inundation Area



SOCIAL VULNERABILITY

The Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) uses fifteen (15) U.S. Census variables to calculate SVI scores that can help local officials identify communities within the county that may need additional support before, during, and/or after disasters. Map 4.3 was developed for the plan update and provides a visual depiction of the SVI scores, by shaded zones, for Wicomico County. Higher social vulnerability regions are indicated by dark purple shading.

Map 4.7: Wicomico County Social Vulnerability Index



Using the information depicted on both Maps 4.6 and 4.7, the intersecting or overlapping areas of SVI score census blocks and hurricane storm surge inundation areas can be determined. Areas with lower social vulnerability index score as indicated on Map 4.7 by light purple shading in the sourthern protion of the county overlap with the hurricane storm surge inundation areas as shown on Map 4.6. This area includes the Towns of Sharptown and Mardela Springs, and portions of the Cities of Fruitland and Salisbury.

FACILITIES AT-RISK – UNINCORPORATED AREAS OF WICOMICO COUNTY

Community Lifelines & Public Facilities

In an effort to minimize and/or eliminate storm surge hazard risk (mitigation) and continue the essential services and functions (resilience), community lifelines were assessed for storm surge hazard vulnerability.

According to the Federal Emergency Management Agency (FEMA), a Community Lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.
- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Public facilities can be any facility, including, but not limited to, buildings, property, recreation areas, and roads, which are owned, leased, or otherwise operated, or funded by a governmental body or public entity. In addition, infrastructure and transportation networks may be vulnerable to the flood hazard

Community Lifelines

Safety and Security - Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety

Food, Water, Shelter - Food, Water, Shelter, Agriculture

Health and Medical - Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management

Energy - Power Grid, Fuel

Communications - Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch

Transportation - Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime

Hazardous Material - Facilities, HAZMAT, Pollutants, Contaminants

The U.S. Army Corps of Engineers, Baltimore District, Planning Division storm surge data layer was used to prepare Map 4.6: Hurricane Storm Surge Inundation Area. The 2021 Plan Update analyzed storm surge risk to community lifelines and public facilities. Facilities located within the storm surge areas were identified and differentiated by hurricane categories. Category One storm surge has the most likelihood of occurrence based on historical data. Table 4.5 lists the community lifelines and public facilities located within the each of the storm surge areas.

Table 4.5: Community Lifelines and Public Facilities in Storm Surge Areas

Facility Type	Number of Facilities	Facility Name	Address
Hurricane Category 1			
County Owned	8	Tyaskin Park	4778 Tyaskin Road
		Whitehaven Ferry	23865 River St
		Riverside Boat Ramp	Riverside Dr
		Bivalve Wharf	Bivalve Wharf Rd
		Nanticoke Harbor (2)	20411 Harbor Road
		Whitpquin Boat Launch	21664 Wetipquin Rd
		Upper Ferry	5420 N Upper Ferry Road
		Cedar Hill Marina & Park	20945 Harbor View Road
Tower	1	Wicomico County Tower	5635 Plantation Ln
Above Ground Storage Tanks	5	Perdue Inc (3 tanks)	521 Willow St
		Taylor Oil Co., Inc. (2 tanks)	333-335 Lake St
Underground Storage Tank	2	Valet Cleaners	223 Lake St.
		Walter Maycocks	600 West Main Street
Hurricane Category 2			
Please note, all facilities listed in Categories 1 Hurricane Storm Surge are included in Category 2.			
County Owned	3	Office of State's Attorney	309 E Main St
		Cope Bennett Park	100 Railway St
		Westside Solid Waste	20906 Nanticoke Road
Fire Department	1	Salisbury Fire Department - Station 16	325 Cypress St
Medical	1	William C Fritz Health Center	300 W Carroll St
Sanitary	2	Sharptown Sewer Plant	Little Water St
		Salisbury Pumping Station	611 Ridge Road
Tower	1	Tower	27410 Riverside Dr Ext
Hurricane Category 3			
Please note, all facilities listed in Categories 1 and 2 Hurricane Storm Surge are included in Category 3.			
County Owned	1	Library	122 S Division St
Underground Storage Tank	1	Mardela Goose Creek	24948 Ocean Gateway
Hurricane Category 4			
Please note, all facilities listed in Categories 1, 2, and 3 Hurricane Storm Surge are included in Category 4.			
County Owned	5	Housing Authority	613 Delaware Ave
		Housing Authority	611 Delaware Ave
		Housing Authority	609 Delaware Ave
		Cedar Hill Marina & Park	20945 Harbor View Road
		Youth & Civic Center/Rec, Park & Tourism Offices	500 Glen Ave
Fire Department	1	Sharptown Fire Department	317 Main St
Medical	1	Hurdle Health Center /Health Department	108 E Main St
Police	1	Salisbury Police Department	Police
Tower	4	Verizon	101 E. Main St.
		Verizon Wireless	25050 Nanticoke Rd
		Tower	24462 Nanticoke Rd
		Tower	4085 Disharoon Rd

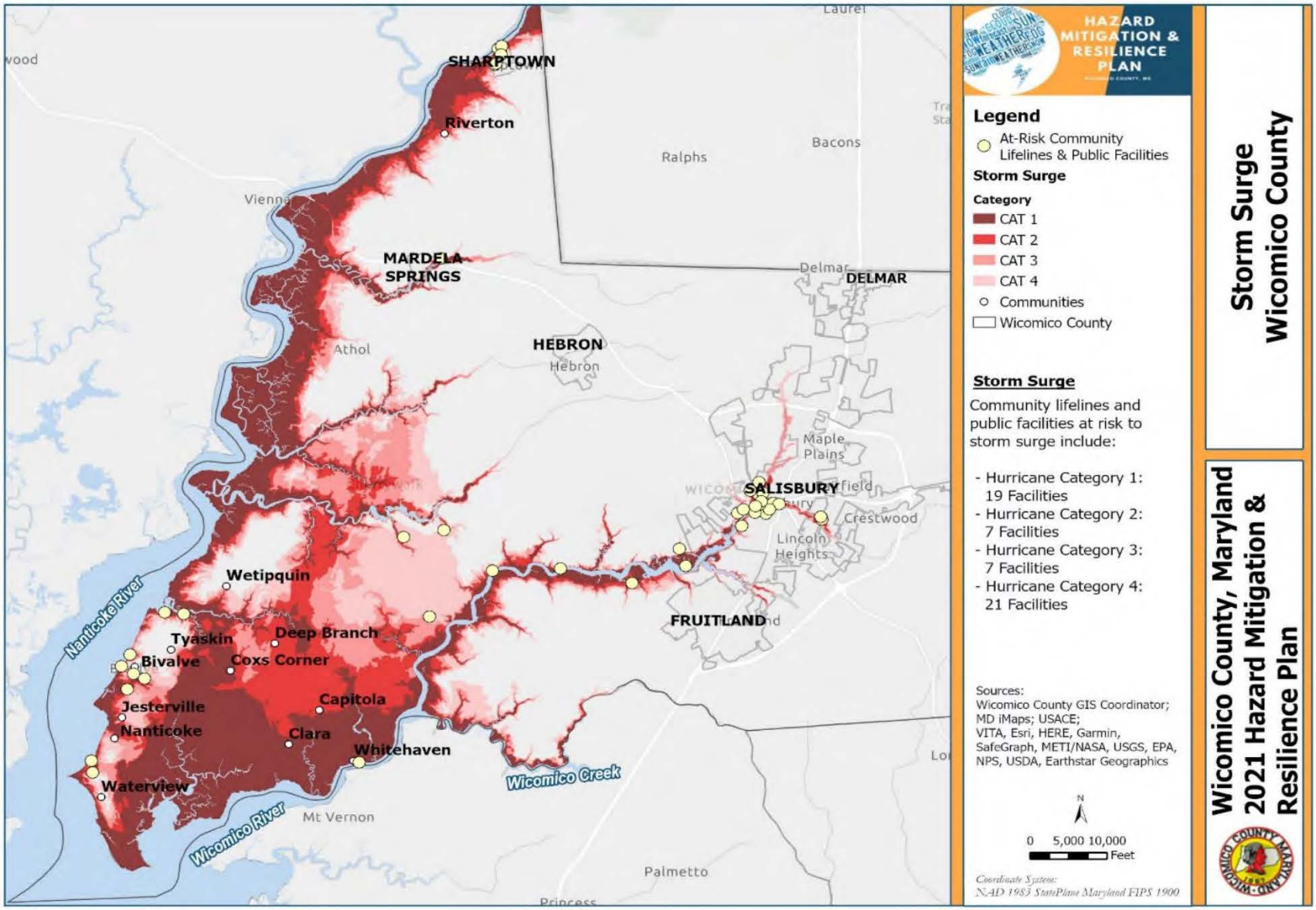
Facility Type	Number of Facilities	Facility Name	Address
Above Ground Storage Tanks	1	Taylor Oil Company, Inc.- Bivalve Plant	3840 Texas Rd
Underground Storage Tank	4	Top Ten	825 West Isabella Street
		Wicomico Teen-Adult Center	Nanticoke St.
		Green Hill Yacht & Country Club	5471 White Haven Road
		Messick Funeral Home	20941 Nanticoke Rd

Map 4.8 illustrates the location of the community lifelines and public facilities within storm surge areas. The mapping does not reflect the expected storm surge flooding for every hurricane, or for any one hurricane. Instead, the data depicts an overall footprint of the area that has some risk of potential storm surge flooding due to hurricanes, based on the MOM output dataset.

A majority of the community lifelines and public facilities at risk are located around the Bivalve community and the City of Salisbury. Changing climate conditions resulting in increased storm activity and severity are projected to impact hurricane storm surge inundations areas. therefore, hurricane storm surge mitigation actions and recommendations should include projected future conditions.

Source: MDEM – Hurricane Evacuation Guide

Map 4.8: Storm Surge Relation to Community Lifelines & Public Facilities



FACILITIES AT RISK – MUNICIPALITIES OF WICOMICO COUNTY

Assessing hurricane storm surge vulnerability of municipal owned facilities (structures) was added as a new element during this plan update. Hurricane storm surge inundation areas and municipal facilities were mapped to determine which facilities were at risk to storm surge.

Municipal owned facilities listed on Table 4.6. A total of eight (8) facilities are vulnerable to hurricane storm surge. Municipal owned facilities at risk are located in the Town of Sharptown and the City of Salisbury. The remaining five (5) municipalities, Hebron, Delmar, Fruitland, Pittsville, and Willards did not own facilities within the hurricane storm surge inundation areas.

Table 4.6: Municipal Owned Facilities in Storm Surge Areas

Facility Type	Number of Facilities	Facility Name	Address
Hurricane Category 1 & 2			
Salisbury	3	Fire Training	317 & 325 Lake St
		Port of Salisbury Marina	506 W main Street
Hurricane Category 3			
Please note, all facilities listed in Categories 1 and 2 Hurricane Storm Surge are included in Category 3.			
Salisbury	2	Parking Garage	101 E Market St
		Salisbury Zoo	501 S Park Dr
Hurricane Category 4			
Please note, all facilities listed in Categories 1, 2, and 3 Hurricane Storm Surge are included in Category 4.			
Sharptown	1	Sharptown Town Hall	401 Main St
Salisbury	3	Fire Training Building	311 W Isabella St
		Housing Authority	621 Delaware Ave
		Housing Authority	610 Pearl St

Salisbury Zoo – October 2016 Flood Event
Source: MDEM – https://www.wboc.com/story/33310634/alpaca-dies-during-floods-cleanup-continues-at-salisbury-zoo
Photo Source: Salisbury Zoo

COMMERCIAL & RESIDENTIAL STRUCTURES AT RISK - MUNICIPAL

Commercial and residential structures located within the seven (7) municipalities of Wicomico County were assessed to determine storm surge vulnerability. This assessment including mapping products was added as a new element during the plan update. Assessment results indicate that commercial and residential structures within the Cities of Fruitland (Map 4.9) and Salisbury (Map 4.10) and the Towns Mardela Springs (Map 4.11), and Sharptown (Map 4.12) are located within the hurricane storm surge inundation areas.

Fruitland

The City of Fruitland is vulnerable to hurricane storm surge categories 3 and 4 along the eastern border. One (1) structure along Covered Bridge Lane is in Hurricane Storm Surge Category 3, while six (6) are within Category 4.

Salisbury

The hurricane storm surge inundation area surrounding Wicomico River, Coty Cox Branch, Johnson Pond, Peggy Branch, Schumaker Pond, Tony Tank Pond, Morris Prong. A total of 740 structures are vulnerable to the hurricane storm surge categories 1 to 4.

Mardela Springs

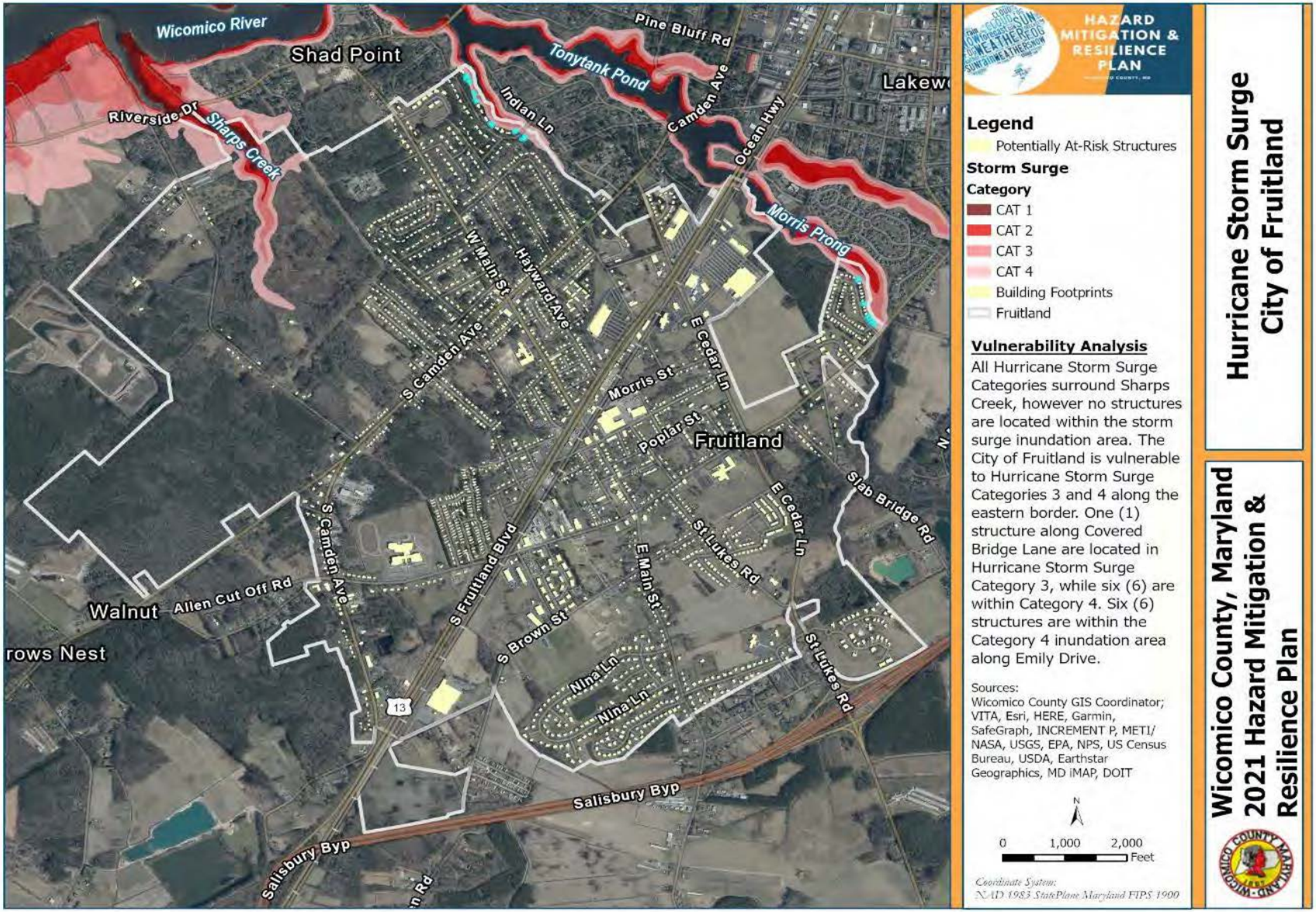
The hurricane storm surge inundation area surrounding Barren Creek. A total of 14 structures are vulnerable to the hurricane storm surge categories 1 to 4.

Sharptown

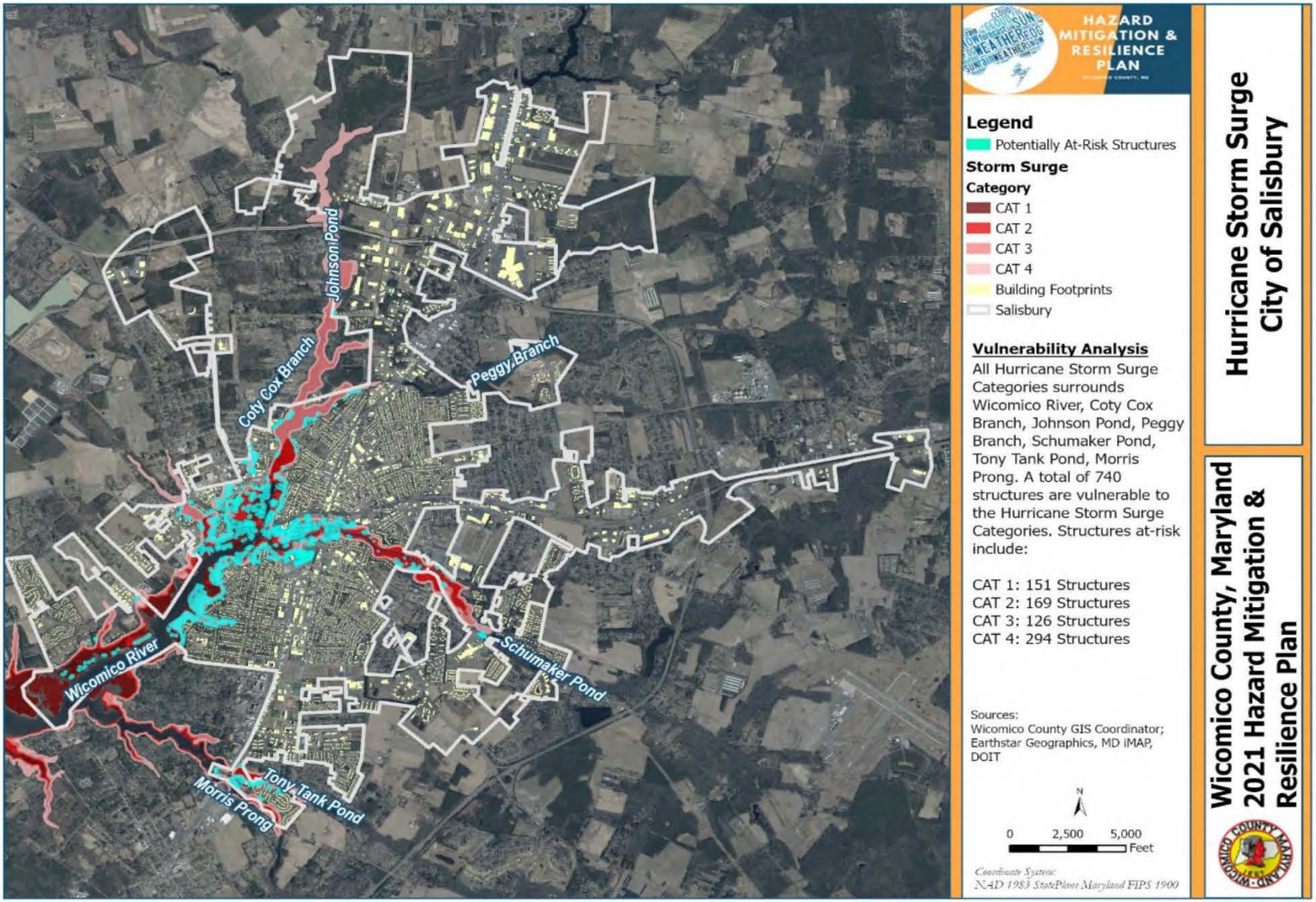
The hurricane storm surge inundation area along the Nanticoke River affects the Town of Sharptown. A total of 175 structures are at-risk to the hurricane storm surge categories 1 to 4. The Sharptown Fire Department is located in Categories 3 and 4.

Note: Flood vulnerability assessment results were shared with and reviewed by municipal representatives.

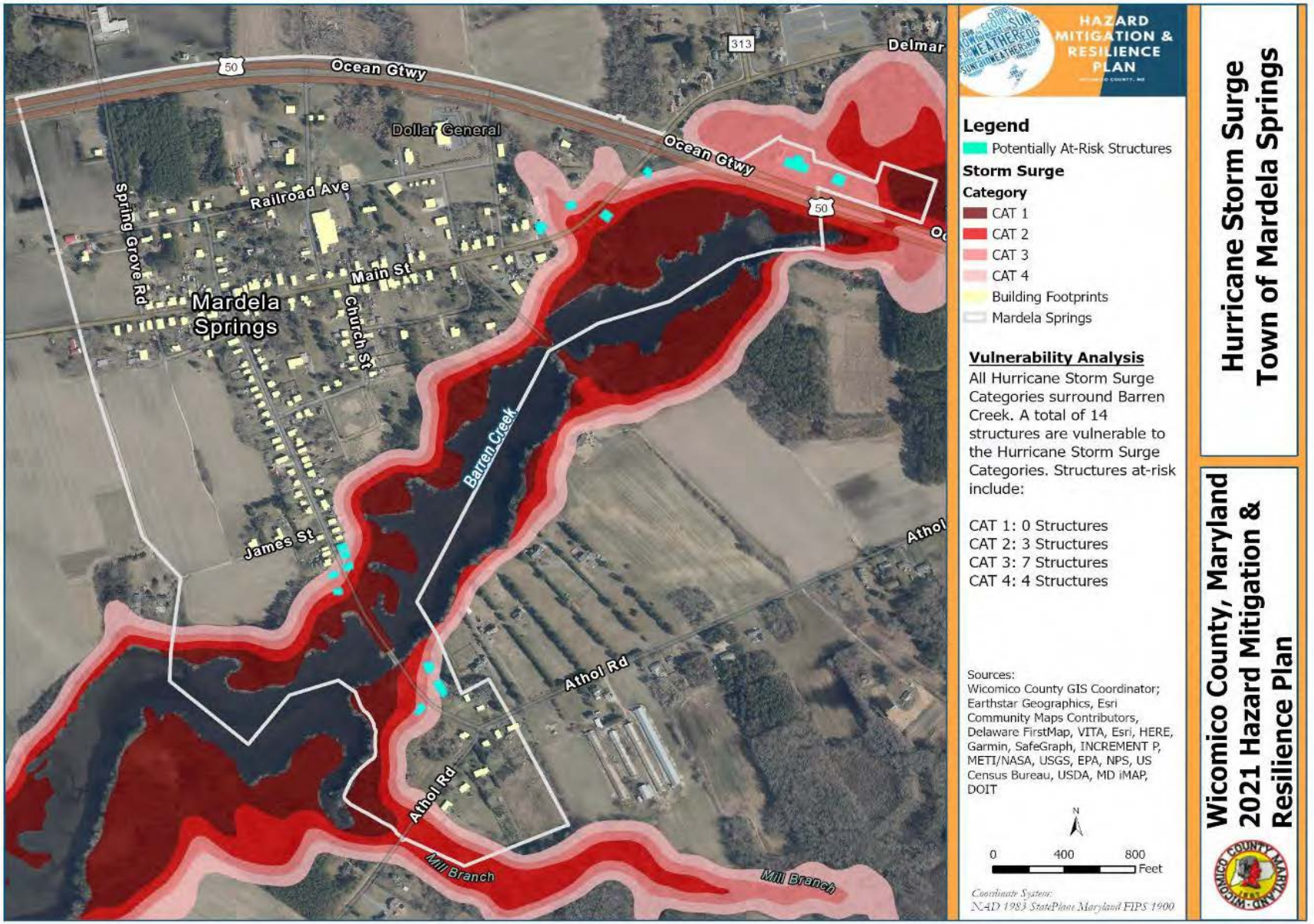
Map 4.9: At-Risk Municipal Facilities – City of Fruitland



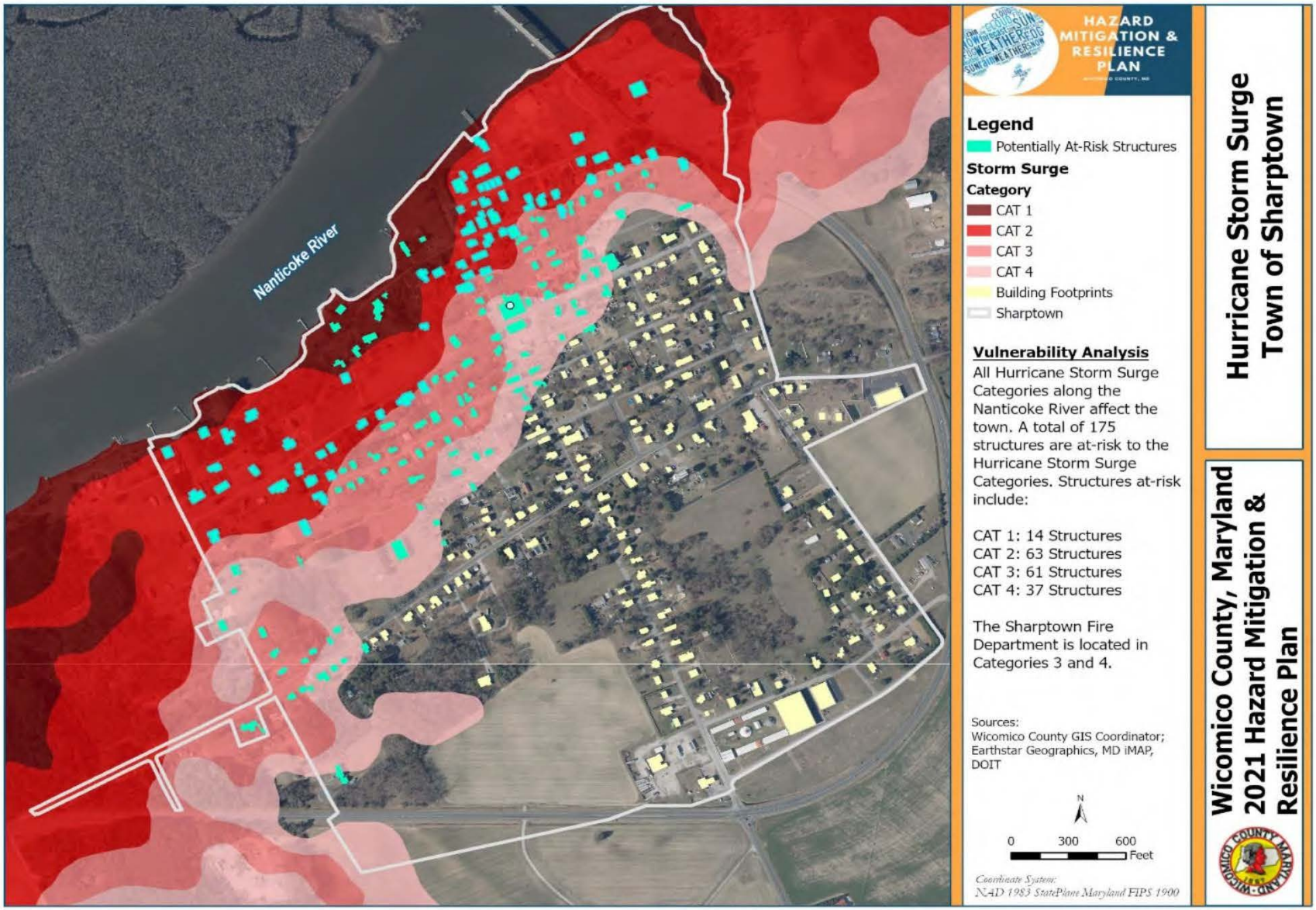
Map 4.10: At-Risk Municipal Facilities – City of Salisbury



Map 4.11: At-Risk Municipal Facilities – Town of Mardela Springs



Map 4:12: At-Risk Municipal Facilities – Town of Sharptown



LOSS ESTIMATIONS - UNINCORPORATED COMMUNITY LIFELINES & PUBLIC FACILITIES

Loss estimates for community lifelines and public facilities located in the hurricane storm surge inundation areas were assessed. Structure improvement values using the most recent Maryland Tax Assessment values are included in Table 4.7.

Table 4.7: Loss Estimates for Community Lifelines and Public Facilities

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
Hurricane Category 1			
County Owned	Tyaskin Park	$5,800	$417,000
	Whitehaven Ferry	$1,300	
	Riverside Boat Ramp	$56,700	
	Bivalve Wharf	$1,700	
	Nanticoke Harbor (2)	$160,400	
	Wetipquin Boat Launch	$9,900	
	Upper Ferry Harbor	$1,500	
	Cedar Hill Marina & Park	$179,700	
Tower	Wicomico County Tower	*$175,000	$175,000
Above Ground Storage Tanks	Perdue Inc (3 tanks)	**$1,500	$3,000
	Taylor Oil Co., Inc. (2 tanks)	**$1,500	
Underground Storage Tank	Valet Cleaners	**$1,500	$3,000
	Walter Maycocks	**$1,500	
Hurricane Category 2			
Please note, all facilities listed in Categories 1 Hurricane Storm Surge are included in Category 2.			
County Owned	Office of State's Attorney	$3,091,300	$3,115,000
	Cope Bennett Park	$21,000	
	Westside Solid Waste	$2,700	
Fire Department	Salisbury Fire Department – Station 16	$7,618,600	$7,618,600
Medical	William C Fritz Health Center	$1,199,700	$1,199,700
Sanitary	Salisbury Sewage Pumping Plant	$98,900	$150,500
	Salisbury Pump Station M Park	$51,600	
Tower	Tower	*$175,000	$175,000
Hurricane Category 3			
Please note, all facilities listed in Categories 1 and 2 Hurricane Storm Surge are included in Category 3.			
County Owned	Library	$3,918,500	$3,918,500
Underground Storage Tank	Mardela Goose Creek	**$1,500	$1,500
Hurricane Category 4			
Please note, all facilities listed in Categories 1, 2, and 3 Hurricane Storm Surge are included in Category 4.			
County Owned	Housing Authority	$45,700	$26,428,700
	Housing Authority	$45,700	
	Housing Authority	$45,700	
	Cedar Hill Marina & Park	$179,700	
	Youth & Civic Center/Rec, Park & Tourism Offices	$26,111,900	
Fire Department	Sharptown Fire Department	$349,200	$349,200
Medical	Hurdle Health Center /Health Department	$4,249,900	$4,249,900
Police	Salisbury Police Department	$8,124,800	$8,124,800

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
Tower	Verizon	*$175,000	$700,000
	Verizon Wireless	*$175,000	
	Tower	*$175,000	
	Tower	*$175,000	
Above Ground Storage Tanks	Taylor Oil Company, Inc.- Bivalve Plant	**$1,500	$1,500

Source: Smith Planning and Design, Maryland Property View- Parcel Dataset June 2020
**Average cost for a cell tower.*
***Average cost for above and underground storage tanks*

LOSS ESTIMATIONS - MUNICIPAL OWNED

Loss estimates for municipal owned facilities located in the hurricane storm surge inundation areas were assessed. Current assessment values within the City of Salisbury's parcel database were used, while structure improvement values from the most recent Maryland Tax Assessment value were used for the Town of Sharptown.

Table 4.8: Municipal Owned Facilities in Storm Surge Areas

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
Hurricane Category 1 & 2			
Salisbury	Fire Training	$88,433	$88,433
	Port of Salisbury Marina	$125,500	$125,500
Hurricane Category 3			
Please note, all facilities listed in Categories 1 and 2 Hurricane Storm Surge are included in Category 3.			
Salisbury	Parking Garage	$2,224,100	$2,224,100
	Salisbury Zoo	$2,556,000	$2,556,000
Hurricane Category 4			
Please note, all facilities listed in Categories 1, 2, and 3 Hurricane Storm Surge are included in Category 4.			
Sharptown	Sharptown Town Hall	$202,100	$202,100
Salisbury	Fire Training Building	$159,100	$201,700
	Housing Authority	$16,800	
	Housing Authority	$25,800	

LOSS ESTIMATION BY LAND USE – COUNTYWIDE

Loss estimates for the previous planning process were calculated in dollars for all facilities, including community lifelines and public facilities by land use using Maryland Tax Assessment values listed in Table 4.9. This information was reviewed, and new information was included for this plan update in Table 4.10.

Table 4.9: Storm Surge - Loss Estimates for All Facilities by Land Use

Land Use	Loss Estimates by Storm Surge Category			
Hurricane Category	**CAT 1**	**CAT 2**	**CAT 3**	**CAT 4**
Agricultural	6,536,830	8,790,320	17,003,510	29,867,320
Apartments	0	0	192,600	4,867,900
Commercial	0	878,500	2,359,000	21,247,700
Commercial Condominium	0	0	0	954,700
Commercial Residential	0	0	334,000	334,000
Exempt	0	139,000	139,000	1,598,070
Exempt Commercial	473,000	603,100	1,855,000	15,171,200
Industrial	592,500	1,158,300	1,344,200	3,174,300
Marsh Land	35,790	35,790	35,790	35,790
Residential	29,225,480	40,208,990	75,287,690	200,806,740
Residential Condominium	608,400	608,400	1,622,240	8,304,930
Town House	0	0	0	254,910

Source: Maryland Property View and Smith Planning and Design

In determining loss estimations for the 2021 Plan update, structures constructed between 2017 and April 2021 were derived from permit data provided by Wicomico County Permit and Inspections Division. Loss estimates were included for these new structures using Maryland Tax Assessment improvement values. Table 4.10 lists the total number of new structures that have been constructed within the hurricane storm surge inundation areas.

Table 4.10: 2021 Loss Estimates for New Construction by Land Use

Land Use	Loss Estimates			
Hurricane Category	**CAT1**	**CAT 2**	**CAT 3**	**CAT 4**
Agricultural	$0	$0	$0	$0
Commercial	1 structure $145,900	$0	$0	$0
Residential	11 structures $2,767,800	7 structures* $1,332,400	3 structures* $491,000	4 structures $859,600

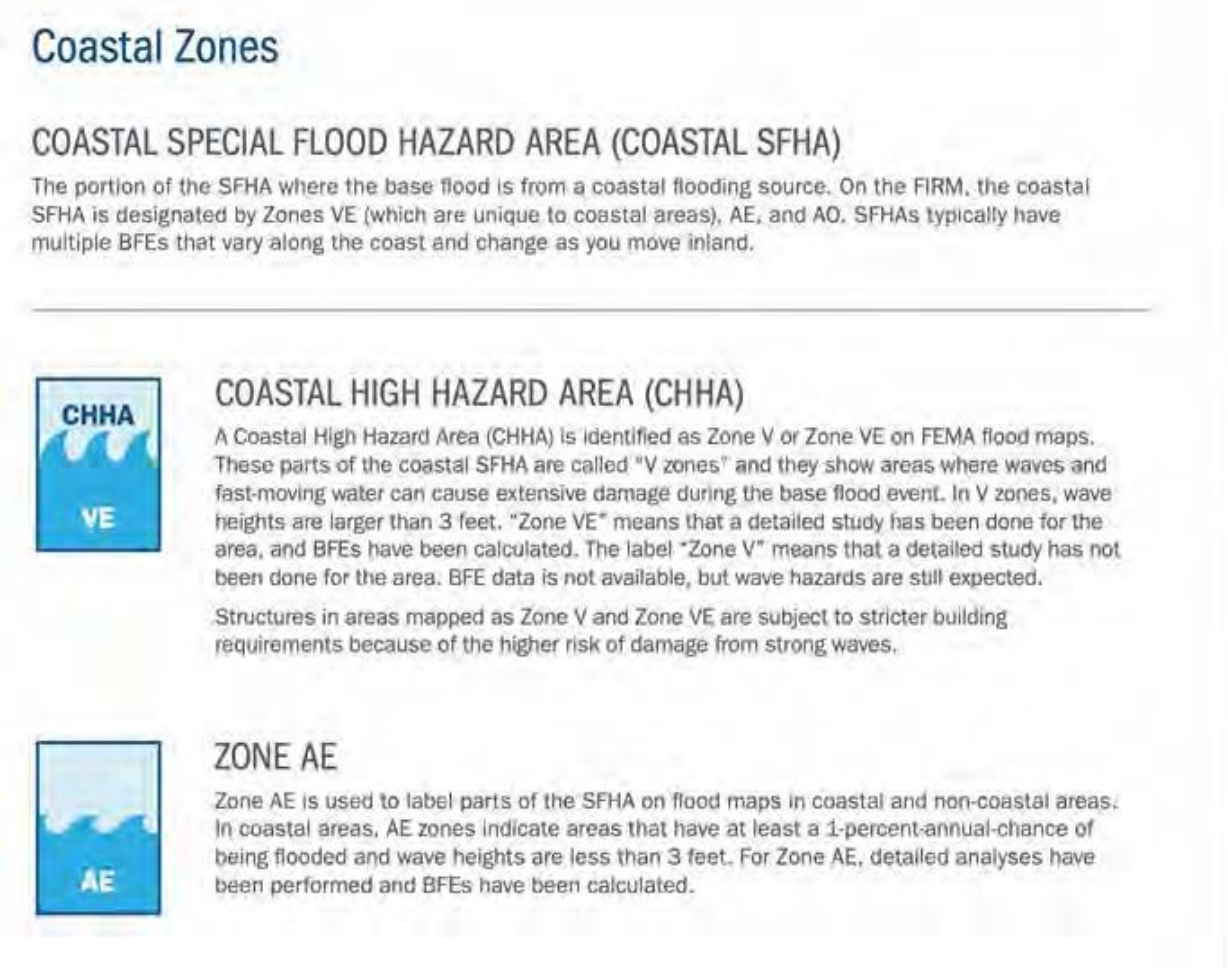
Source: Wicomico County Permit and Inspections Division and Smith Planning and Design
** One new construction is a replacement mobile home.*
Please note, all facilities listed in Categories 1, 2, and 3 Hurricane Storm Surge are included in Category 4.

4.4 COASTAL FLOOD RISK

HAZARD CHARACTERIZATION

A coastal flood, or the inundation of land areas along the coast, is caused by higher-than-average high tide and worsened by heavy rainfall and onshore winds (i.e., wind blowing landward from the ocean); while a flood is a general and temporary inundation of normally dry land areas. When a coastal process such as waves, tides, and/or storm surge produces that flood condition, it is referred to as a coastal flood.

Chapter 8 Flooding included flood zones associated with riverine and flash flooding, whereas, FEMA coastal flood zones are included in this section.



Coastal Zones

COASTAL SPECIAL FLOOD HAZARD AREA (COASTAL SFHA)

The portion of the SFHA where the base flood is from a coastal flooding source. On the FIRM, the coastal SFHA is designated by Zones VE (which are unique to coastal areas), AE, and AO. SFHAs typically have multiple BFEs that vary along the coast and change as you move inland.

CHHA
VE

COASTAL HIGH HAZARD AREA (CHHA)

A Coastal High Hazard Area (CHHA) is identified as Zone V or Zone VE on FEMA flood maps. These parts of the coastal SFHA are called "V zones" and they show areas where waves and fast-moving water can cause extensive damage during the base flood event. In V zones, wave heights are larger than 3 feet. "Zone VE" means that a detailed study has been done for the area, and BFEs have been calculated. The label "Zone V" means that a detailed study has not been done for the area. BFE data is not available, but wave hazards are still expected.

Structures in areas mapped as Zone V and Zone VE are subject to stricter building requirements because of the higher risk of damage from strong waves.

AE

ZONE AE

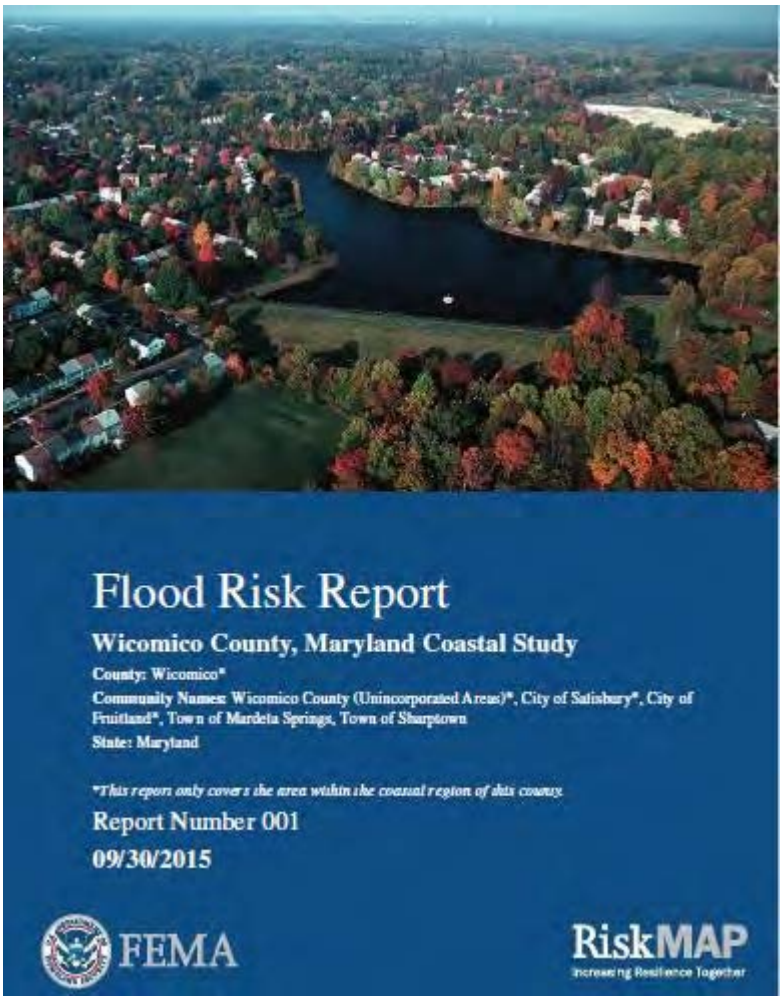
Zone AE is used to label parts of the SFHA on flood maps in coastal and non-coastal areas. In coastal areas, AE zones indicate areas that have at least a 1-percent-annual-chance of being flooded and wave heights are less than 3 feet. For Zone AE, detailed analyses have been performed and BFEs have been calculated.

Source: https://www.fema.gov/sites/default/files/documents/fema_coastal-glossary.pdf

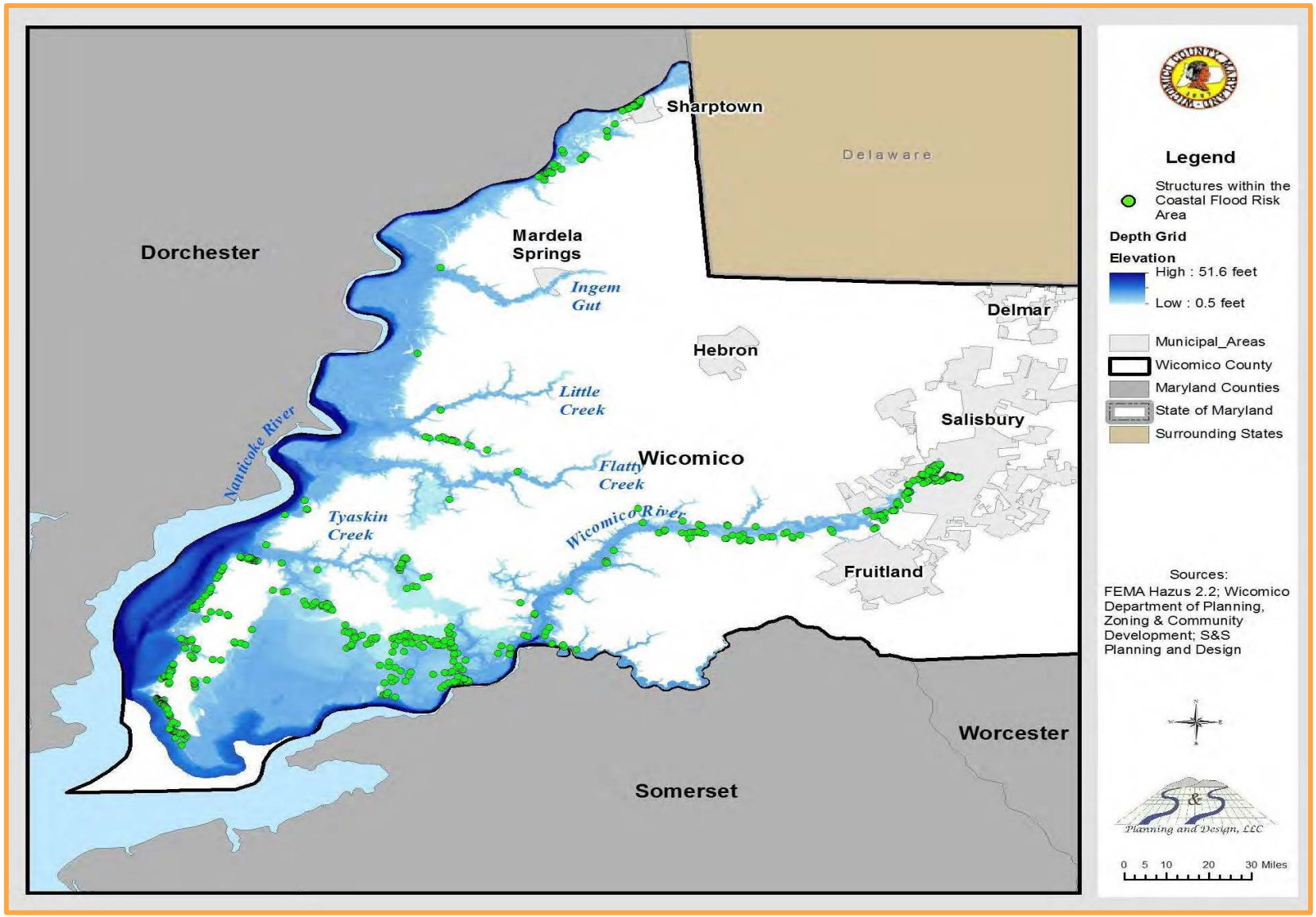
HAZARD RISK & HISTORY

The Maryland Department of Environment (MDE) and Maryland Department of Emergency Management (MDEM) are developing Non-Regulatory Coastal Flood Risk Product for jurisdictions located within the coastal area of the Chesapeake Bay. This planning initiative is intended to assist local communities with increasing their resiliency to flooding and to better protect their citizens. Results are provided in a Flood Risk Report (FRR), which is not intended to be regulatory or the final authoritative source of all flood risk data in the project area. The report is intended to be used in conjunction with other data sources to provide a comprehensive picture of flood risk within the project area.

FEMA's HAZUS program was utilized to determine coastal flood losses for the 1-percent-annual-chance flood event. In order to accurately calculate loss estimates, user defined data was imported into HAZUS for the coastal flood risk product. First, depth grids were developed using the high-resolution digital elevation model (DEM) and FIRM Zones AE and VE with a static base flood elevation (BFE) for the approved Digital Flood Insurance Rate Maps (DFIRM). Flood depths were obtained by subtracting the water surface from the ground elevation; hence depth grids. Next, the user defined facility inventory was developed. User defined inventory includes residential, commercial and other (industrial, agriculture, religion, government and educational). Building footprints were utilized to determine which structures were located within the flood zone. The lowest adjacent grade was determined for each structure within the flood risk area to depict where the flood will be the highest on each structure affected. Additionally, information from the 2012 Maryland Property View Database was incorporated to ensure all necessary attributes were captured in order to obtain more accurate loss estimates. By inputting user defined data and inventory into the HAZUS program, site-to-site results versus an aggregated table of damages and losses is provided. Map 4.3 below depicts the depth grid and user defined structures located within the coastal 100-year floodplain.



Map 4.13: Non-Regulatory Coastal Flood Risk – HAZUS Coastal Analysis



VULNERABILITY

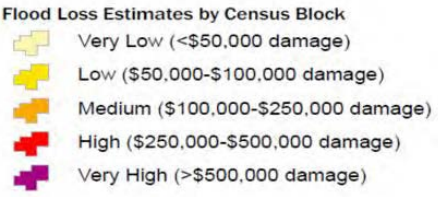
To help coastal communities understand and reduce their risks, FEMA has initiated coastal flood hazard studies. According to the Flood Risk Report developed for Wicomico County in 2015, the coastal flood risk is highest in areas of the county that lie close to the Chesapeake Bay and the Nanticoke and Wicomico Rivers. These areas include the Towns of Mardela Springs and Sharptown, which have the highest percentage of coastal land area, followed by the City of Fruitland. Forty-nine percent of the unincorporated portion of the county's land area is coastal.

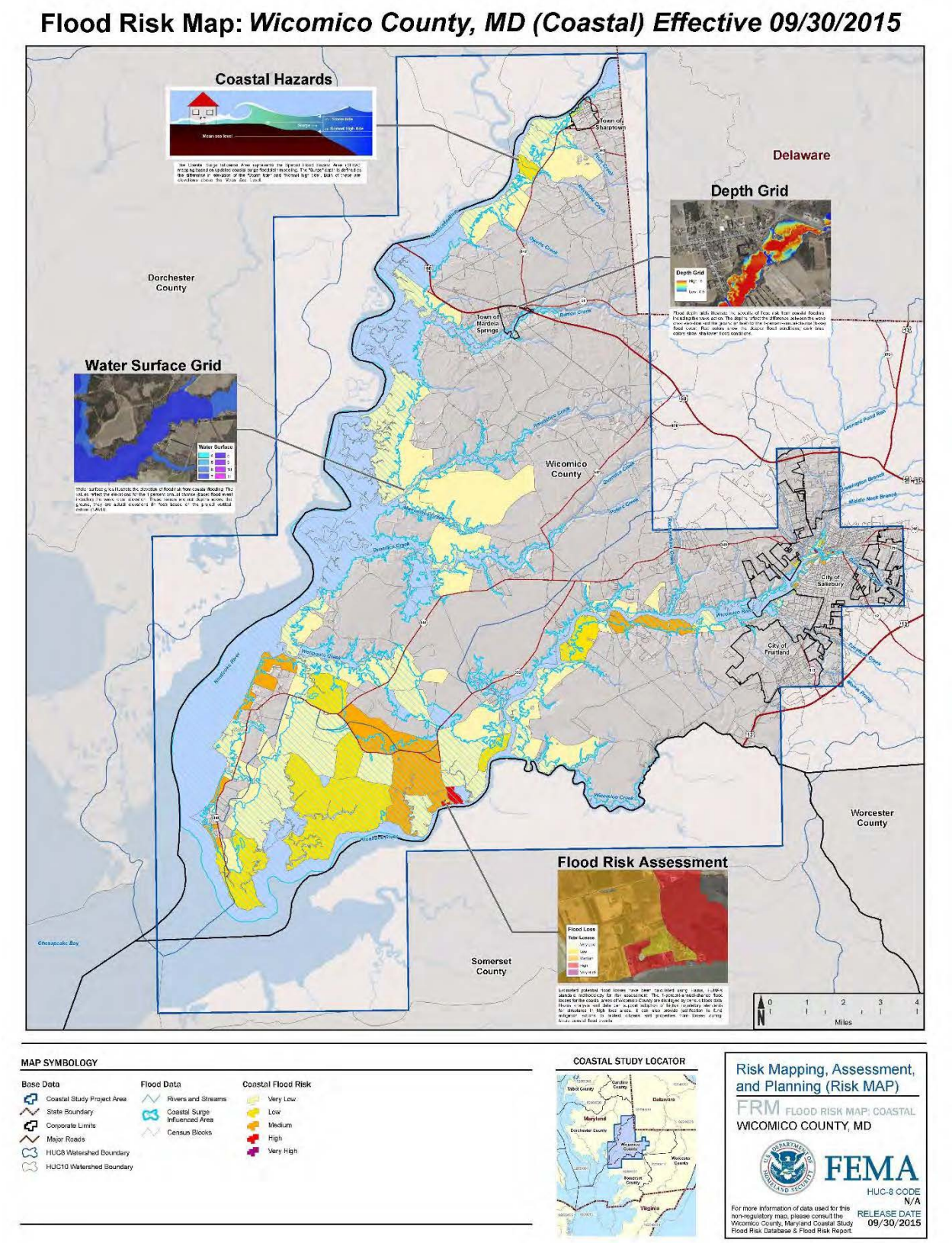
Community Name	CID	Total Community Population[1]	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating
City of Salisbury	240080	30,343	72	13.4	53	Y	10
City of Fruitland	240139	4,866	81	3.8	81	Y	10
Town of Mardela Springs	240079	347	100	0.4	100	Y	10
Town of Sharptown	240081	651	100	0.4	100	Y	10
Wicomico County (Unincorporated Areas)	240078	56,064	51	350.3	49	Y	10

[1]Population according to 2010 U.S. Census

Source: 2015 Wicomico County Flood Risk Report

The Flood Risk Report (FRR) also included a Flood Risk Map. According to the FRR, the Flood Risk Map includes a countywide map of estimated flood losses by census block and summary tables for the entire project area, and a series of maps for High-Risk Areas (places in the county that have a large amount of flood damage in a concentrated area). High-Risk Areas are created by grouping together adjacent Census Blocks with high flood loss estimations. As shown below on the Flood Risk Map for Wicomico County, the area around the community of Whitehaven was denoted in red as the High-Risk Area.



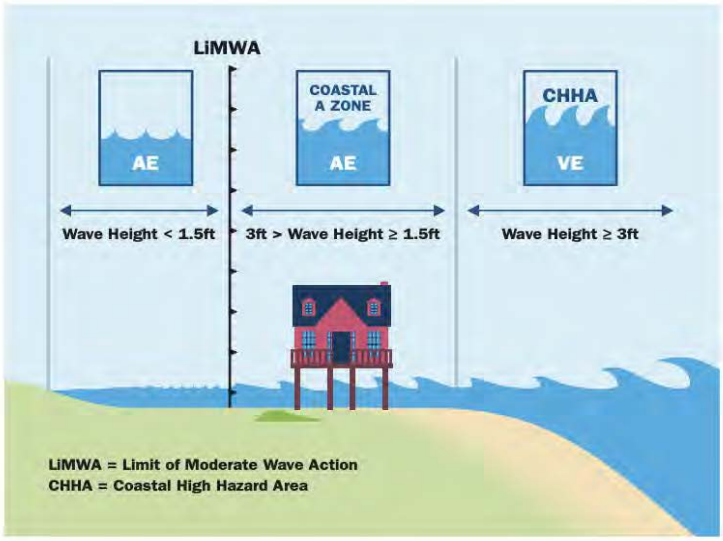


Source: 2015 Wicomico County Flood Risk Report

In addition to coastal flood, Wicomico County also has Limit of Moderate Wave Action (LiMWA). This information line is located along the coastal area and marks the inland limit of the Coastal A Zone. FEMA's LiMWA Fact Sheet states that due to the higher risk of wave damage to structures in the Coastal A Zone, FEMA encourages communities to apply VE Zone floodplain managements standards in this area.

Limit of Moderate Wave Action (LiMWA)

Flood maps in coastal areas may include a line called the Limit of Moderate Wave Action (LiMWA). The LiMWA marks the inland limit of the "Coastal A Zone," a term referenced by building codes and standards. The Coastal A Zone is the part of the coastal SFHA where wave heights can be between 1.5 and 3 feet during the base flood event. Because of the higher risk of damage to homes and other structures from waves in the Coastal A Zone, FEMA encourages the practice of building to Zone V standards within this area. Many local building codes require that buildings in the Coastal A Zone be built to Zone V standards. However, the LiMWA does not impose any additional National Flood Insurance Program (NFIP) regulations.



The Limit of Moderate Wave Action (LiMWA) is depicted below. Several communities are in close proximity to the LiMWA including Bivalve, Jesterville, Nanticoke, Waterview, Clara, and Whitehaven. The community of Whitehaven was also determined to be in the High-Risk Area in the Flood Risk Report.

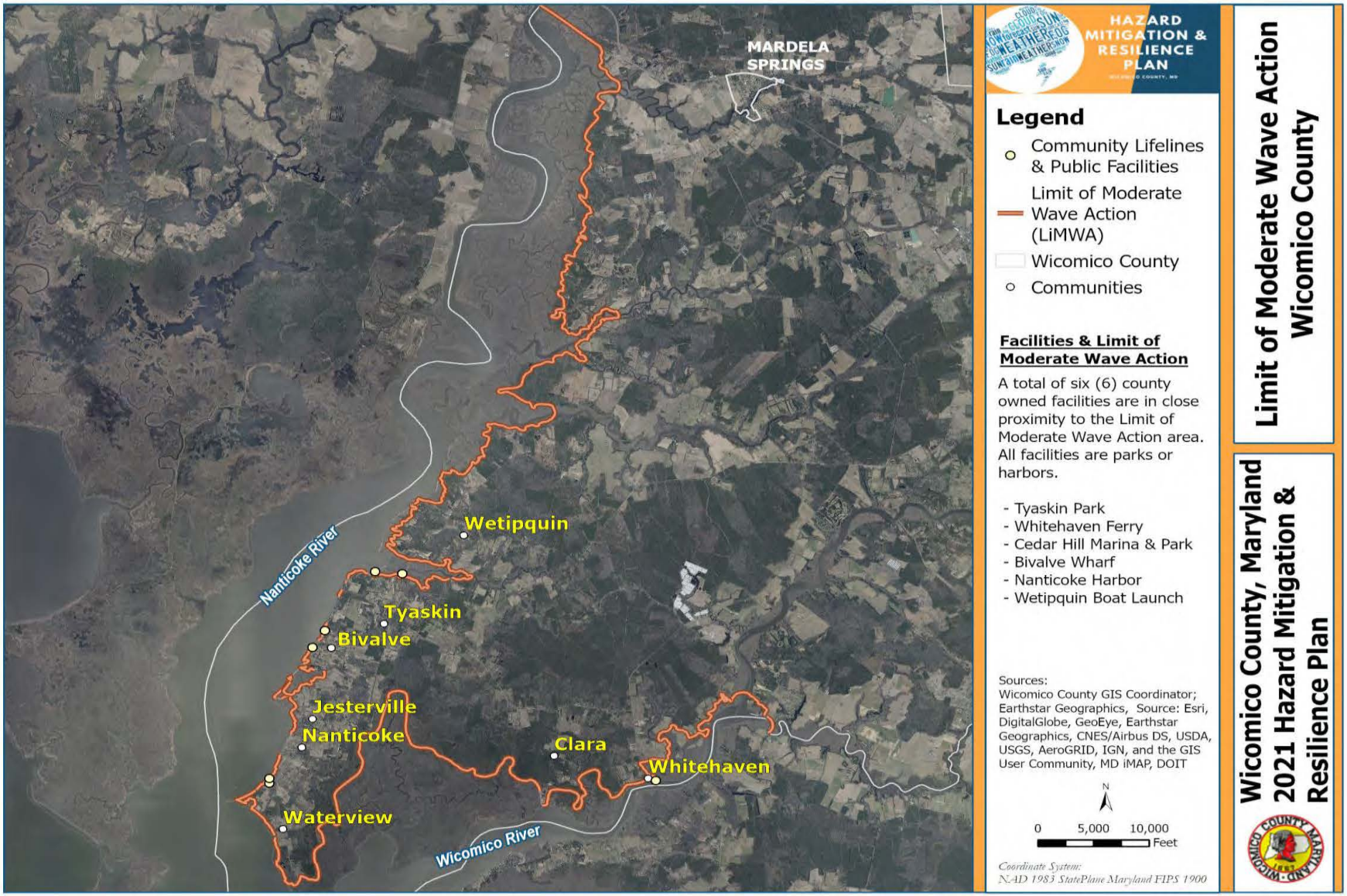
Several public facilities (county owned) are located within or next to the LiMWA. These facilities are parks and include accommodations for boats. Only two (2) county owned facilities contain structures located between the shoreline and the LiMWA and included:

- Tyaskin Park (1 structure - pavilion); and,
- Whitehaven Ferry (1 structure and pier).

The following public facilities are within or in close proximity to the LiMWA, however do not have structures within the LiMWA.

- Cedar Hill Marina & Park (structure just outside of LiMWA);
- Bivalve Wharf (pier);
- Nanticoke Harbor (two boat ramps, loading ramp, and 68 boat slips); and,
- Wetipquin Boat Launch (boat ramp).

Map 4.14: Limit of Moderate Wave Action

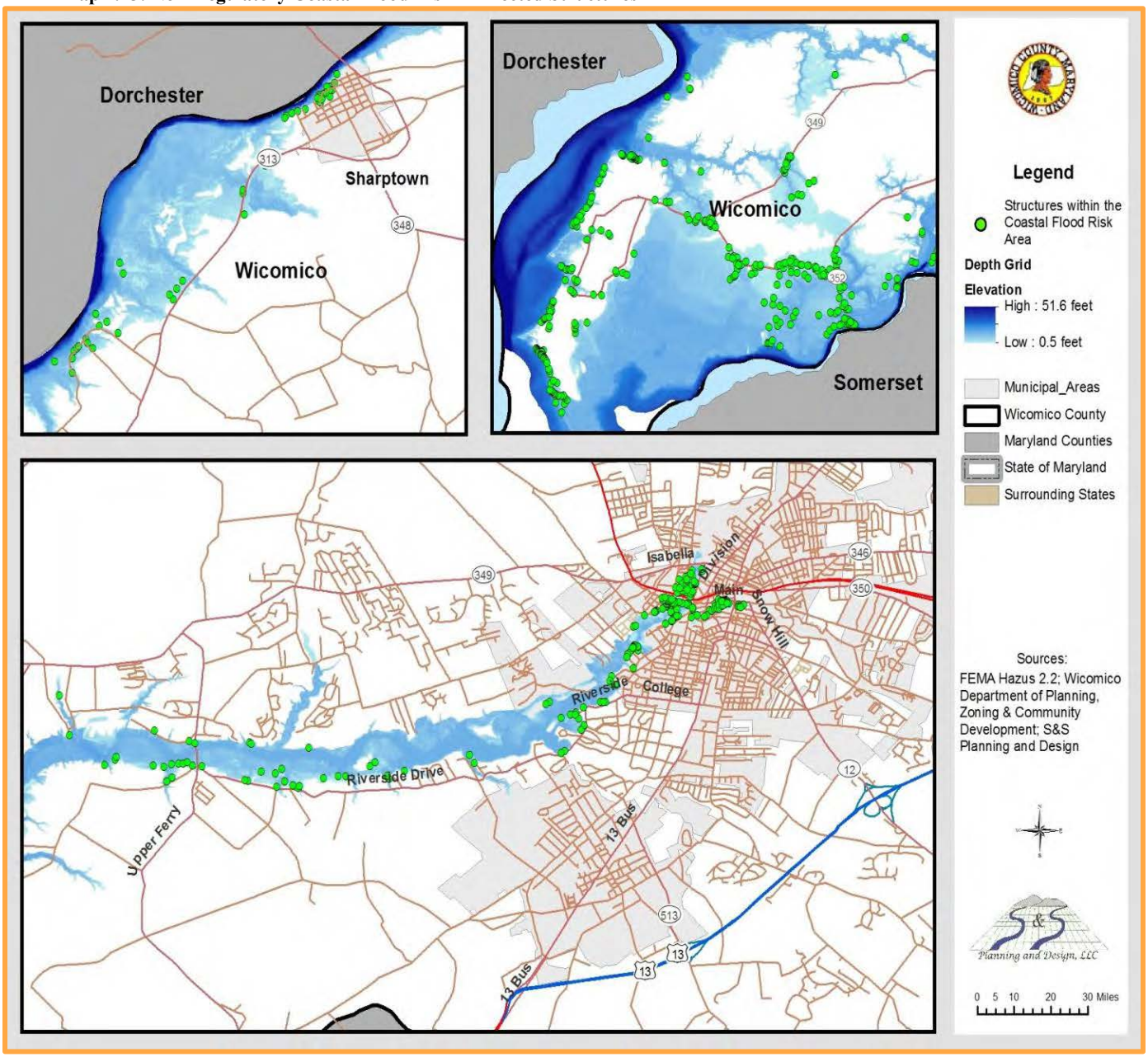


FACILITIES AT-RISK

1. Non-Regulatory Coastal Flood Risk Product

A total of 619 structures are located within the coastal flood zone. As depicted in Map 4.15, affected structures are concentrated in three locations: Town of Sharptown, City of Salisbury and the unincorporated southwestern portion of the County. The Town of Sharptown comprises 3% of structures located within the coastal floodplain, while the City of Salisbury contains 25% and the remaining 72% are within the unincorporated areas of the County. A total of 516 structures affected by coastal flooding are residential. The remaining structures are comprised of structures such as commercial, industrial, etc.

Map 4.15: Non-Regulatory Coastal Flood Risk – Affected Structures



LOSS ESTIMATIONS

The Non-Regulatory coastal flood risk analysis incorporates results from a HAZUS Coastal Flood analysis which accounts for newly modeled areas in the Coastal Flood Risk Project and newly modeled depths for the 1-percent-annual-chance flood event. Potential losses were compared with state-level tax data and locally provided building footprints to estimate loss estimations for the 1-percent-annual-chance flood scenario. The following tables provide the overall cost of structures within the flood prone areas and their associated loss estimates.

Table 4.11: Non-Regulatory Coastal Flood Risk – User Defined Facilities within Affected Area

Political Area	Total Cost	Total Residential Cost	Total Commercial Cost	Total Other Cost
Wicomico County Unincorporated Areas	$95,771,000.00	$92,601,200.00	$2,308,000.00	$861,800.00
Town Of Delmar	$0.00	$0.00	$0.00	$0.00
Town Of Fruitland	$0.00	$0.00	$0.00	$0.00
Town Of Hebron	$0.00	$0.00	$0.00	$0.00
Town Of Mardela Springs	$0.00	$0.00	$0.00	$0.00
City Of Salisbury	$62,149,200.00	$15,604,200.00	$4,505,800.00	$21,978,200.00
Town Of Sharptown	$2,620,400.00	$2,582,200.00	$38,200.00	$0.00
Town Of Pittsville	$0.00	$0.00	$0.00	$0.00
Town Of Willards	$0.00	$0.00	$0.00	$0.00
Wicomico County, Maryland Coastal Study	**$160,540,600.00**	**$110,787,600.00**	**$6,852,000.00**	**$22,840,000.00**

Source: FEMA HAZUS

Note: Municipalities containing $0.00 value losses did not contain structures within the coastal risk area according to the HAZUS model. Both Fruitland and Mardela Springs contain areas of risk, however these risk areas are 3.8 and 0.4 square miles, respectively. Refer to Appendix J – Non-Regulatory Coastal Flood Risk Product, page 25.

Table 4.12: Non-Regulatory Coastal Flood Risk – Loss Estimations

Political Area	Total Cost	Total Residential Cost	Total Commercial Cost	Total Other Cost
Wicomico County Unincorporated Areas	$7,068,228.00	$6,109,036.00	$518,629.00	$115,173.00
Town Of Delmar	$0.00	$0.00	$0.00	$0.00
Town Of Fruitland	$0.00	$0.00	$0.00	$0.00
Town Of Hebron	$0.00	$0.00	$0.00	$0.00
Town Of Mardela Springs	$0.00	$0.00	$0.00	$0.00
City Of Salisbury	$3,320,396.00	$695,004.00	$2,056,446.00	$568,946.00
Town Of Sharptown	$188,280.00	$177,818.00	$10,462.00	$0.00
Town Of Pittsville	$0.00	$0.00	$0.00	$0.00
Town Of Willards	$0.00	$0.00	$0.00	$0.00
Wicomico County, Maryland Coastal Study	**$10,576,904.00**	**$6,981,858.00**	**$2,585,537.00**	**$684,119.00**

Source: FEMA HAZUS

4.5 NUISANCE FLOODING

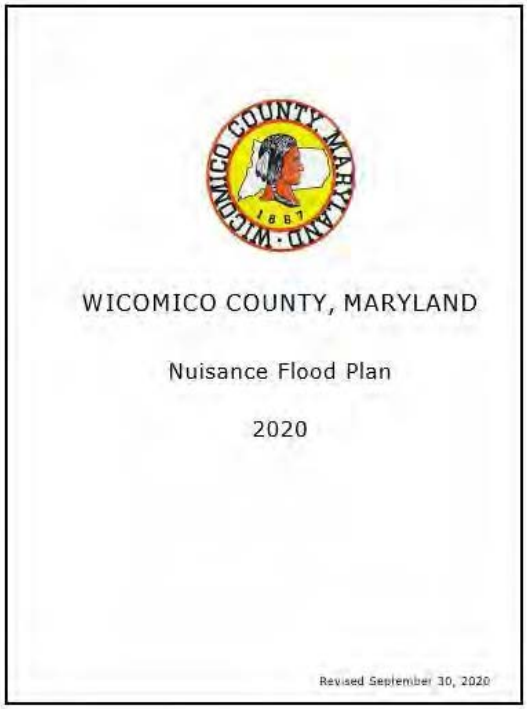
HAZARD CHARACTERIZATION

Nuisance flooding is defined in §3-1001 of the Natural Resource Article of the Maryland Annotated Code as "high-tide flooding that causes public inconvenience."

Nuisance flooding is associated with high tides that flow back through the stormwater system, increasing/raising the level of groundwater, and overtopping the banks and edges of waterways. Nuisance flooding is an indicator of rising water levels in the Chesapeake Bay and its tributaries. Areas that were previously dry now flood during high tides because the water elevation is high enough to lap over the banks of waterways and to enter stormwater systems through outfalls that were previously high enough to prevent backflow, while allowing outflow.

HAZARD RISK & HISTORY

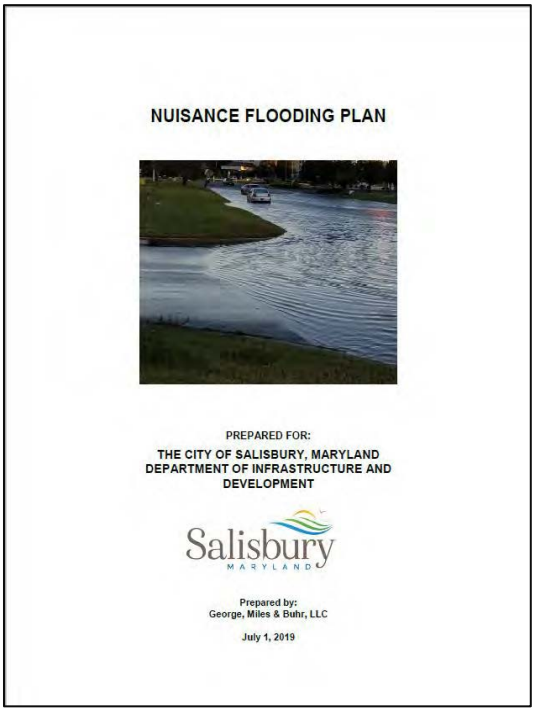
Maryland Senate Bill (SB) 1407 states that "on or before October of 2020, a local jurisdiction that experiences nuisance flooding shall develop a plan to address nuisance flooding." The legislation further specifies that the plan must be submitted to the Maryland Department of Planning, published on the local jurisdiction's website, and updated at least every five years. Wicomico County's Nuisance Flood Plan was revised in September 2020 and was approved by the State. In addition, the City of Salisbury Nuisance Flooding Plan was published July 1, 2019.



Wicomico County is a coastal community located in southeastern Maryland on the Delmarva Peninsula. The City of Salisbury is the only municipality that experiences tidal nuisance flooding, and as such a separate Nuisance Flood Plan was developed. Both nuisance flood plans were reviewed and integrated for this plan update.

VULNERABILITY

Areas of nuisance tidal flooding vulnerability were identified in both the 2020 Wicomico County Nuisance Flood Plan (WCNFP) and the 2019 City of Salisbury Nuisance Flooding Plan. According to the WCNFP, only unincorporated areas of the county and the City of Salisbury experience tidal nuisance flooding.



Sources of Flooding

According to the 2020 WCNFP, Wicomico County is bordered on three sides by waterways – to the west by the Nanticoke River, to the south by the Wicomico River and Wicomico Creek, and to the east by the Pocomoke River. The latter water source is so close to its headwaters that it is not tidally influenced. However, the Nanticoke and Wicomico Rivers are occasional sources of nuisance tidal flooding. Nuisance tidal flooding impacts are associated with repetitive roadway flooding. Wicomico County has identified roadways subject to nuisance flooding, most of which are located in rural areas, as discussed in the Wicomico County Nuisance Flood Plan and Comprehensive Plan.

The plan states that Wicomico County has mostly minor flooding from extreme high tides, with some moderate flooding during lunar events. Major flooding can occur during any weather event that pushes water up the Chesapeake Bay, such as a circulating "nor'easter" storm or a strong south-southwest wind. When water levels rise within the Chesapeake Bay, a similar effect is experienced within the Wicomico and Nanticoke Rivers and their tributaries. A positive aspect of tidal flooding is that it recedes within hours of the peak high tide.

March 7, 2018- Salisbury's Field Operations placed hazard signs and barricades along flooded roads across the city.

Photo Credit: Jennifer Isacoff
Source: https://wicoclimate.weebly.com/flooding--infrastructure.html#floodinginfrastructure

According to City of Salisbury Nuisance Flooding Plan, the area subject to nuisance flooding is the floodplain near the confluence of both the North and South Prongs of the Wicomico River. This area was separated into three (3) areas of interest due to the geographical nature of the overall area being discussed.

The plan states that these areas all have a direct connection to the Wicomico River with very little topographic relief. Tidal fluctuations and the resulting tailwater conditions have a direct impact on the storm drain capacity throughout the entire area of interest.

Furthermore, some high tide events can cause flooding in some areas, even without any associated rainfall.

Levels of Nuisance Flooding

During the development of the WCNFP, staff from various departments met to identify and review nuisance tidal flooding issues. As part of the development of the WCNFP, different levels of nuisance flooding were identified and defined, as follows:

- Minor Flooding – Less than 6" of water in the roadway that recedes within 6 to 12 hours
- Moderate Flooding – 6" to 2' of water in the roadway that recedes within 6 to 12 hours
- Major Flooding – greater than 2' of water in the roadway that recedes within 6 to 12 hours

Levels of nuisance flooding were not identified in the City of Salisbury Nuisance Flooding Plan.

FACILITIES AT RISK

Following the identification of areas vulnerable to nuisance tidal flooding, facilities at risk for both Wicomico County and the City of Salisbury were assessed. Facilities at risk due to nuisance tidal flooding including transportation routes and are considered a community lifeline. These transportation routes are listed in both plans and those listings have been integrated into this plan section.

Wicomico County

During the nuisance flood plan development, several roads were identified as experiencing nuisance tidal flooding based on staff experience and other available tools, including:

- Tide charts for Roaring Point (Nanticoke) and Whitehaven available from the Maryland Department of Natural Resources.
- Readings from the NOAA/NOS/CO-OPS observed water levels at flood gauge number 8571421 located in Bishops Head, Maryland.

Wicomico County has identified the following flood depths for each level of flooding.

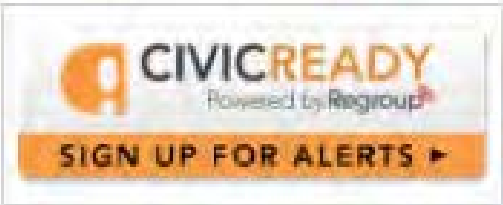
- **Minor Flooding**
  approximately 1.5' to 2.0' high tide
- **Moderate Flooding**
  approximately 2.0' to 2.8' high tide
- **Major Flooding**
  approximately greater than a 2.8' high tide

Bishops Head, MD - Station ID: 8571421

Source: NOAA Tides & Currents https://tidesandcurrents.noaa.gov/stationhome.html?id=8571421

Wicomico County will monitor tidal flooding events that occur over the next five years and refine tide depths and levels of flooding, as appropriate.

In addition, the Department of Public Works will monitor road conditions and, when appropriate, place high water signs and re-route traffic if flooding reaches hazardous levels. The Department of Emergency Services will alert the public to impending nuisance tidal flooding issues via social media, emergency alerts and other means outlined in the Wicomico County Emergency Operations Plan.



A total of sixteen (16) roadways, community lifeline – transportation, were identified in Nuisance Flood Plan as experiencing nuisance tidal flooding and are shown in the following table.

Table 4.13: Roads Identified as Experiencing Nuisance Tidal Flooding

Road Name/Flood Source	Location Of Flooding	Comments
Clara Road, Tyaskin Wicomico River and tidal ditches	Worse flooding occurs south of Mezick Road; however, occasional minor tidal flooding can occur along the length of Clara Road due to tidal ditches.	Minor collector road. Mitigation efforts are planned. See additional comments in the Mitigation Efforts section of the Nuisance Flood Plan.
Cove Road, Tyaskin Nanticoke River	Final approximately 1,000 feet of the road as it reaches the Nanticoke River.	Minor collector road. Moderate tomajor flooding can occur during extreme tidal events.
Deep Branch Road, Quantico Tyaskin Creek	At the bridge	Minor collector road. Moderate flooding can occur during extreme tidal events. The road would have to be raised significantly in order to mitigate the flooding.
Harbor Road, Nanticoke Nanticoke River	Parking lot and road near boat ramp	Local road. Minor flooding occurs in this area from an unprotected beach area and a boat ramp.
Muddy Hole Road, Tyaskin Broad Creek, Muddy Hole Creek, and various tidal tributaries of the Wicomico River	Entire length	Minor collector. This is primarily an unimproved road running through tidal marshlands. A new bridge was built over Broad Creek several years ago, and continued maintenance has only kept the road passable in some areas. No significant improvements are planned due to the lack of residences along this unimproved road.
Nanticoke Drive, Nanticoke Nanticoke River and tidal ditches	Near community park and at the end of the cul-de-sac	Local road. Mitigation efforts have occurred with more planned. See additional comments in the Mitigation Efforts section of the Nuisance Flood Plan.
Nanticoke Road, Waterview Nanticoke River, tidal ditches and marshes	Several locations near Waterview	This is a State Road, and it is unlikely that mitigation efforts will occur since this road serves only a small number of residences in this section.
Riverside Drive, Salisbury Stock Creek	Where tidal creek crosses Riverside Drive	Major collector. Only minor occasional nuisance flooding.
Riverton Road, Riverton Nanticoke River and tidal ditches	Near Old School House Road	Minor collector. This area has minor flooding on high and lunar tides and can experience moderate to major flooding during extreme tidal events. There is no bulkhead or rip rap along the Nanticoke River in the area; there is a tidal ditch which runs along theroad; and ground elevations are only approximately two to four feet.
Town of Whitehaven – Church Street, River Street and Whitehaven Road Wicomico River and tidal ditches and marshes	All three roads in the town flood repeatedly on high and lunar tides,with the worst flooding occurring on River Street and Whitehaven Road.	Whitehaven Rd. is major collector.Other roads are local roads. Mitigation efforts have occurred with more planned. See additional comments in the Mitigation Efforts section of the Nuisance Flood Plan.

Road Name/Flood Source	Location Of Flooding	Comments
Trinity Church Road, Tyaskin Muddy Hole Creek and tidal ditches	Various places along the road	Minor collector. Raising the road may help. This is a rural road serving only a couple residences.
Tyaskin Road, Tyaskin Nanticoke River	Park and Parking Lot at the end of the road	Minor road. Nuisance flooding occurs occasionally in the park area.
Upper Ferry Road, Eden Wicomico River and tidal ditches	Near the ferry and for about 200 feet	Major collector. The elevation of the road is only about 1.5' to 2.5' above sea level and there is a tidal ditch running along the road. With the ferry, elevating the road would be difficult.
Wetipquin Road, Tyaskin Wetipquin Creek	At the bridge	Minor collector. There is minor to moderate flooding occurring on both sides of the bridge from high and lunar tides. The road would have to be raised.

According to the WCNFP, two of the roads noted above – Upper Ferry Road and Whitehaven Road – lead to vehicular ferries providing transportation across the Wicomico River. These routes are used daily by commuters from the west side of Wicomico County who work in Somerset County – especially those working at Eastern Correctional Institution or working or attending the University of Maryland Eastern Shore (UMES). They are also popular routes for tourists and bicyclists.

The ferries are vulnerable to high tides and often have to cease operation during peak hours of a higher-than-normal tide. During a 2012 study, it was determined that the two ferries were closed 21 times during a 60-day period due to high tides. The closings are often only for an hour and a half to two hours, but these closings can cause serious headaches for residents depending upon the ferries for travel to work and school. Detours around the ferries are time-consuming.

City of Salisbury

Area 1 is below the confluence along the main section of the river down to where Mitchell Pond enters the Wicomico River. It includes Fitzwater Street and West Main Street on the north bank and a portion of Riverside Drive on the south bank. The Fitzwater Street area has been subject to chronic flooding events. The Germania Circle neighborhood has also seen persistent flooding.

Area 1: Fitzwater Street
Source: Google StreetView

Area 2 is located along the South Prong and is bound to the east by a dam just beyond Snow Hill Road and includes a fair portion of downtown Salisbury. East Main Street, West Market Street, East Market Street, Baptist Street, and Poplar Hill Road are all within this area.

Area 3 is located along the North Prong of the Wicomico River and is bound to the north by Johnson Dam. Portions of Lake Street and Mill Street are included within the outlined area.

Area 2: West Main Street
Source: https://www.wmdt.com/2019/10/roads-flooded-closed-in-downtown-salisbury/

4.6 RECENT MITIGATION EFFORTS

WICOMICO COUNTY

The 2020 Wicomico County Nuisance Flood Plan provided recent mitigation efforts. The following mitigation efforts are excerpts from the plan.

1. **Clara Road**
   The road serves residences and one seasonal business. That portion of the road south of Mezick Road is the sole evacuation route for the approximately 10 residences and one seasonal business located in that section. The Department of Public Works is planning to clean out the ditches and culverts for the last 2,000 feet of road before it meets the Wicomico River to assist the tidal waters in receding faster. That project is expected to begin in the Fall of 2020. Raising the road may also assist with nuisance tidal flooding. The County will continue to monitor tidal flooding events along this road following the ditch and culvert clean-out project to determine if further mitigation efforts are feasible.

2. **Nanticoke Drive**
   This local road runs along the Nanticoke River in the community of "Nanticoke Acres". There are primarily two areas along the road experiencing minor flooding during high and lunar high tides, with moderate to major flooding occurring during extreme high tides and high wind events. The tidal ditch at the park has filled in with silt. Bushes and trees have grown, reducing the ditch's capacity to allow flood waters to recede back to the Nanticoke River. The Department of Public Works has contacted the Homeowners Association and requested the clean out of the ditch along the community park, the County will ditch along Nanticoke Drive and replace failed driveway culverts so tidal waters can flow out to the Nanticoke River quicker. There are two repetitive loss properties which are affected by this tidal ditch, so mitigation is a priority.

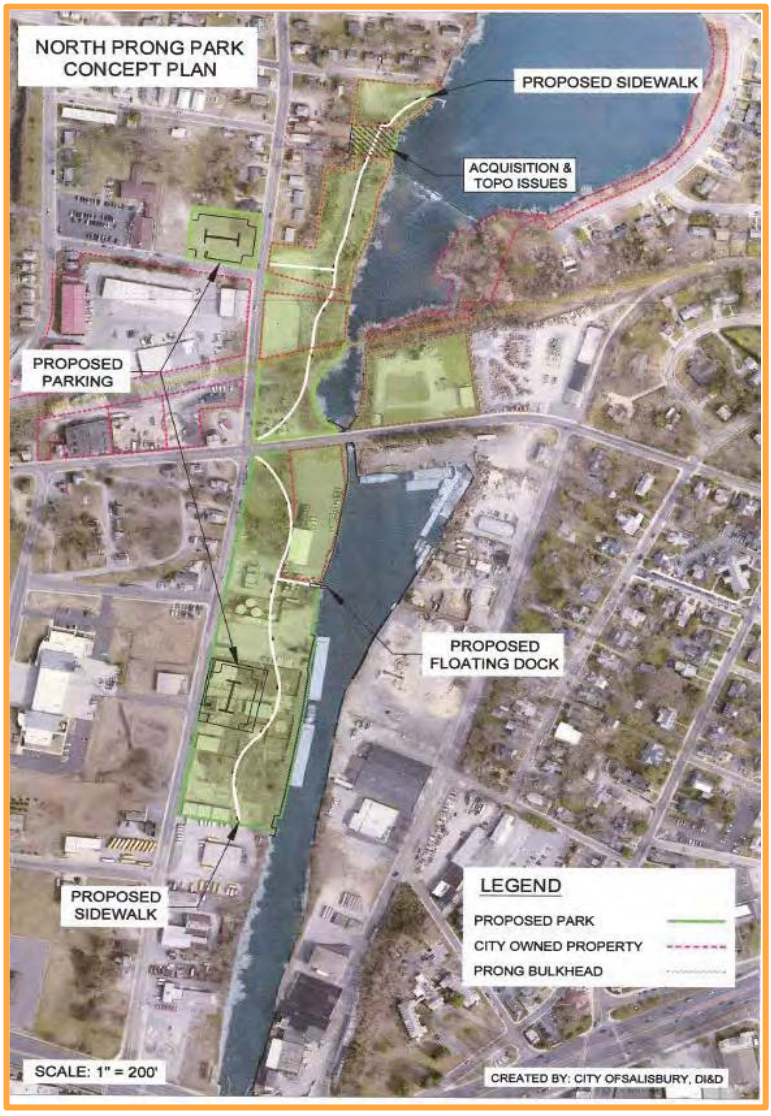
3. **Town of Whitehaven – Church Street, River Street and Whitehaven Road**
   The entire historic town of Whitehaven is vulnerable to tidal flooding from the Wicomico River, tidal ditches to the east and west, as well as the tidal marsh to the east. There is a significant tidal ditch running along Whitehaven Road which has been responsible for minor flooding of that road during high tides, moderate flooding during lunar tides, and major flooding during extreme and storm events. Along River Street there are two drainage outlets which backwash with water during high tides, creating minor to moderate flooding. Further down River Street, there is no bulkhead at the intersection with Church Street and the River is able to wash over the narrow land, adding to the backwash from the outlet located nearby. Due to the complexity of the flooding issues, the County contacted the Army Corp of Engineers for assistance. A planning study was completed, and a final report was received in September 2020. Once the report has been reviewed by County officials, a meeting with the town's residents will be held to discuss possible courses of action to reduce flooding within Whitehaven. Mitigation efforts are necessary in order to protect this historic town and ferry from rising sea levels and increased tidal events. There are repetitive loss properties within Whitehaven, so mitigation is a priority.

CITY OF SALISBURY

Current mitigation efforts for the North Prong Park and the City-wide I/I Study are detailed in the Nuisance Flood Plan. The city is also evaluating the tide gates and is participating in a pilot program, which will address the concern of the tide gates function in low head situations. The City is also partnering with Sharp Energy's property owner to provide temporary stormwater storage within the watershed where the tide gates are located.

The North Prong Park was included in the Downtown Salisbury Master Plan. The Park project would remove vulnerable properties from the floodplain, provide open space, and provide some mitigation benefit by allowing the area to be inundated during flood events.

A City-wide Infiltration/Inflow (I/I) Study began in 2016 for approximately 155 miles of sewer mains and 3,200 manholes in their system. The study continued through 2020 with remedial construction slated through 2022. According to the Nuisance Flooding Plan, the inflow portion of this work will yield direct benefits to the city in protecting both their mains and the treatment plant from nuisance flooding.



Concept Design of the North Prong Park
Source: 2019 City of Salisbury Nuisance Flooding Plan

4.7 CONCLUSION

Review of the various vulnerability assessments conducted and presented within this chapter indicates that the jurisdictions that are most vulnerable to coastal storm hazards include the City of Salisbury, Town of Sharptown, and the unincorporated southwestern portion of the county. One particularly notable community lifeline at risk to coastal storm hazards is the Salisbury Fire Station No. 16. This facility was identified in both the Category 2 Storm Surge and Coastal Flood risk vulnerability assessments. Finally, there are several marinas/docks and underground storage tanks located within both storm surge and coastal flood risk areas. Many of these facilities are located within or near the City of Salisbury.

Whitehaven was determined to be the High-Risk Area in the Flood Risk Report. This area is also located between the shoreline and the mapped Limit of Moderate Wave Action (LiMWA). The Nuisance Flood Plan noted this community as a high-risk for flooding.

According to the permit data provided by Wicomico County Permit and Inspections Division, several mobile homes within the floodplain and storm surge areas have been removed, however both were replaced.

Finally, both the County and City of Salisbury have completed Nuisance Flood Plans. These documents have identified areas of tidally influenced nuisance flooding. Information from these plans are included in Chapter 14 Mitigation Strategies.

CHAPTER 5 – CLIMATE CHANGE

Updates to the Wicomico County Chapter 5 – Climate Change included the following:

- Updated chapter with information from 2020 Annual Report of the Maryland Commission on Climate Change (MCCC)
- Updated chapter with information from 2030 Greenhouse Gas Emissions Reduction Act (GGRA) Plan
- Update solar panel permit data from the Wicomico County Permit & Inspections Division
- Updated chapter with information from July 2020 Center for Disease Control (CDC) Climate and Health Program
- Added new Plan Integration Section

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

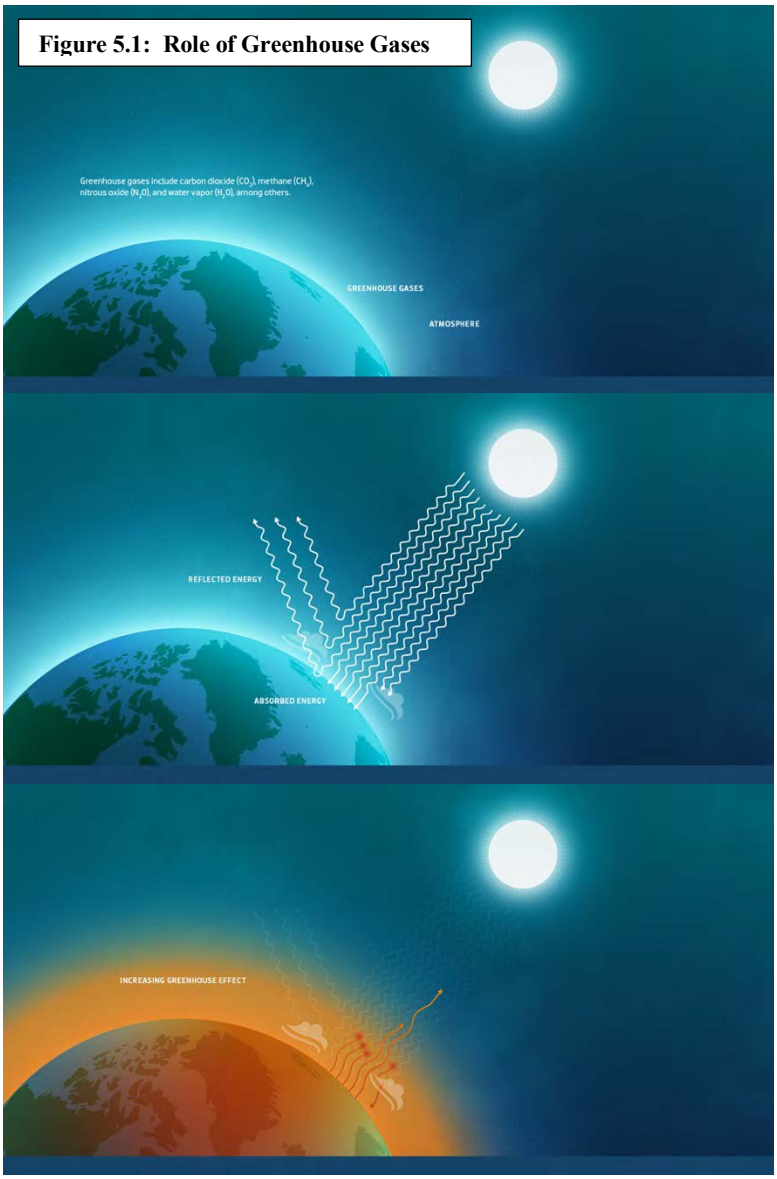
CHAPTER 5 – CLIMATE CHANGE

5.1 HAZARD CHARACTERIZATION

According to the Environmental Protection Agency (EPA), Climate change is caused by both natural and human factors. Natural factors include earth's orbit, solar activity or volcanic eruptions. The major human factor affecting climate change is the accumulation of greenhouse gases in the atmosphere. The earth's temperature is a balance between energy being absorbed (heating) and released (cooling). Greenhouse gases (GHG) cause heat to be retained, therefore prohibiting energy to be released and allowing the earth to cool. According to the EPA, most of the observed warming since the mid-20th century is attributed to human-induced greenhouse gas emissions.

Figure 5.1 illustrates how greenhouse gases are absorbing the energy emitted from the earth's surface, preventing heat from escaping, hence causing the energy to be re-emitted and warming the earth's surface.

Figure 5.1: Role of Greenhouse Gases



Source: www.epa.gov/climatechange/science/causes.html

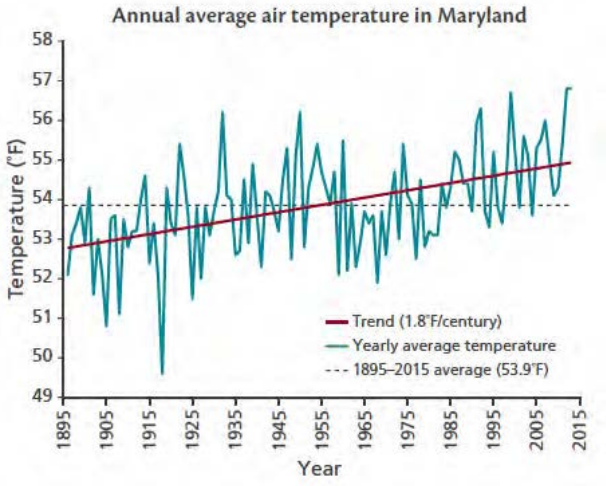
5.2 HAZARD RISK & HISTORY

In April of 2016, the Greenhouse Gas Emissions Reduction Act – Reauthorization (GGRA of 2016) was signed into law. Expanding on the requirements of the original GGRA (2009), the new law mandates the state to achieve a minimum of a 40% reduction in statewide greenhouse gas emissions from 2006 levels by 2030. In order to achieve this goal, MDE developed a statewide GHG reduction plan entitled the 2030 Maryland Greenhouse Gas Reduction Plan (2030 GGRA Plan).

The Executive Summary of the 2020 Annual Report of the Maryland Commission on Climate Change (MCCC), states that the Intergovernmental Panel on Climate Change (IPCC) concluded that "human drivers, including GHG emissions, are extremely likely to have been the dominant cause of the observed warming since the mid-20th century, recently estimating that human

activities have contributed to approximately 1.8 degree Fahrenheit of global warning above pre-industrial levels, particularly the emission of heat-trapping GHG's into the atmosphere."

Long-term temperature data show that average temperatures in Maryland have risen in the last century and will continue to rise in the future (NOAA, NCEI). Marylanders around the State are already noticing warmer winter days, more intense heat and humidity in the summer, and increased damage due to storms.



According to the Maryland Department of Natural Resources (MD-DNR), over the next century (100-years), Maryland expects increased winter-spring precipitation and run-off, warmer air and water temperatures, and relative sea level rise of approximately 3.7 feet, http://www.mdsg.umd.edu/news/scientists-unveil-new-projections-sea-level-rise-maryland. Coastal areas are predicted to experience approximately 2.1 feet of seal level rise by the year 2050. One hundred years of data confirms that Maryland is warming on average by 1.8 degrees Fahrenheit and by as much as 3.6 degrees Fahrenheit in the winter. Wetter conditions have become prevalent in March and September, while July and August have become drier. These trends will impact the success and efficiency of restoration practices along Maryland's dynamic coast.

According to the *July 2020 Center for Disease Control (CDC) Climate and Health Program*, the health impacts from climate change in the Northeastern United States include:

- Temperature-Related Death and Illness;
- Extreme Events;
- Water-Related Illness;
- Food Safety, Nutrition and Distribution;
- Mental Health and Well-Being; and,
- Populations of Concern.

The Maryland Department of Health is a CDC funded jurisdiction since 2012 and is a Climate-Ready States and Cities Initiative (CRSCI) recipient.

Maryland Department of Health, CRSCI Recipient, funded by CDC since 2012

The Maryland Climate Change Health Adaptation Program is the lead for integration of health adaptation into the state's response to a changing climate. Located in the Maryland Department of Health, the program provides a health focus to climate response efforts across the state, through technical assistance, development of epidemiologic tools and data products, and education and outreach. The program primarily addresses extreme heat, air quality and respiratory illness, water-borne diseases, and extreme weather events, such as hurricanes and tornadoes. The program, which is closely integrated with the Maryland Commission on Climate Change, includes education and outreach for school age youth (K-12), minority groups, community health workers, and informal healthcare networks. Among the products of the program is a climate change training curriculum for community health workers and extension workers. The training increases competency among informal healthcare networks in order to advise patients and community members on how to understand climate impact on themselves and their health. The program's Climate Ambassador program, which is a program targeted at school age youth in Maryland, provides students with tools and information to educate and empower themselves and their communities to respond to the impacts of a changing climate.

5.3 VULNERABILITY

According to the EPA, the climate for the northeast has changed with an approximate average temperature increase of 2 degrees Fahrenheit and an increase of 4 degrees Fahrenheit in winter temperatures. Precipitation events have also increased in magnitude and frequency. Rain events now exceed snow events for the northeast region of the United States. With an increase in rain events, influences to sea level rise are likely to increase as well. Sea level rise, storm surge, erosion, and the destruction of important coastal ecosystems will likely contribute to an increase in coastal flooding events, including the frequency of the current "1% annual chance flood hazard (100-year flood)" levels.

With 3,100 miles of shoreline, Maryland is the fourth most vulnerable state to suffer the effects of sea-level rise associated with climate change (MDE). Rising sea levels, along with increased storm intensity, will have devastating and far-reaching environmental and economic impacts on the Chesapeake Bay and on the quality of life Marylanders enjoy. Maryland's sizable farming community could suffer costly losses during extreme droughts and heat waves. Marylanders everywhere will face increased risk of flooding and significant property damage as a result of heavier precipitation and other extreme weather events. The effects of heat waves and increased air pollution are of particular concern in vulnerable populations such as children, the elderly, and other at-risk populations.

5.4 CONTRIBUTING FACTORS

In terms of implementing the 2030 Greenhouse Gas Reduction Plan, as an example, options for reductions in the energy sector have been reviewed. Electricity consumption is one of the highest factors contributing to greenhouse gas emissions. Electricity supply sector accounts for greenhouse gas emissions occurring as a result of the combustion of fossil fuels at electricity-generating facilities located within the State. The majority of power plants in Maryland are using fossil fuels such as coal, which adds carbon dioxide and other emissions into the atmosphere. Reducing energy use is a major part of the Greenhouse Gas Reduction Plan. Therefore, three important programs within the energy sector target the reduction of carbon dioxide emissions from electricity generating plants. These programs include:

- Regional Greenhouse Gas Initiative (RGGI);
- EmPOWER Maryland Initiative; and
- Renewable Portfolio Standard.

Excerpts from: https://www.marylandmatters.org/2021/03/08/bipartisan-coal-transition-bill-withdrawn-by-house-sponsor/- *Department of the Environment Releases a Climate Action Plan — 14 Months After Deadline By* ***Elizabeth Shwe****-February 20, 2021*

The Coal Community Transition Act of 2021 establishes a timeline for remaining coal power plants in Maryland to shut down and create a fund to assist displaced workers. The General Assembly refused again to take action; it was withdrawn during a committee work session. A similar bill was proposed in 2020.

Maryland's coal-fired power plants generated less than 6% of the electricity that was consumed by the state in 2020 but emitted around 4.4 million metric tons of climate-polluting carbon dioxide, according to David Smedick, Maryland Chapter of the Sierra Club. "In the year in which the operations and Maryland's coal plants were at historic lows, they still produced the climate pollution equivalent of nearly 1,000,000 cars," he said.

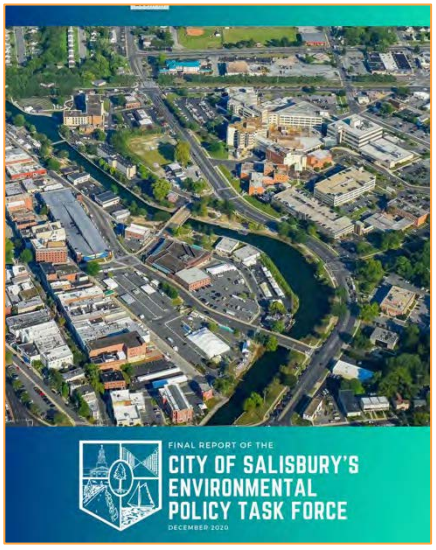
5.5 PLAN INTEGRATION

In addition to climate change planning documents published by the State of Maryland, local climate change planning initiatives have been undertaken.

Wicomico County developed and published an ESRI ArcGIS StoryMap entitled Climate Change in Wicomico County. The site includes Wicomico County specific information, such as:

- Cool climate change facts;
- Land use related climate change issues;
- Wildlife climate change impacts;
- Economic climate change impacts and adaptation strategies; and,
- Public health climate change impacts.

Source: https://www.arcgis.com/apps/Cascade/index.html?appid=a8594f585a0246dc863638c918a68f5b



The City of Salisbury Environmental Policy Task Force Report includes an energy use and emissions section include:

1. Embedding energy and emissions assessments into city planning, which is a prerequisite for being able to adequately implement and track these efforts into the future;
2. Building usage, which in 2009 accounted for nearly 20% of the City's emissions (2,057 tons);
3. Transportation usage, which in 2009 accounted for more than 19% of the City's emissions (2,059 tons) and the most expensive category at $435,813 per year; and
4. Sustainable energy sources, which are critical for moving the needle forward.

5.6 MITIGATING GREENHOUSE GAS

In Wicomico County, INGENCO's operates a gas-to-energy power plant at the County's Newland Park Landfill, which generates 6 megawatts (MWe) of electricity daily for local use. The process used by this power plant involves the incineration of waste, which generates energy in the form of electricity and/or heat. This process of generating energy reduces the release of carbon dioxide, helping to reduce greenhouse gas emissions.

Businesses and residents also recognize the importance of reducing GHG's and converting to the utilization of renewable energy sources where practical. The use and implementation of solar energy has advanced to be both efficient and economical in supplementing conventional energy demands. Commercial and residential permit data was obtained from the Wicomico County Building Inspection Department to evaluate the prevalence of businesses and residents applying to install solar panels. Data was updated for this plan to include the years since the adoption of the previous plan. As shown in Table 5.1, solar panel installation permits have increased significantly since 2010, however, the number of permits issued for solar panel installations has ebbed somewhat since 2018.

Table 5.1: Solar Panel Projects

WICOMICO COUNTY PERMIT DATA	
YEAR	**SOLAR PANEL PERMITS ISSUED**
2010	1
2011	14
2012	10
2013	26
2014	74
2015	161
2021 HMP UPDATE	
2016	241
2017	200
2018	149
2019	114

Source: Wicomico County Permit Data, www.wicomicocounty.org

Additionally, Maryland's *Climate Action Plan* includes two climate change adaptation strategies that are currently being used to guide state-level adaptation planning efforts. The first strategy addresses the impacts associated with sea level rise and coastal storms. The second strategy, released as a complement to the Climate Action Plan, addresses changes in precipitation patterns and increased temperature, and the likely impacts to human health, agriculture, forest and terrestrial ecosystems, bay and aquatic environments, water resources, and population growth and infrastructure. Together, more than 100 experts from the governmental, nonprofit, and private sectors participated in a series of meetings from the purpose of interpreting the most recent climate change literature, evaluating adaptation options, and recommending strategies to reduce Maryland's overall climate change vulnerability.

Consideration of land use and transportation systems such as parks and open space as well alternative modes of travel promote climate change actions at the local government level. Promoting community design that incorporates open space, pedestrian and bicycle use, and tree plantings have the co-benefit of improving public health.

CHAPTER 6 – SHORELINE EROSION & SEA LEVEL RISE

Updates to the Wicomico County Chapter 6 – Shoreline Erosion and Sea Level Rise included the following:

- Updated the Soils section within Shoreline Erosion
- Added New Shoreline Erosion Mapping
- Add New Maryland Coastal Resiliency Assessment for Wicomico County
- Reviewed and Updated Community Lifelines & Public Facilities At Risk to Shoreline Erosion Risk Zone
- Added New At-Risk Community Lifelines and Public Facilities Mapping
- Added New Coast Smart Climate Ready Action Boundary (CS-CRAB) Assessment
- Added New Section – Facilities At Risk – Municipalities Of Wicomico County
- Added New At-Risk Municipal Owned Facilities Mapping
- Added New Climate Ready Action Boundary Mapping for each Municipality
- Review and Updated Loss Estimations for Community Lifelines and Public Facilities as well as Municipal Owned Facilities
- Added Loss Estimations for New Construction
- Added New Section – Social Vulnerability
- Added New Section – Recent Mitigation Efforts
- Added New Conclusion Section

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

CHAPTER 6 – SHORELINE EROSION AND SEA LEVEL RISE

6.1 INTRODUCTION

Shoreline erosion and sea level rise are two interconnected hazards and are included within this chapter; the effects of both are apparent within the coastal areas of Wicomico County and the Towns of Sharptown and Mardela Springs and the Cities of Fruitland and Salisbury. Each of these hazards are presented separately.

Shoreline erosion was ranked as a "medium" risk, while sea level rise was ranked "medium-low" risk. During the 2021 plan update, the public survey results indicate that the community is "concerned" about both shoreline erosion and sea level rise.

Excerpt from Sea-level Rise: Projections for Maryland 2018

The level of Chesapeake Bay water with respect to the land is now rising about three times as fast as it was during colonial times, threatening more densely built communities and infrastructure that developed over the interim. Effects of accelerated sea level rise are already apparent, including shoreline erosion, deterioration of tidal wetlands, and saline contamination of low-lying farm fields.

Source: Boesch, D.F., W.C. Boicourt, R.I. Cullather, T. Ezer, G.E. Galloway, Jr., Z.P. Johnson, K.H. Kilbourne, M.L. Kirwan, R.E. Kopp, S. Land, M. Li, W. Nardin, C.K. Sommerfield, W.V. Sweet. 2018. Sea-level Rise: Projections for Maryland 2018, 27 pp. University of Maryland Center for Environmental Science, Cambridge, MD.

6.2 SHORELINE EROSION

HAZARD CHARACTERIZATION

Shoreline erosion hazard along Wicomico County's shorelines is due to and influenced by a complex dynamic of natural and man-made conditions, which include soil composition and type, weather, topography, water depth, fetch, surface water/groundwater conditions, vegetation, and shoreline conditions.

Although shoreline erosion is a natural process, man-made factors can exacerbate its effects, resulting in accelerated erosion which occurs at rates exponentially higher than natural processes. Man-made factors could include land use, shoreline reinforcement activities, surface water usage, ground water usage, and the placement of buildings, roads, and other infrastructure. In general, erosion problems tend to be the greatest in areas where:

- sediments are unconsolidated;
- fetch is greater than one mile;
- upland areas generate significant runoff of saturated soils; and,
- adjacent shorelines are hardened with protective structures.

Shorelines consisting of very fine or unconsolidated silts, clays, or lighter organic material, such as marshes are particularly at risk. Additionally, soil types that are categorized as "shrink-swell" soils can contribute to increased erosion rates along Wicomico's shorelines. According to the USDA-NRCS Web Soil Survey for Wicomico County (2020), approximately 27.6% of the County is composed of soils that could be categorized as shrink-swell soils.

Shrink-swell soil types have a very slow infiltration rate (high runoff potential) when saturated. These consist chiefly of clays that have a high percent rating of linear extensibility, soils that have a high-water table, soils that have a fragipan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These types of soils have a very slow rate of water transmission.

Table 6.1: Shrink-Swell Soils in Wicomico County, was generated by evaluating soil types that had a combination of two qualities, hydrologic soil group and linear extensibility. These qualities are defined as follows:

- Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
- Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

In order to identify soil types as shrink-swell soils for the purposes of this plan update, soil types that are categorized as hydrologic soil group D soils, and that also have a linear extensibility greater than 0.75, are classified as shrink-swell soils and are listed in Table 6.1.

Table 6.1: Shrink-Swell Soils in Wicomico County

Map Unit Symbol	Map Unit Name	Acres in County	Percent of County
CoA	Corsica mucky loam, 0 to 2 percent slopes	7,799.20	3.00%
FadA	Fallsington sandy loams, 0 to 2 percent slopes, Northern Tidewater Area	10,074.70	3.90%
FgdA	Fallsington loams, 0 to 2 percent slopes, Northern Tidewater Area	4,297.20	1.70%
Ho	Honga peat, very frequently flooded, tidal	1,653.70	0.60%
KfA	Keyport fine sandy loam, 0 to 2 percent slopes	2,318.90	0.90%
KfB	Keyport fine sandy loam, 2 to 5 percent slopes	483.7	0.20%
LfA	Lenni sandy loam, 0 to 2 percent slopes	7,444.00	2.90%
LgA	Lenni loam, 0 to 2 percent slopes	5,614.40	2.20%
NM	Nanticoke and Mannington soils, very frequently flooded, tidal	1,350.60	0.50%
OKA	Othello and Kentuck soils, 0 to 2 percent slopes	781.3	0.30%
OtA	Othello silt loams, 0 to 2 percent slopes, Northern Tidewater Area	16,547.40	6.40%
SuA	Sunken mucky silt loam, 0 to 2 percent slopes, occasionally flooded, tidal	983.7	0.40%
TP	Transquaking and Mispillion soils, very frequently flooded, tidal	9,602.30	3.70%
Zk	Zekiah silt loam, frequently flooded	2,319.10	0.90%
Total		**71,270.20**	**27.60%**

Source: USDA-NRCS Web Soil Survey for Wicomico County, Updated 6/11/2020

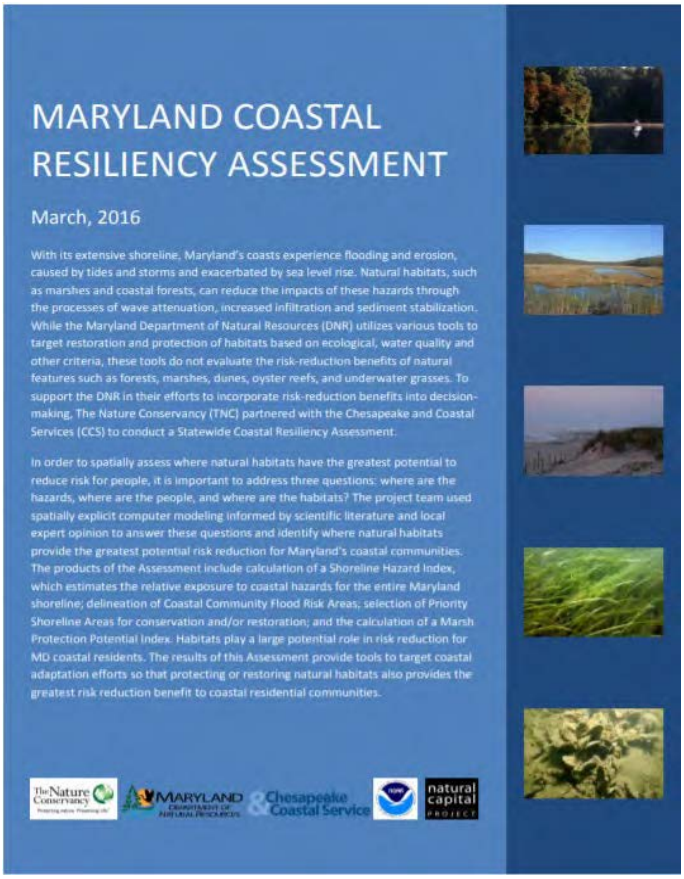
In addition to accelerated shoreline erosion rates, homes built on shrink-swell soils have the possibility of being structurally damaged due to the expansion-contraction properties of this soil type. These soils can cause foundation problems such as cracks and walls being pushed inwards due to outside pressure. Best Management Practices (BMPs) for building on shrink-swell soils

include monitoring for extreme changes in soil moisture content and planting trees 15 to 30 feet away from foundations. It is important to note that no documentation/data exists stating that residential, commercial, or other facilities in Wicomico County have had damaged due to shoreline erosion.

HAZARD RISK & HISTORY

Shoreline erosion and deposition is a natural process; however, accelerated shoreline erosion can result in significant problems for property owners, businesses, and public facilities. Anthropogenic impacts along the shoreline, such as inappropriate planning, design, and construction activities, have the potential to increase natural erosion rates, or more likely, exacerbate and compound the impacts of natural shoreline erosion.

In previous iterations of the plan, the 2000 Final Report by the Maryland Shore Erosion Task Force was referenced, however the most recent report and data available is the Statewide Coastal Resiliency Assessment conducted by the Maryland Department of Natural Resources (DNR), the Nature Conservancy (TNC), and partnering with Maryland's Chesapeake and Coastal Service (CCS). This assessment was integrated into the plan update, replacing the *Shore Erosion Task Force, Final Report 2000* information. The data from the 2000 Final Report by the Maryland Shore Erosion Task Force was provided, *2000 Shoreline Erosion Rates* table, for comparison purposes.



Except from 2006 Data Update to the Shore Erosion Task Force, Final Report

Approximately 260 acres of tidal shoreline are lost each year due to shoreline erosion. Between 2002 and 2006, Center for Coastal Resources Management (CCRM) and Virginia Institute of Marine Science (VIMS) updated the shoreline erosion rates for Maryland. The higher erosion rates are located along the shorelines of the Nanticoke River, which experiences wave action, accelerating erosion rates. According to the data provided by US Army Corps of Engineers (USACE), since most of the segments occurred in low fetch environments, high erosion and undercut segments were classified as "slight", indicative of erosion rates between 0-2 ft/year. The communities located along shorelines classified as slight include Bivalve, Nanticoke, Waterview, and Whitehaven.

2000 Shoreline Erosion Rates

Area	Erosion Rate 0-2 feet/year (miles)	Erosion Rate 2-4 feet/year (miles)	Erosion Rate > 4 feet/year (miles)	Total Eroding Shoreline (miles)	Total County Shoreline (miles)
Wicomico County	13	6	1	20 (22%)	89
Maryland (16 coastal counties)	955	234	142	1,341 (34%)	4,360

Source: State of MD – Shore Erosion Task Force, Final Report 2000

In 2016 the Maryland Department of Natural Resources (DNR), the Nature Conservancy (TNC), and partnering with Maryland's Chesapeake and Coastal Service (CCS) conducted a Statewide Coastal Resiliency Assessment. According to the 2016 Maryland Coastal Resiliency Assessment report, DNR, TNC and CCS used spatially explicit computer modeling informed by scientific literature and local expert opinion to spatially assess where natural habitats have the greatest potential to reduce risk for people. The report states that the products of the Assessment include; calculation of a Shoreline Hazard Index, which estimates the relative exposure to coastal hazards for the entire Maryland shoreline, delineation of Coastal Community Flood Risk Areas, selection of Priority Shoreline Areas for conservation and/or restoration, and the calculation of a Marsh Protection Potential Index.

The Maryland Shoreline Hazard Index was calculated from six physical variables: geomorphology, elevation, relative sea level rise, wave power, storm surge height and erosion rates, and five natural feature types (forest, marsh, dune, oyster reef and underwater grasses). Each variable is ranked from very low hazard (rank=1) to very high hazard (rank=5), based on criteria shown in Table 6.2 and provided below.

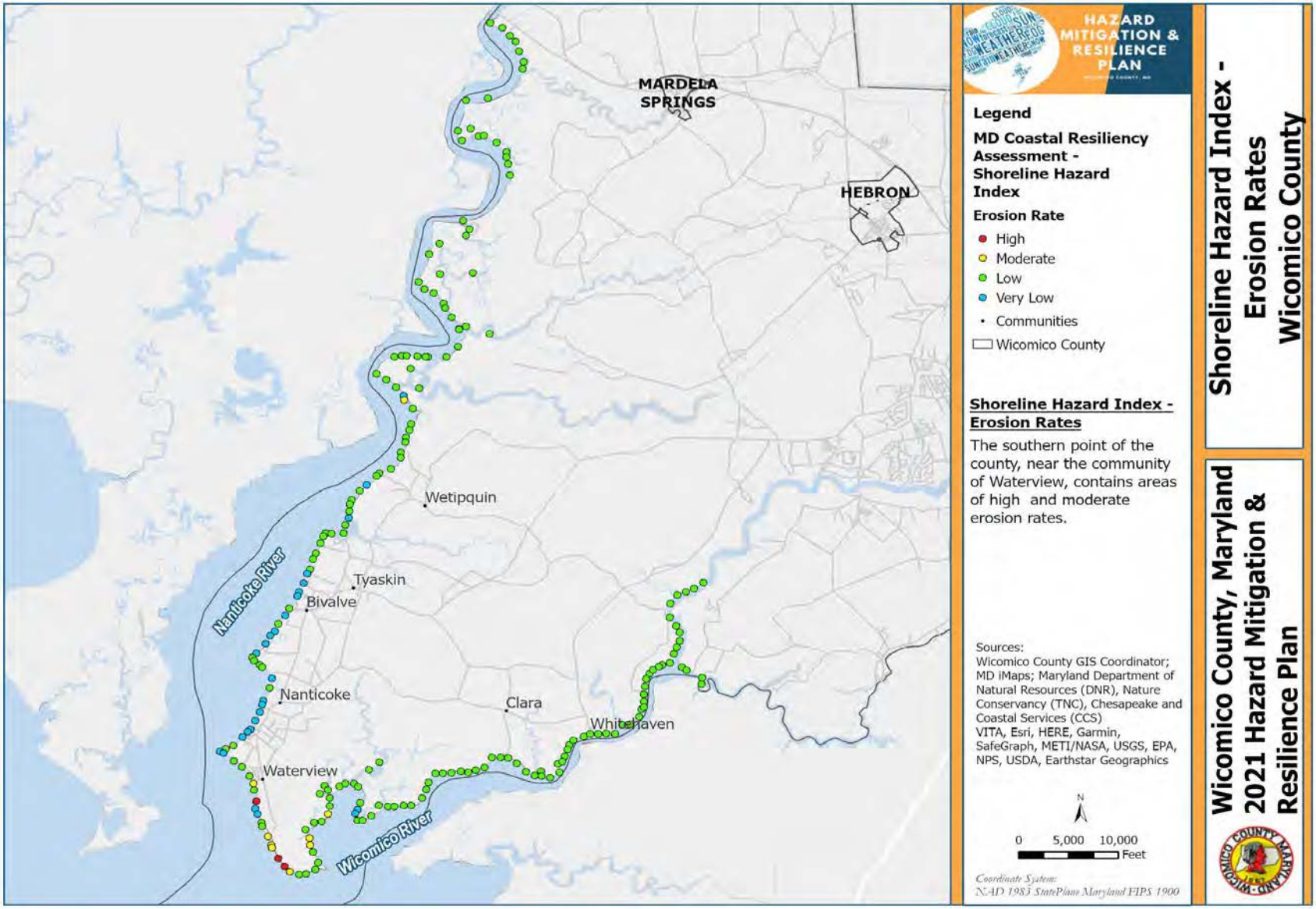
Table 6.2. Variables and Ranking System for InVEST Coastal Vulnerability Model

Variable	Very Low Hazard Rank (1)	Low Hazard Rank (2)	Moderate Hazard Rank (3)	High Hazard Rank (4)	Very High Hazard Rank (5)
Geomorphology	Bulkhead	Riprap	Groin, breakwater,jetty, unconventional structure, living shoreline	Coarse-grained sand to gravel beaches	Other natural shoreline, dilapidated bulkhead
Elevation(meters)	14.7 - 81.6	5.9 - 14.7	2.3 - 5.9	0.5 - 2.3	0 - 0.5
Natural Habitats	Forest	Marsh	Dune	Oyster reef, Underwater grass (dense = 4, less dense = 4.5)	No habitat
Sea Level Rise (meters)	None	1.32 – 1.42	1.46 – 1.48	1.49 – 1.67	2.05 – 2.35
Wave Power (kW/m)	0 - 0.02	0.02 - 0.05	0.05 - 0.16	0.16 - 0.78	Atlantic Shoreline
Storm Surge Height (feet)	0	0.1 - 2.2	2.3 - 3.5	3.6 - 4.6	4.7 - 8.9
Erosion Rate (feet/year)	Accretion or Protected	0 - 2, no change or unknown	2 - 4	4 - 8	>8

Source: 2016 Maryland Coastal Resiliency Assessment Report

The Shoreline Hazard Index – **Erosion Rates**, shown in Table 6.2 and shaded in orange were reviewed and mapped for Wicomico County. As shown in Map 6.2, most of Wicomico County shorelines have low erosion rates. However, the shoreline beginning near the community of Waterview, running parallel with Nanticoke Road, and extending to Stump Point, has high and moderate erosion rates.

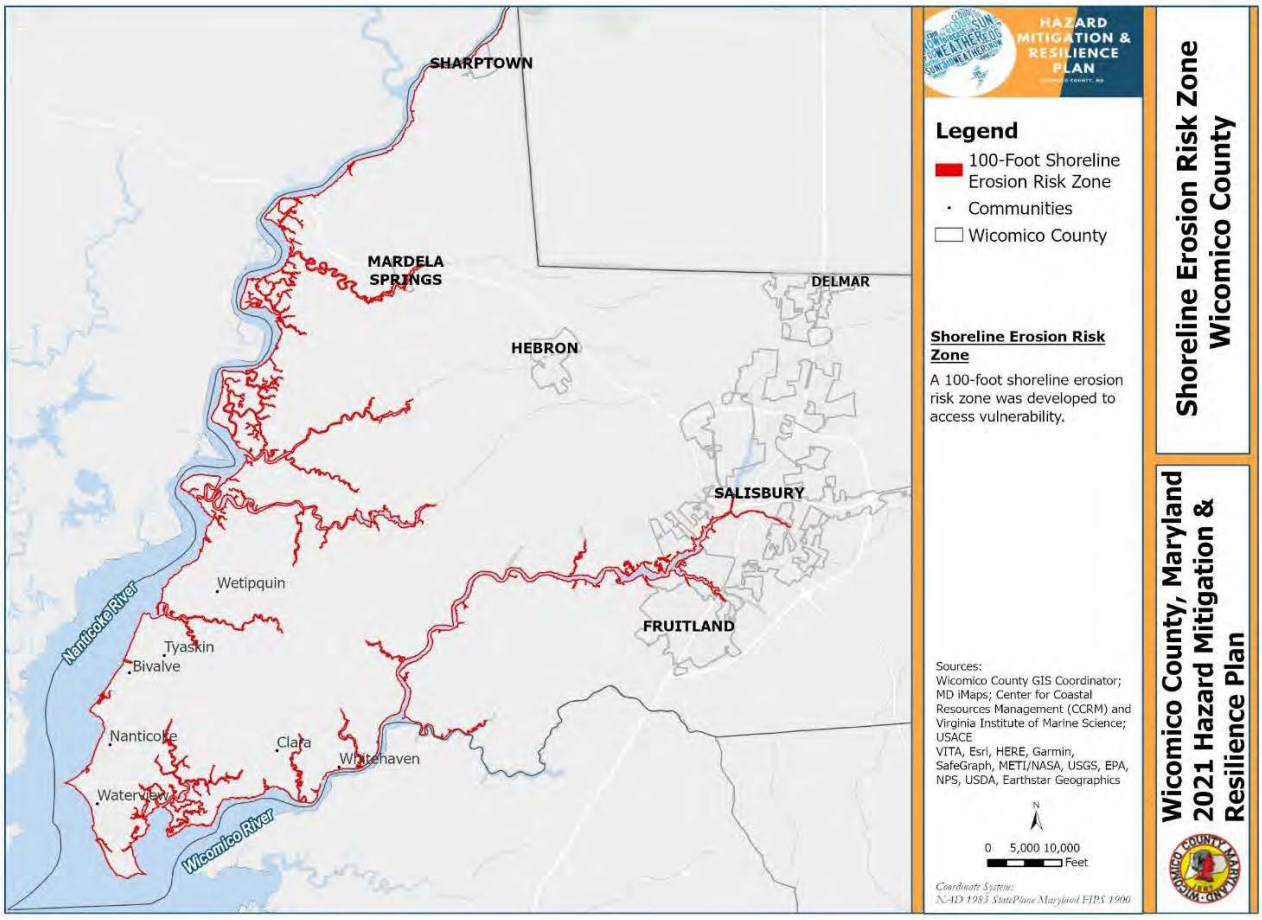
Map 6.1: Shoreline Hazard Index – Erosion Rates



VULNERABILITY

To access vulnerability due to shoreline erosion, a 100-foot shoreline erosion risk zone, was developed for the *2021 Wicomico County Hazard Mitigation & Resiliency Plan Update.* This shoreline erosion risk assessment examines Wicomico County's community lifelines and public facilities along tidal shorelines located within the 100-foot shoreline erosion risk zone identified for this planning project.

Map 6.2: 100-foot Shoreline Erosion Zone

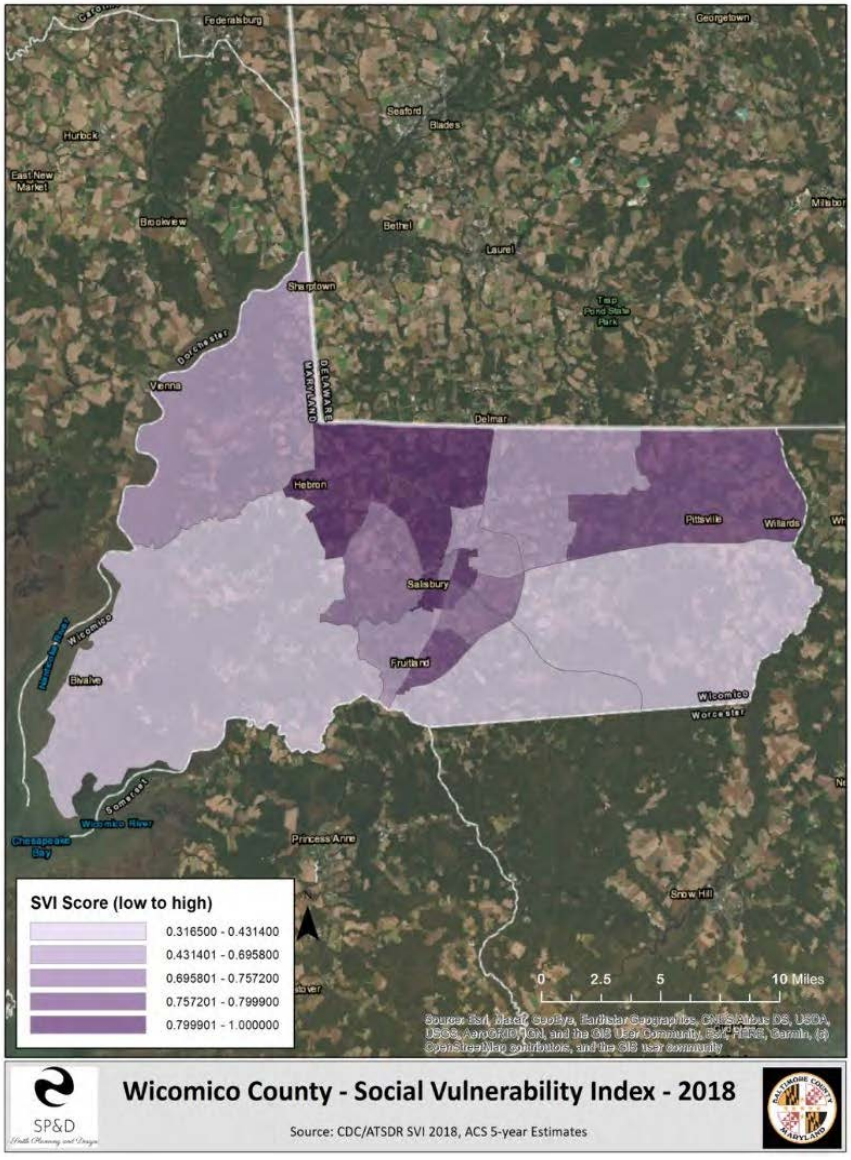


SOCIAL VULNERABILITY

The Social Vulnerability Index (SVI) has been conducted for Wicomico County at the census tract level. The SVI is discussed in further detail in Chapter 3 – Hazard Identification & Risk Assessment on page 3-6. Map 6.3 was developed for the plan update and provides a visual depiction of the SVI scores, by shaded zones, for Wicomico County. Higher social vulnerability regions are indicated by dark purple shading.

Using the information depicted on both Maps 6.2 and 6.3, the intersecting or overlapping areas of SVI score census blocks and shoreline erosion risk zone can be determined. Areas with low social vulnerability index score as indicated on Map 6.3 by light purple shading overlap with the 100-foot shoreline erosion risk zone as shown on Map 6.2. This area includes the unincorporated area including the communities of Bivalve, Nanticoke, Waterview, and Whitehaven. Areas denoted in dark purple have a high social vulnerability index score. This area overlaps with the shoreline erosion risk zone in portions of the Cities of Fruitland and Salisbury.

Map 6.3: Wicomico County Social Vulnerability Index



FACILITIES AT-RISK – UNINCORPORATED AREAS OF WICOMICO COUNTY

Community Lifelines & Public Facilities

During the plan update, a vulnerability assessment was completed for community lifelines and public facilities. Detailed information about community lifelines and public facilities was provided in Chapter 4 - Coastal Storms on page 4-18. The 100-foot shoreline erosion risk zone was used to identify facilities at risk to shoreline erosion. Facilities at risk consisted of county owned facilities and underground storage tanks (UST). Table 6.3 provides the facilities at risk. No community lifelines were identified within the 100-foot shoreline erosion risk zone.

Table 6.3: Public Facilities within 100-foot Shoreline Erosion Risk Zone

Facility Type	Number of Facilities	Detail of Facility	Address of Facility
County Owned	9	Tyaskin Park	4778 Tyaskin Road
		Whitehaven Ferry	23865 River Street
		Riverside Boat Ramp	Riverside Drive
		Bivalve Wharf	Bivalve Wharf Road
		Nanticoke Harbor (2)	20411 Harbor Road
		Wetipquin Boat Launch	21664 Wetipquin Road
		Upper Ferry	5420 N Upper Ferry Road
		Cedar Hill Marina & Park	20945 Harbor View Road
		Cope Bennett Park	100 Railway Street
Underground Storage Tank	2	Green Hill Country Club	5469 Whitehaven Road
		Valet Cleaners	223 Lake Street

Source: Smith Planning and Design

FACILITIES AT-RISK – MUNICIPALITIES OF WICOMICO COUNTY

Assessing shoreline erosion vulnerability of municipal owned facilities was added as a new element during this plan update. The 100-foot shoreline erosion risk zone and municipal facilities were mapped to determine facilities at risk to shoreline erosion.

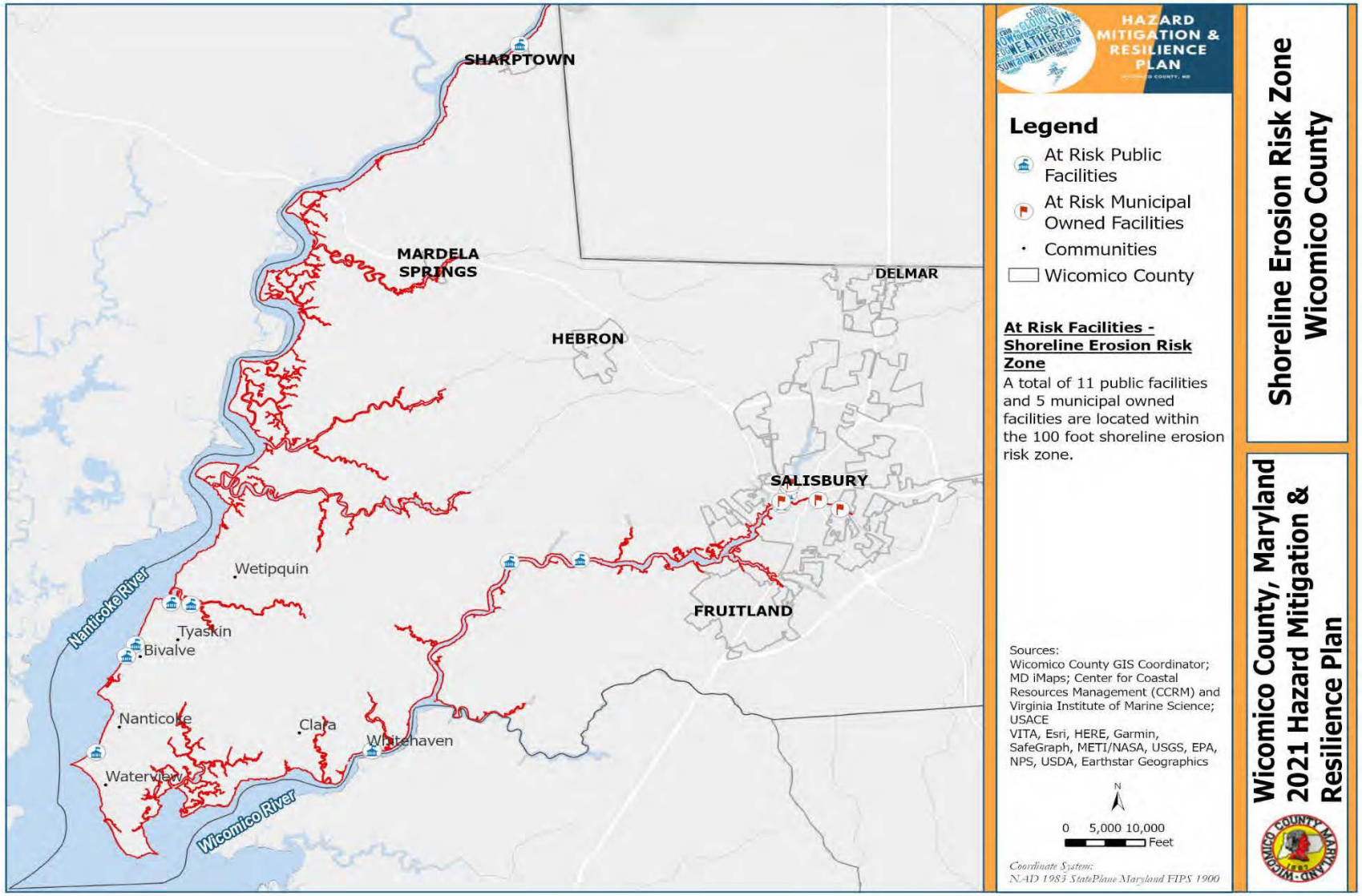
A total of five (5) facilities were identified within the 100-foot shoreline erosion risk zone; all within the City of Salisbury.

Table 6.4: Municipal Owned Facilities within 100-foot Shoreline Erosion Zone

Facility Type	Number of Facilities	Detail of Facility	Address of Facility
Salisbury	5	Fire Training	317 & 325 Lake Street
		Port Of Salisbury Marina	506 W Main Street
		Salisbury City Park	500 E Main Street
		Salisbury Zoo	501 S Park Drive
		DPW - Water & Sewer Branch	400 W Isabella Street

Source: Smith Planning and Design

Map 6.4: At Risk Public and Municipal Owned Facilities - 100-foot Shoreline Erosion Risk Zone



LOSS ESTIMATIONS - UNINCORPORATED COMMUNITY LIFELINES & PUBLIC FACILITIES

Loss estimates for public facilities located within the 100-foot shoreline erosion risk zone were assessed. Ten (10) county owned facilities and one (1) UST were identified. Structure improvement values using the most recent Maryland Tax Assessment values are included in Table 6.5.

Table 6.5: Loss Estimates for Public Facilities - Unincorporated

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
County Owned	Tyaskin Park	$5,800	$438,000
	Whitehaven Ferry	$1,300	
	Riverside Boat Ramp	$56,700	
	Bivalve Wharf	$1,700	
	Nanticoke Harbor (2)	$160,400	
	Wetipquin Boat Launch	$9,900	
	Upper Ferry Harbor	$1,500	
	Cedar Hill Marina & Park	$179,700	
	Cope Bennett Park	$21,000	
Underground Storage Tank	Green Hill Country Club	*$1,500	$1,500

Source: Smith Planning and Design, Maryland Property View- Parcel Dataset June 2020
**Average cost for above and underground storage tanks*

LOSS ESTIMATIONS - MUNICIPAL OWNED

Loss estimates for municipal owned facilities located within the 100-foot shoreline erosion risk zone were assessed. Five (5) municipal facilities, all located in the City of Salisbury, were identified. Current assessment values within the City of Salisbury's parcel database were utilized for loss estimations.

Table 6.6: Loss Estimations for Municipal Owned Facilities

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
Salisbury	Fire Training	$41,300	$4,083,800
	Port Of Salisbury Marina	$125,500	
	Salisbury City Park	$1,057,267	
	Salisbury Zoo	$2,556,000	
	DPW - Water & Sewer Branch	$303,733	

Source: Smith Planning and Design & City of Salisbury – Parcel Database

LOSS ESTIMATION BY LAND USE – COUNTYWIDE

Loss estimates calculated during the previous planning process for all facilities by land use categories, specifically commercial and residential. Maryland Tax Assessment total improvement values for each land use category are listed in Table 6.7. This information was reviewed, and new information was included for this plan update and shown in Table 6.8.

Table 6.7: Loss Estimates for All Facilities by Land Use

Land Use	Loss Estimations (Total Improvement Values)
Apartments	$ 9,468,800
Commercial	$ 21,774,600
Commercial Condominium	$ 516,200
Commercial Residential	$ 313,800
Exempt Commercial	$ 17,305,400
Industrial	$ 1,938,300
Residential	$ 158,218,170
Residential Condominium	$ $8,706,500

Source: Smith Planning and Design

In determining commercial and residential loss estimations for the 2021 Plan update, structures constructed between 2017 and April 2021 were extrapolated from permit data provided by Wicomico County Permit and Inspections Division. Loss estimates were included for these new structures using Maryland Tax Assessment total improvement values. Table 6.8 lists the total number of new residential structures that have been constructed within the 100-foot shoreline erosion risk zone. No new commercial structures were built within the risk zone during this time period.

Table 6.8: 2021 Loss Estimates for New Construction by Land Use

Land Use	Loss Estimations (Total Improvement Values)
Residential - (4 structures)	$ 691,600

Source: Wicomico County Permit and Inspections Division and Smith Planning and Design

The four (4) residential structures located within the 100-foot shoreline erosion risk zone are not constructed within the high and moderate erosion rate areas shown on Map 6.2.

6.3 SEA LEVEL RISE

HAZARD CHARACTERIZATION

Shorelines within and along the Chesapeake Bay have been continuously eroding since the formation of the Bay roughly 10,000 years ago. Over the long-term, sea level rise is one of the primary causes of shoreline erosion. In the short term, waves and storm events are the primary cause of changes in the shoreline. While localized human activities, such as coastal development, have played a part in shoreline erosion, global climate change is also an important factor. Warmer global temperatures mean two events occur: 1) loss of land-based ice, such as glaciers and polar ice caps, and 2) thermal expansion, which simply means that water expands and takes up more space as it warms. These two factors are major causes of sea level rise, which in turn causes shoreline erosion.

Maryland's average rate of sea level rise is approximately 3-4 mm per year, or approximately one foot per century. According to NOAA, this is a "significantly larger rate than the sea level rise averaged over the last several thousand years." Sea level rise is another factor contributing to shore erosion in Maryland. Sea level rise contributes to shoreline erosion by influencing and exacerbating on-going coastal processes, making coastal areas more vulnerable to extreme events. The rise in sea level creates a higher baseline for storm surge. In fact, a 1-meter rise in sea level would turn 15-year flood areas into 1% annual chance flood hazard (100-year flood areas) (Kana et al., 1984; Leatherman, 1984). Tide gauge measurements in the Chesapeake Bay show that sea level rates are increasing almost twice as fast as the global average.

The University of Maryland Center for Environmental Science (UMCES) published a 2018 report, *Sea-Level Rise Projections for Maryland 2018*, in order to fulfil the requirements of the Maryland Commission on Climate Change Act of 2015. This report provides updated sea level rise estimates for Maryland's coastal lands expected into the next century. These projections are included in Table 6.9 below.

Table 6.9: Sea Level Rise Projections

Year	Emissions Pathway	Central Estimate 50% probability SLR meets or	Likely Range 67% probability	1 in 20 Chance 5% probability SLR meets or	1 in 100 Chance 1% Probability SLR meets or
2080	Growing	2.3 ft	1.6-3.1 ft	3.7 ft	4.7 ft
	Stabilized	1.9 ft	1.3-2.6 ft	3.2 ft	4.1 ft
	Paris Agreement	1.7 ft	1.1-2.4 ft	3.0 ft	3.2 ft
2100	Growing	3.0 ft	2.0-4.2 ft	5.2 ft	6.9 ft
	Stabilized	2.4 ft	1.6-3.4 ft	4.2 ft	5.6 ft
	Paris Agreement	2.0 ft	1.2-3.0 ft	3.7 ft	5.4 ft
2150	Growing	4.8 ft	3.4-6.6 ft	8.5 ft	12.4 ft
	Stabilized	3.5 ft	2.1-5.3 ft	7.1 ft	10.6 ft
	Paris Agreement	2.9 ft	1.8-4.2 ft	5.9 ft	9.4 ft

Source: Sea Level Rise: Projections for Maryland 2018, UMCES (Note: SLR estimates based on Baltimore tide-gauge station)
Note: This table indicates that it is "likely" that Maryland will experience 0.8-1.6 feet of sea-level rise by 2050.

HAZARD RISK & HISTORY

Accelerated sea level rise in Maryland's coastal areas are already evident in the form of shoreline erosion, tidal wetland deterioration, and low-lying farm field saline contamination.

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.

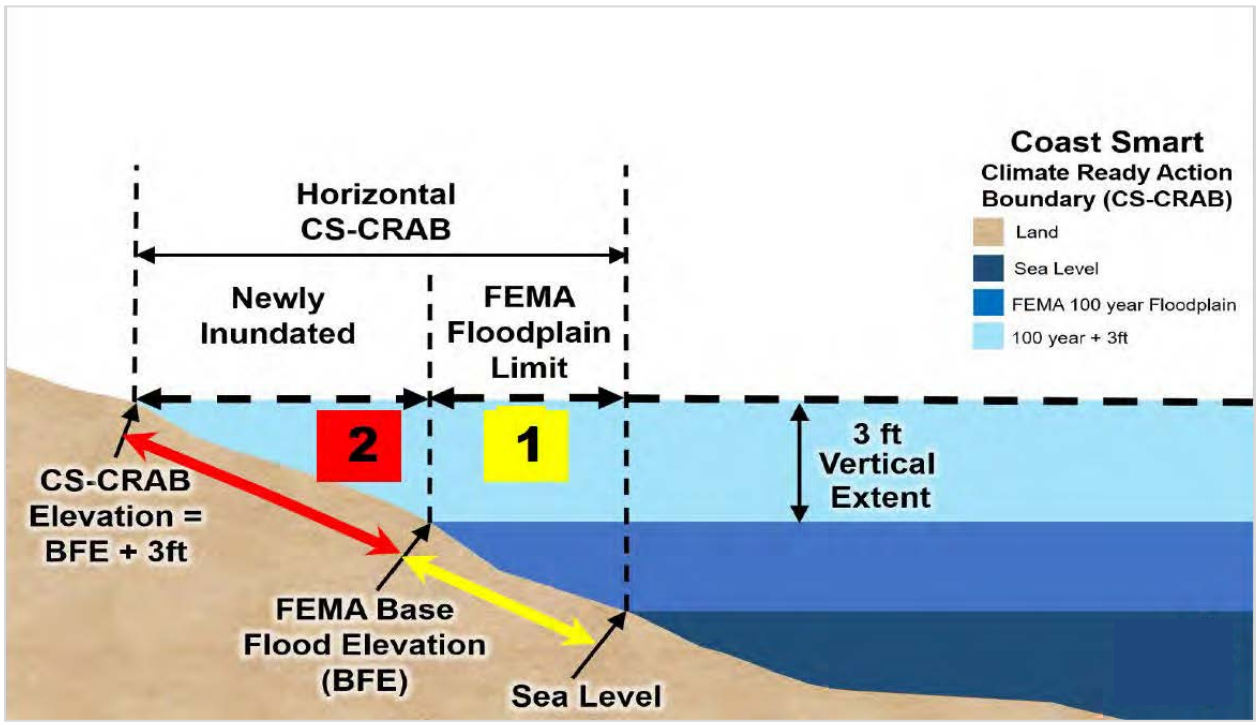
Scientists predict that with global warming, sea levels may rise as much as 2-3 feet in the Chesapeake Bay by 2100. Considering that climate change is most likely resulting in in greater frequencies and intensities of storms, both shoreline erosion and sea-level rise effects and impacts are occurring. According to the EPA, during the 20th century, global sea level rose by roughly seven inches. Subsiding land in the Chesapeake Bay area is projected to worsen the effects of relative sea level rise, increasing the risk of flooding in communities, inhabited islands, and tidal wetlands. According to NOAA's Chesapeake Bay Office, sea level in the Chesapeake Bay is rising at an average rate of 0.14 inches per year. This rate is almost 0.08 inches faster than the global average due to the land subsiding around the Chesapeake Bay. Ongoing research suggests that land subsidence in the region due to post-glacial crust movement and groundwater withdraws is the contributing factor to the increased rate of sea level rise in Maryland.

VULNERABILITY

To assess sea-level rise vulnerability, community lifelines and public facilities were intersected with the Maryland Coast Smart Climate Ready Action Boundary (CS-CRAB) Inundated Zones data layer. This data layer was created using a GIS spatial analysis model unique for Maryland. CS-CRAB data was created by the Maryland Environmental Service (MES) in partnership with the Maryland Department of Environment (MDE) and the Coast Smart Council, under the guidance of the Maryland Department of Natural Resource (DNR). The results of this analysis are included in Tables 6.10 and 6.11.

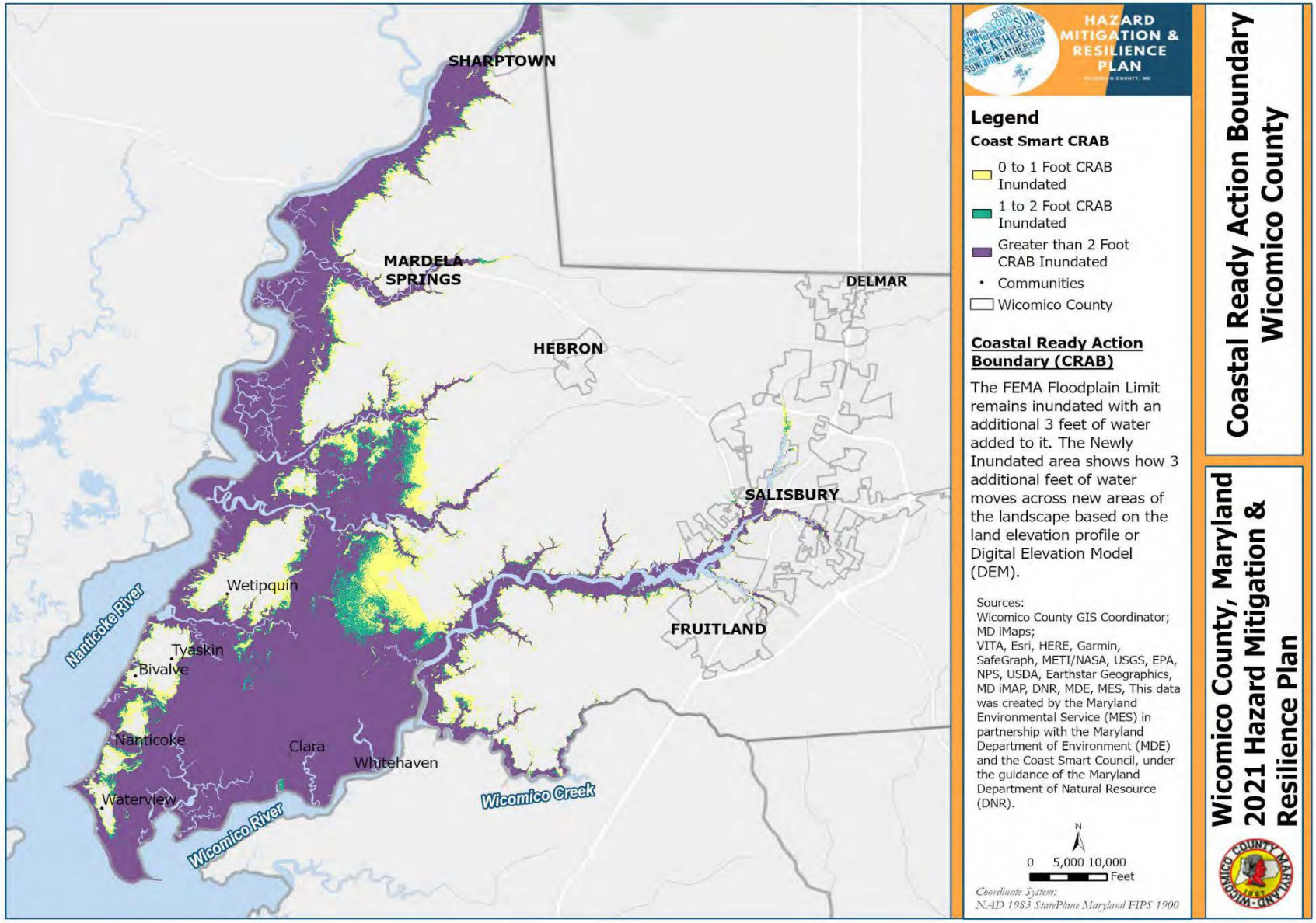
Currently, the FEMA floodplain layer records a base flood elevation above sea level. If a community simply adds a higher elevation to their floodplain, it only applies within that FEMA boundary. Maryland Coast Smart regulations that went into effect on September 1, 2020, now require state projects over $500,000 for construction or state funding to apply the corresponding horizontal limits of the higher 100-year plus three feet inundation as indicated by the Coast Smart CRAB. The FEMA Floodplain Limit remains inundated with an additional 3 feet of water added to it. The Newly Inundated area shows how 3 additional feet of water moves across new areas of the landscape based on the land elevation profile or Digital Elevation Model (DEM).

The following figure depicts how the CS-CRAB modifies the existing FEMA 100-year floodplain.



Map 6.5 illustrates the Coast Smart Climate Ready Action Boundary (CS-CRAB) Inundated Zones data layer. The CS-CRAB intersects with the Towns of Sharptown and Mardela Springs and the Cities of Fruitland and Salisbury. The communities of Nanticoke, Clara, and Whitehaven are encompassed in the CS-CRAB.

Map 6.5: Climate Ready Action Boundary (CRAB) Vulnerability

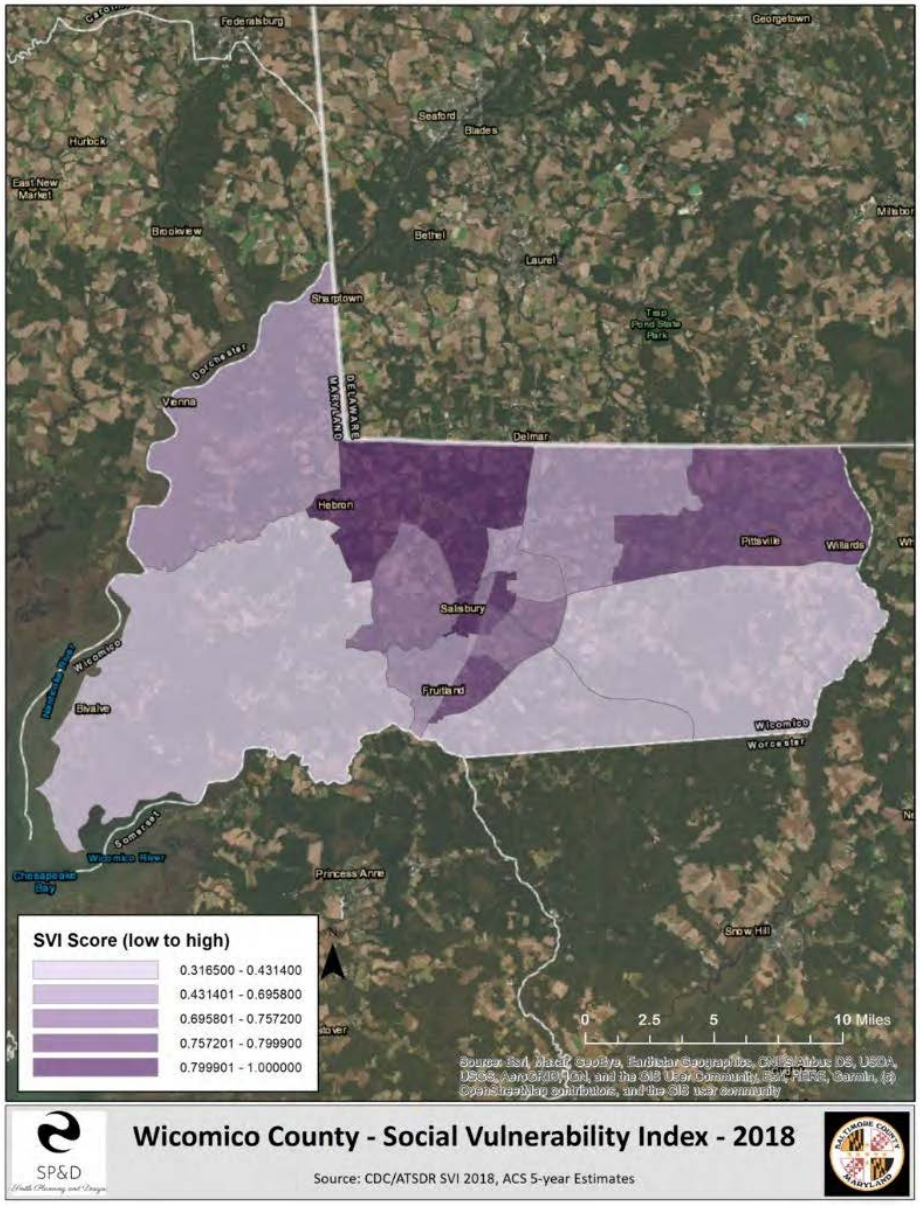


SOCIAL VULNERABILITY

Map 6.6 was developed for the plan update and provides a visual depiction of the SVI scores, by shaded zones, for Wicomico County. Higher social vulnerability regions are indicated by dark purple shading.

Using the information depicted on both Maps 6.5 and 6.6, the intersecting or overlapping areas of SVI score census blocks and CS-CRAB inundation zones can be determined. As shown in Map 6.6, areas with higher SVI scores, denoted in dark purple, are located in and around the Cities of Fruitland and Salisbury. These same areas are within the CS-CRAB inundation zones, as depicted on Map 6.5.

Map 6.6: Wicomico County Social Vulnerability Index



FACILITIES AT RISK – UNINCORPORATED AREAS OF WICOMICO COUNTY

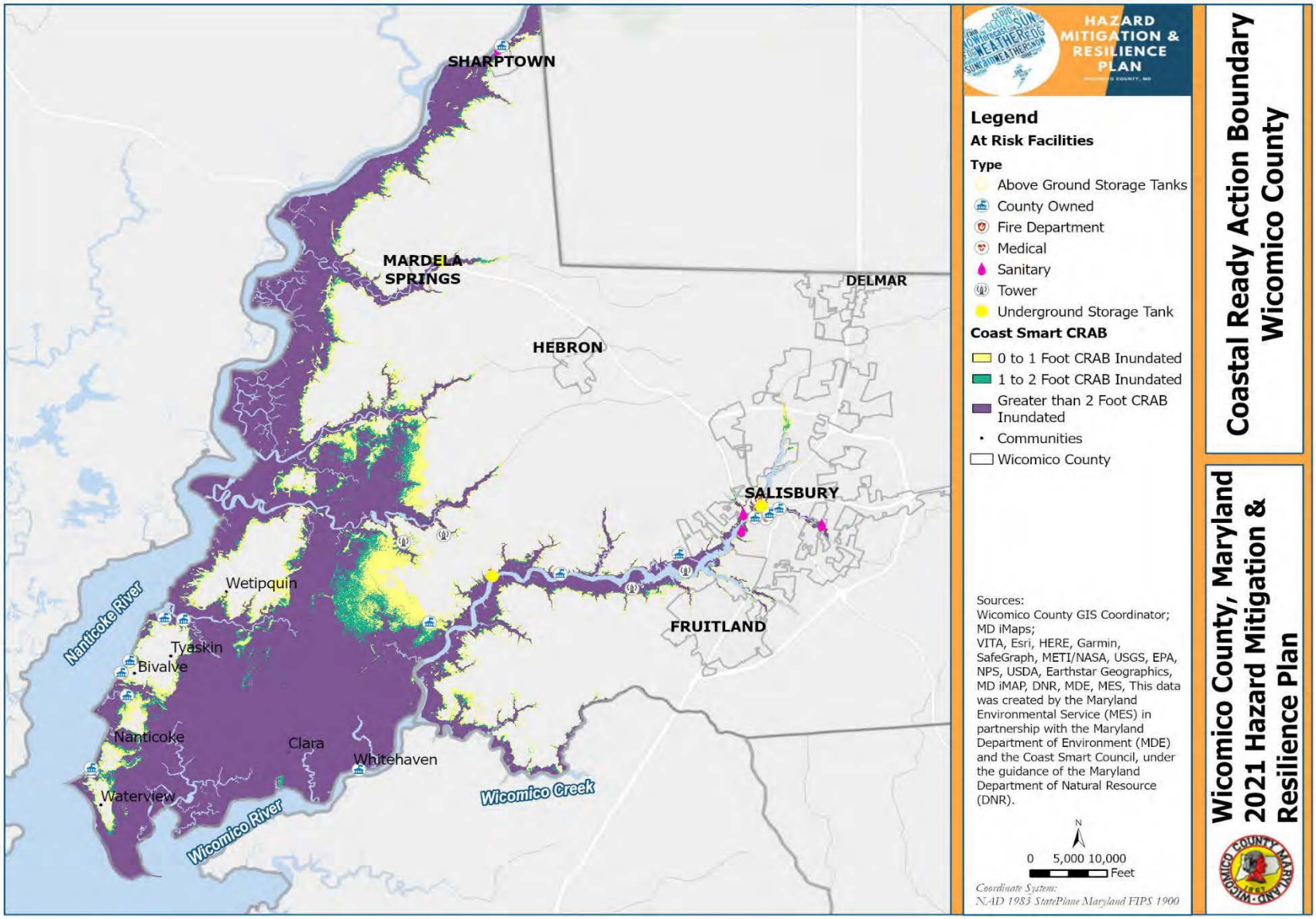
New to the plan update, sea level rise vulnerability was assessed for community lifelines and public facilities using the Coast Smart Climate Ready Action Boundary (CS-CRAB) Inundated Zones data layer. Community lifelines and public facilities within the CS-CRAB Inundated Zones are listed in the table below. Community lifelines and public facilities have been identified as being within one (1) of the three (3) following CS-CRAB inundation zones: 0 to 1 foot, 1 to 2 foot, and greater than 2 feet.

Table 6.10: Community Lifelines & Public Facilities within CRAB Inundation Zones

Facility Type	Number of Facilities	Detail of Facility	Address of Facility
GREATER THAN 2 FEET CRAB INUNDATED			
County Owned	12	Tyaskin Park	4778 Tyaskin Road
		Westside Solid Waste	20906 Nanticoke Road
		Whitehaven Ferry	23865 River Street
		Cedar Hill Marina & Park	20945 Harbor View Road
		Office of State's Attorney	309 E Main Street
		Riverside Boat Ramp	Riverside Drive
		Library	122 S Division Street
		Pemberton Historical Park	5635 Plantation Lane
		Bivalve Wharf	Bivalve Wharf Road
		Nanticoke Harbor	20411 Harbor Road
		Wetipquin Boat Launch	21664 Wetipquin Road
		Upper Ferry	5420 N Upper Ferry Road
Fire	1	Salisbury Fire Department - Station 16	325 Cypress Street
Medical	1	William C Fritz Health Center	300 W Carroll Street
Tower	1	Wicomico County Tower	5635 Plantation Lane
Sanitary	3	Sharptown Sewer Plant	Little Water Street
		Salisbury Pumping Station	611 Ridge Road
		Pump Station M Park	N Park Drive
Aboveground Storage Tank	5	Perdue Inc. (3 tanks)	521 Willow Street
		Taylor Oil Co., Inc. (2 tanks)	333-335 Lake Street
Underground Storage Tank	2	Green Hill Country Club	5469 Whitehaven Road
		Valet Cleaners	223 Lake Street
1-2 FEET CRAB INUNDATED			
County Owned	1	Cope Bennett Park	100 Railway Street
Sanitary	1	Salisbury Sewage Pumping Plant	100 Delaware Avenue
0-1 F00T CRAB INUNDATED			
County Owned	1	Pirates Wharf	4701 Whitehaven Road
Tower	2	Tower	25050 Nanticoke Road
		Tower	27410 Riverside Drive Ext.
Underground Storage Tank	1	Mardela Goose Creek	24948 Ocean Gateway

Source: Smith Planning and Design

Map 6.7: At Risk Community Lifelines and Public Facilities - CS-CRAB Inundation Zones



FACILITIES AT RISK – MUNICIPALITIES OF WICOMICO COUNTY

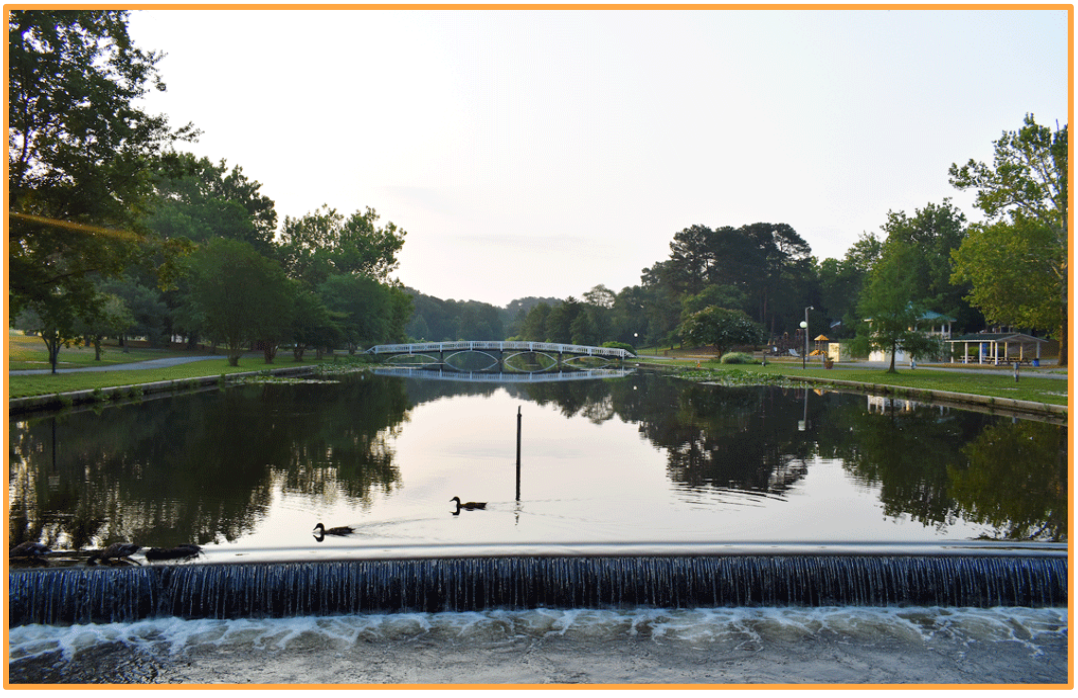
Assessing sea level rise vulnerability using the CS-CRAB Inundated Zones data layer for municipal owned facilities was added as a new element during this plan update. The Coast Smart Climate Ready Action Boundary (CS-CRAB) Inundated Zones data layer and municipal facilities were mapped to determine which facilities are at risk.

Municipal owned facilities at risk are listed on Table 6.11 and depicted in Map 6.8. A total of eight (8) facilities are vulnerable to CS-CRAB - greater than 2 feet inundated zone. All municipal owned facilities at risk are located in the City of Salisbury. The remaining six (6) municipalities, Hebron, Delmar, Fruitland, Pittsville, Sharptown, and Willards did not own facilities within the CS-CRAB inundation zones.

Table 6.11: Municipal Owned Facilities within CRAB Inundation Zones

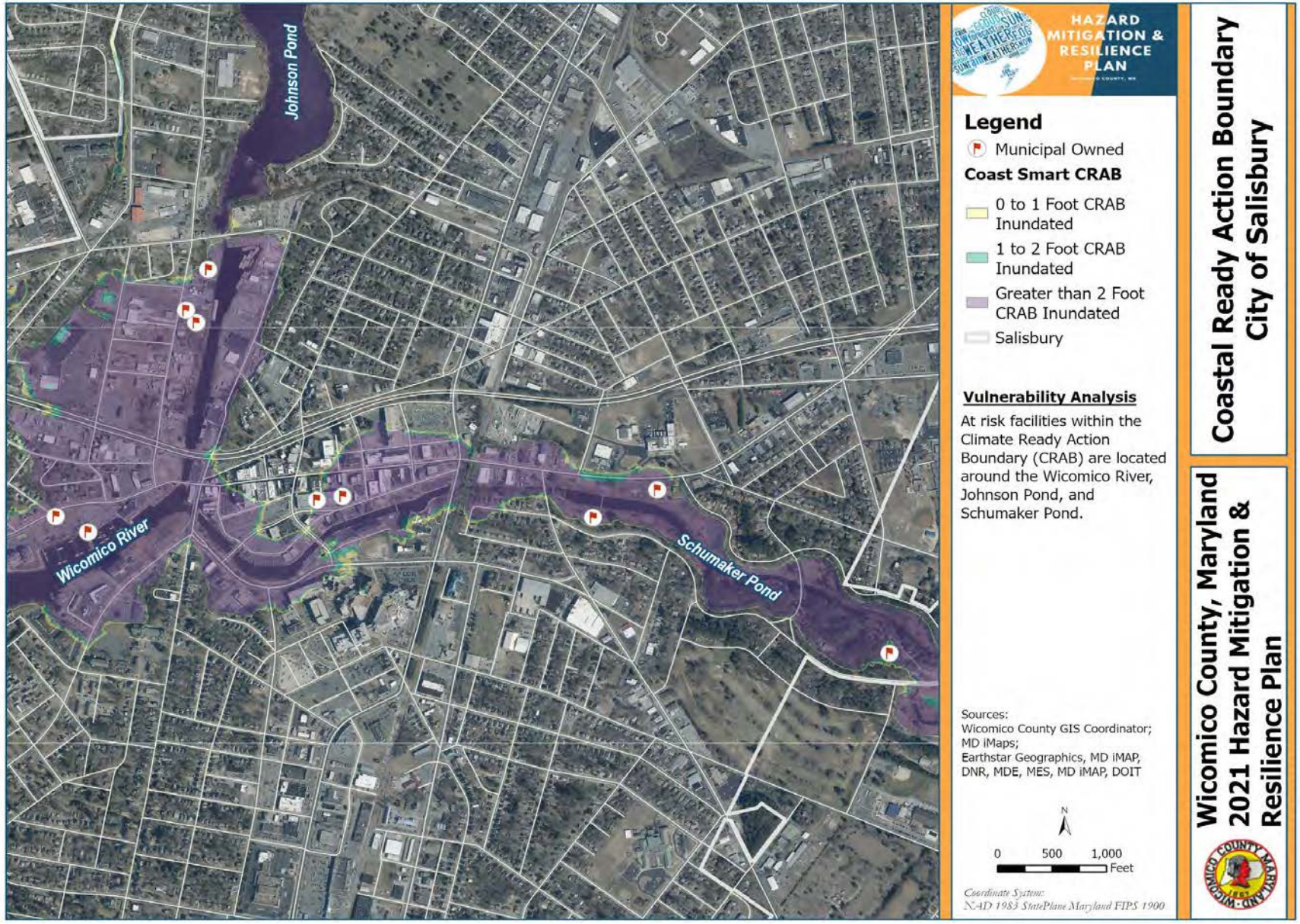
Municipality	Number of Facilities	Facility Name	Address
GREATER THAN 2 FEET CRAB INUNDATED			
Salisbury	8	Fire Training	317 & 325 Lake Street
		Port of Salisbury Marina	506 W Main Street
		Salisbury City Park	500 E Main Street
		Salisbury Zoo & Park	501 S Park Drive
		DPW - Water & Sewer Branch	400 W Isabella Street
		Parking Garage	110 & 115 E Market Street
		Municipal Park	500 E Main Street

Source: Smith Planning and Design



Salisbury City Park
Source: City of Salisbury - https://sbyparksandrec.com/parks/city-park

Map 6.8: At Risk Municipal Facilities - CS-CRAB Inundation Zones



COMMERCIAL & RESIDENTIAL STRUCTURES AT RISK - MUNICIPAL

Commercial and residential structures located within the seven (7) municipalities of Wicomico County were assessed to determine sea level rise vulnerability using the Maryland Coast Smart - Climate Ready Action Boundary (CS-CRAB) Flood Depth Grid raster layer. This assessment, including mapping products, was added as a new element during the plan update. Assessment results indicate that commercial and residential structures within the City of Fruitland (Map 6.9) are not located within CS-CRAB Flood Depth Grid raster layer.

Mardela Springs

The CS-CRAB Flood Depth Grid raster layer surrounds Barren Creek, depicted in Map 6.10. A total of 7 structures within town limits are located within the CRAB flood depth grid.

Salisbury

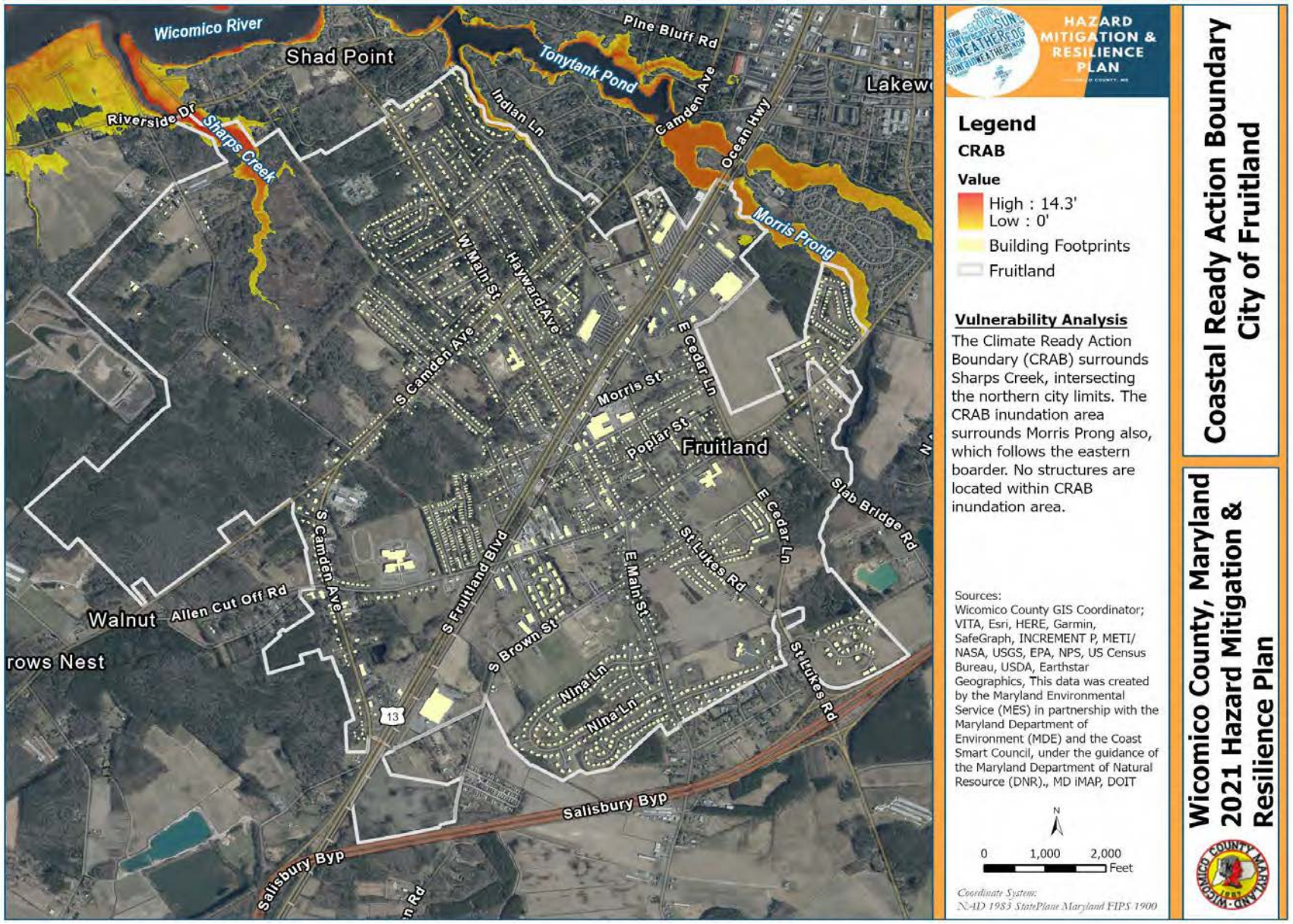
The CS-CRAB Flood Depth Grid raster layer intersects the City of Salisbury's boundary through several waterways. A total of 387 structures, both residential and commercial, are located within the CRAB flood depth grid raster layer. At-risk structures are depicted on Map 6.11.

Sharptown

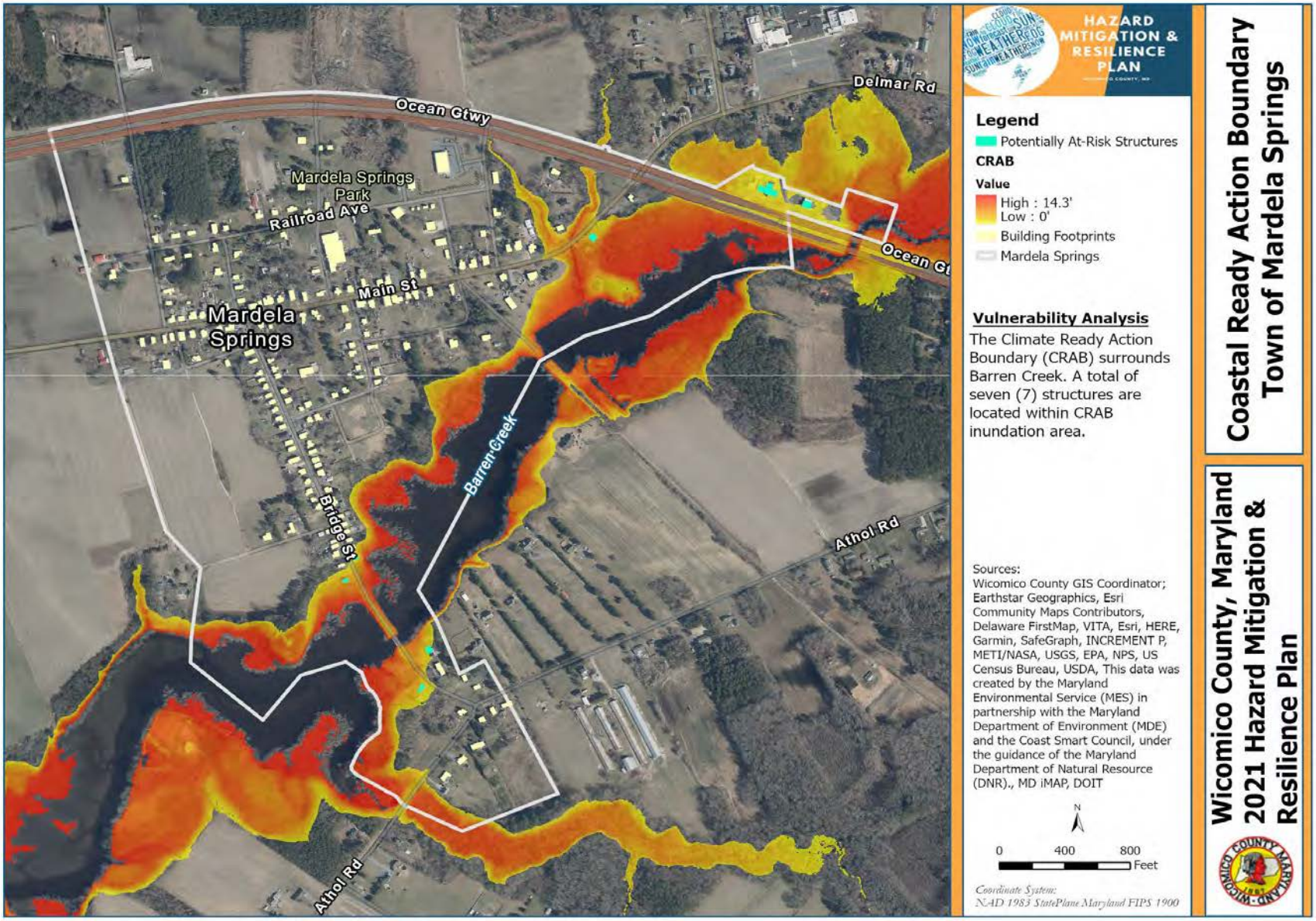
The CS-CRAB Flood Depth Grid raster layer intersects the town limits via the Nanticoke River. A total of 89 structures are located within the CRAB flood depth grid raster layer (Map 6.12).

Note: Flood vulnerability assessment results were shared with and reviewed by municipal representatives.

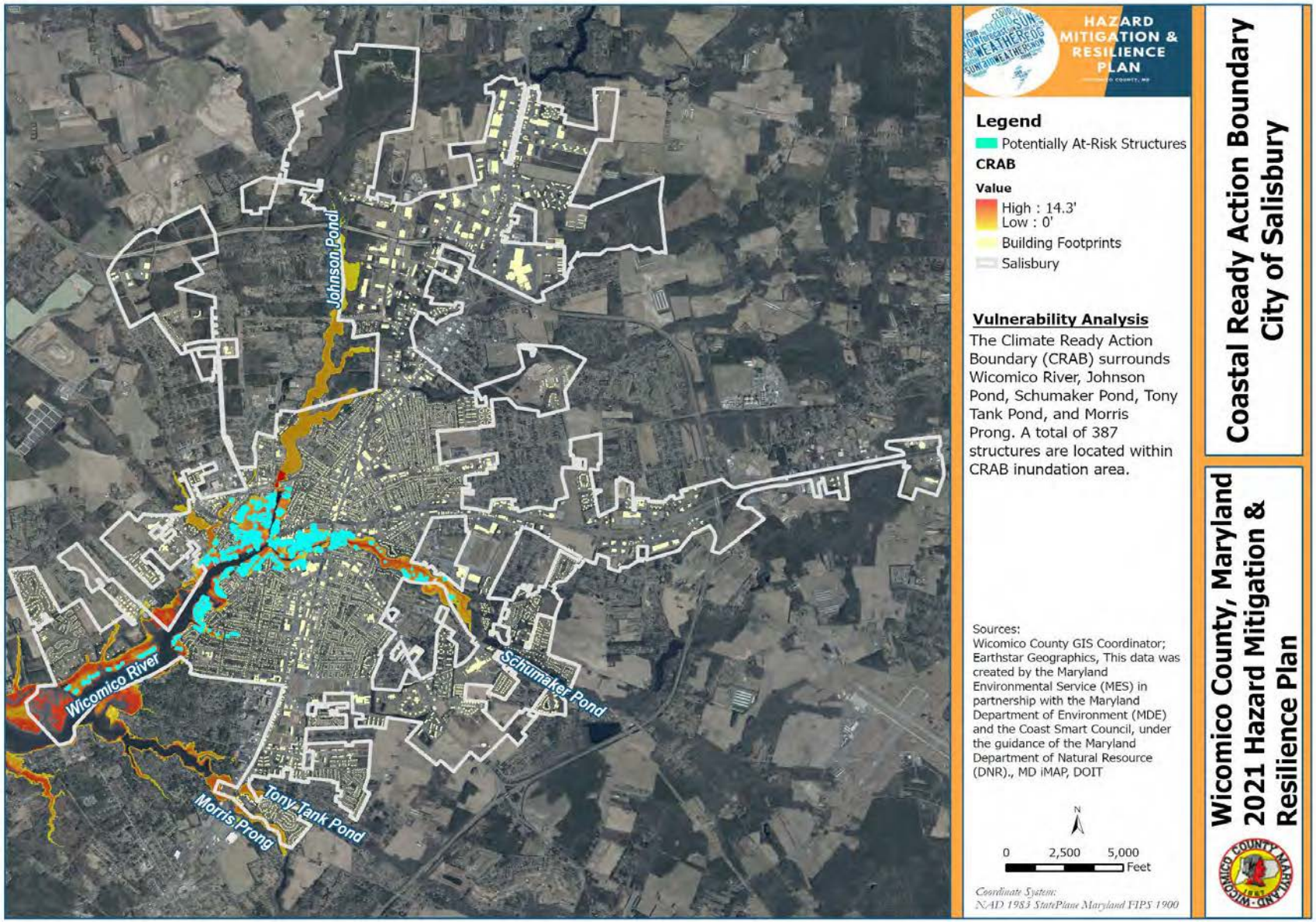
Map 6.9: City of Fruitland - CS-CRAB Inundation Zones



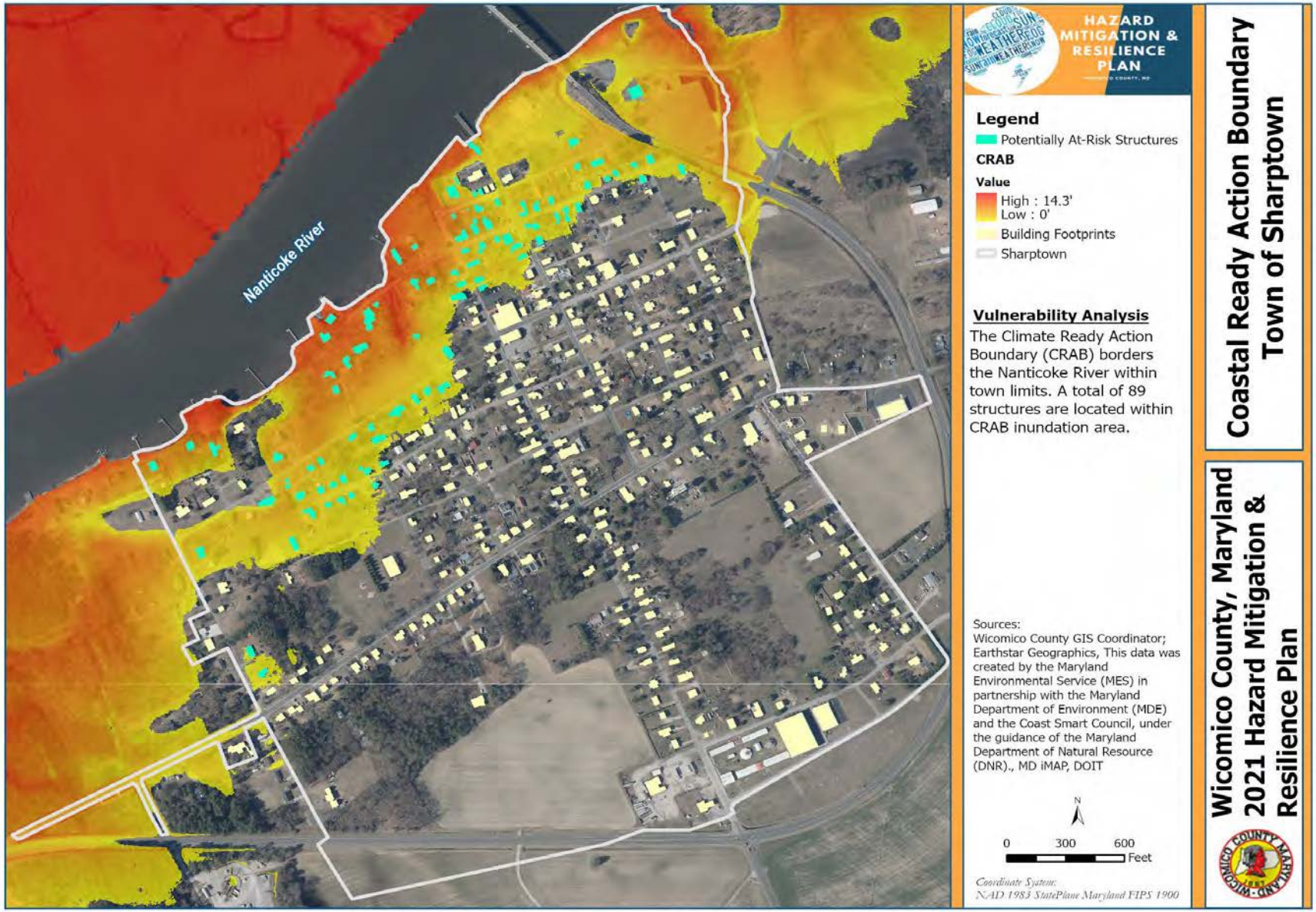
Map 6.10: Town of Mardela Springs - CS-CRAB Inundation Zones



Map 6.11: City of Salisbury - CS-CRAB Inundation Zones



Map 6.12: Town of Sharptown - CS-CRAB Inundation Zones



LOSS ESTIMATIONS - UNINCORPORATED COMMUNITY LIFELINES & PUBLIC FACILITIES

Loss estimates for community lifelines and public facilities located in the CS-CRAB inundation areas were assessed. Structure improvement values using the most recent Maryland Tax Assessment values are included in Table 6.12.

Table 6.12: Loss Estimates for Public Facilities

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
GREATER THAN 2 FEET CRAB INUNDATED			
County Owned	Tyaskin Park	$5,800	$7,429,500
	Westside Solid Waste	$2,700	
	Whitehaven Ferry	$1,300	
	Cedar Hill Marina & Park	$179,700	
	Office of State's Attorney	$3,091,300	
	Riverside Boat Ramp	$56,700	
	Library	$3,918,500	
	Bivalve Wharf	$1,700	
	Nanticoke Harbor	$160,400	
	Wetipquin Boat Launch	$9,900	
	Upper Ferry Harbor	$1,500	
Fire	Salisbury Fire Department – Station 16	$7,618,600	$7,618,600
Medical	William C Fritz Health Center	$1,199,700	$1,199,700
Tower	Wicomico County Tower	*$175,000	*$175,000
Sanitary	Sharptown Sewer Plant	$24,800	$138,300
	Salisbury Pumping Station	$61,900	
	Salisbury Pump Station M Park	$51,600	
Aboveground Storage Tank	Perdue Inc. (3 tanks)	**$1,500	$7,500
	Taylor Oil Co., Inc. (2 tanks)	**$1,500	
Underground Storage Tank	Green Hill Country Club	**$1,500	$3,000
	Valet Cleaners	**$1,500	
1-2 FEET CRAB INUNDATED			
County Owned	Cope Bennett Park	$21,000	$21,000
Sanitary	Salisbury Sewage Pumping Plant	$98,900	$98,900
0-1 F00T CRAB INUNDATED			
Tower	Tower	*$175,000	$350,000
	Tower	*$175,000	
Underground Storage Tank	Mardela Goose Creek	**$1,500	$1,500

Source: Smith Planning and Design, Maryland Property View- Parcel Dataset June 2020
**Average cost for a cell tower.*
***Average cost for above and underground storage tanks*

LOSS ESTIMATIONS - MUNICIPAL OWNED

Loss estimates for municipal owned facilities located in the CS-CRAB inundation areas were assessed. Current assessment values within the City of Salisbury's parcel database were used.

Table 6.13: Loss Estimations for Municipal Owned Facilities

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
Salisbury	Fire Training	$88,433	$7,786,900
	Port of Salisbury Marina	$125,500	
	Salisbury City Park	$1,057,267	
	Salisbury Zoo & Park	$2,556,000	
	DPW - Water & Sewer Branch	$303,733	
	Parking Garage	$2,598,700	
	Municipal Park	$1,057,267	

Source: Smith Planning and Design & City of Salisbury – Parcel Database

LOSS ESTIMATION BY LAND USE – COUNTYWIDE

In determining loss estimations for the 2021 Plan update, structures constructed between 2017 and April 2021 were derived from permit data provided by Wicomico County Permit and Inspections Division. Loss estimates were included for these new structures using Maryland Tax Assessment total improvement values. Table 6.14 lists the total number of new structures that have been constructed within the CS-CRAB inundation areas.

Table 6.14: 2021 Loss Estimates for new Construction by Land Use

Land Use	Loss Estimates (Total Improvement Values)
GREATER THAN 2 FEET CRAB INUNDATED	
Residential - (17 structures)	$8,859,700
1-2 FEET CRAB INUNDATED	
Residential - (1 structure)	$244,400
0-1 F00T CRAB INUNDATED	
Residential - (1 structure)	$54,900

Source: Wicomico County Permit and Inspections Division and Smith Planning and Design

6.4 RECENT MITIGATION EFFORTS

Wicomico County currently has two (2) shoreline restoration projects occurring: Cove Road and Roaring Point. Both projects were funded by the Maryland Department of Natural Resources, Chesapeake & Coastal Service, and Shoreline Conservation Service.

Living Shoreline Project at Cove Road

- This project is located along the Nanticoke River at Cove Road in Bivalve. This project involves the construction of approximately 260 linear feet of a segmented low-profile stone breakwaters on filter fabric, placement of clean sand fill, planting of marsh grasses and the restoration of all graded and disturbed areas.

Source: Wicomico County Recreation, Parks & Tourism

Living Shoreline Project at Roaring Point

- This project is located along the Nanticoke River at Red Hill Lane in Nanticoke. This project involves the construction of approximately 345 linear feet of a segmented low-profile stone breakwaters on filter fabric, placement of clean sand fill, planting of marsh grasses and the restoration of all graded and disturbed areas.

Source: Wicomico County Recreation, Parks & Tourism

6.5 CONCLUSION

Shoreline erosion and sea level rise are both occurring in Wicomico County. While theses hazards are ranked as medium and medium-low, respectively, mitigation actions can be implemented in identified areas to reduce the risk of property loss and/or facility impacts.

The shoreline beginning near the community of Waterview, running parallel with Nanticoke Road, and extending to Stump Point, has high and moderate erosion rates. As such, this area is recommended for shoreline restoration. The upper portion of this area is owned by several private property owners, while the lower portion of the shoreline is owned by the State of Maryland.

Using the Coast Smart Climate Ready Action Boundary (CS-CRAB) Inundated Zones data layer, loss estimates for community lifelines facilities were calculated and reported on Table 6.12 and facilities were listed on Table 6.10. The City of Salisbury's Fire Department – Station 16 is located within the greater than 2 feet CS-CRAB inundation zone. In addition, the following sanitary facilities are located within the CS-CRAB inundation zones:

- Pumping Station, 611 Ridge Road
- Salisbury Pump Station M Park, North Park Drive
- Sharptown Sewer Plant, Little Water Street
- Salisbury Sewage Pumping Plant, 100 Delaware Avenue

These facilities should be further assessed for vulnerability and resiliency.

CHAPTER 7 – SEVERE WEATHER

Updates to the Wicomico County Chapter 7 -Severe Weather included the following:

- Updated Thunderstorm Wind Event Data
- Updated Tornado Event Data
- Updated Hail Event Data
- Updated Lightning Event Data
- Updated High Wind Event Data
- Updated Strong Wind Event Data
- Added pictures and updated graphics throughout the chapter.
- Added conclusion to the chapter.

CHAPTER 7 – SEVERE WEATHER

7.1 INTRODUCTION

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

7.2 THUNDERSTORM WIND HAZARD CHARACTERIZATION

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 20-30 minutes.

7.3 THUNDERSTORM WIND HAZARD RISK & HISTORY

Between 1958 and 2021, the *National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI)* reported ninety-seven (97) thunderstorm wind event days that occurred in Wicomico County resulting in a total of one hundred thirty-two (132) total events recorded within the database. While only thunderstorm wind events with reported property damage greater than $5,000 are shown in Table 7.1, it is important to note that many other thunderstorms wind events resulted in property damage less than $5,000.

The National Weather Service (NWS) considers a **thunderstorm wind** event severe only if produces wind gusts of 58 mph or higher, precipitates large hail (3/4 in. diameter or larger), or results in tornados.

Note: Property damage estimates were not recorded in the database prior to 1995.

Table 7.1: Thunderstorm Wind Events with Reported Property Damage Greater than $5,000

Location	Date	Event Narrative	Property Damage
Salisbury	November 11, 1995	Numerous power lines down and poles snapped. Trees down, some caused damage to buildings.	$30,000
Powellville	November 11, 1995	Several power poles snapped off. Trees were downed. Roofs off two chicken houses in Parsonsburg; one chicken house destroyed, and VFW damaged in Powellville.	$40,000
Salisbury	May 4, 1996	Several trees downed and roof blown off a chicken house.	$12,000
Salisbury	July 16, 1997	Wind gust of 68 mph recorded at WBOC TV. Portions of a motel roof and industrial park roofs were blown off. Numerous trees and wires down.	$30,000
Salisbury	June 13, 1998	Thunderstorm winds caused construction wall to collapse at Giant food store.	$5,000
Hebron	June 26, 1998	Barn was destroyed and top of trees blown off.	$10,000
Salisbury	April 28, 2002	Trees down on two houses.	$5,000
Tyaskin	June 6, 2007	Approximately 15 trees were downed along Wetipquin Creek.	$5,000

Location	Date	Event Narrative	Property Damage
Salisbury	June 29, 2012	A derecho produced a widespread path of damaging winds across much of the Lower Maryland Eastern Shore. Numerous trees were downed in Salisbury.	$5,000
Mardela Springs	June 13, 2013	A squall line produced widespread wind damage across much of the Maryland Eastern Shore. Wind gusts up to 70 mph (60 knots) produced widespread damage across the county. The most significant damage was near Mardela Springs where several trees were downed onto homes. A storage shed was also blown over. Significant damage was also observed around the Mardela Springs Middle and High Schools. Softball dugouts were destroyed, soccer goals were damaged, and bleachers were blown over. Several trees were sheared and some toppled around the schools. Additional trees were downed in Delmar and Salisbury.	$20,000
Countywide	January 11, 2014	Scattered severe thunderstorms in advance of a cold front produced damaging winds across portions of the Lower Maryland Eastern Shore. Long stretch of pool fence was blown over. Several large trees were also downed.	$5,000
2021 HMP Update			
Salisbury	July 2, 2015	After collaboration with county emergency management, a wet microburst was determined to have downed several trees from Marble Court to Kaywood Drive, including the Tide Mill Apartment Complex. All damage was reported in a narrow one mile stretch just northwest of Salisbury Airport, or along the Route 13 Bypass.	$5,000
Nr. Melson Rd.	July 13, 2016	Chicken coop was destroyed. Shingles were blown off a roof. Small tree was snapped off.	$5,000
Parsonburg	June 28, 2019	Large trees were downed. There was also damage to a trailer, chicken house and trampoline. This damage occurred at the 7300 Block of Parsonsburg Road and Grant Road.	$10,000
Salisbury	July 17, 2019	Multiple trees and power lines were downed in Salisbury, including four reports of trees down on houses.	$5,000
Fruitland	October 31, 2019	Winds caused a transformer fire in Fruitland.	$5,000

Source: NOAA NCEI
***Note:** Estimated property damage is reported within the NCEI database.*

In terms of number of occurrences, the NOAA NCEI listed a total of seventy (70) thunderstorm wind event day listings with reported property damage affecting Wicomico County during the time period of 1995-2021. According to the data, on average, Wicomico County experiences approximately 2.6 thunderstorm events with recorded property damage per year.

7.4 THUNDERSORM WIND VULVERABILITY

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

Source: Mardela Springs; Storm damage in Mardela Springs; Photo: WBOC reporter Amy Lu

7.5 TORNADO HAZARD CHARACTERIZATION

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

Tornados can be ranked by intensity using the Fujita Scale devised by Dr. Theodore Fujita at the University of Chicago in 1971. Since 2007, tornadoes are rated by the Nation Weather Service according to the Enhanced Fujita Scale (EF Scale). Ratings vary from EF0, for light damage, to EF5, for total destruction of a building. A tornado's rating is determined by a combination of wind speed (Table 7.2) and damage estimates to structures. Figure 7.1, below, provides basic FEMA definitions for each category.

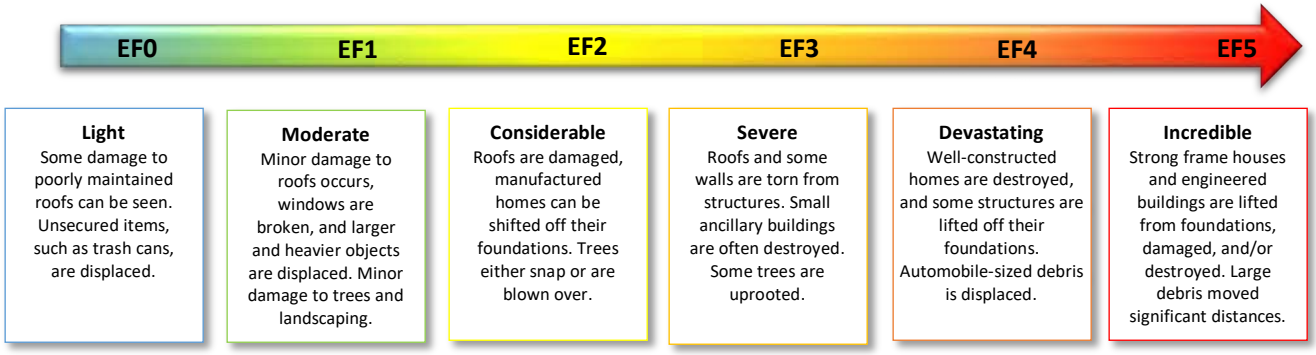
Table 7.2: Enhanced Fujita Scale for Tornado Damage

Enhanced Fujita Wind Scale	
EF Number	**3 Second Gust (mph)***
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200
* The three-second gust is the highest sustained gust over a 3 second period having a 1 in 50 probability of being exceeded per year.	

Source: NOAA.gov

Vehicles damaged by a possible tornado sit in a parking lot in Salisbury.
Source: Baltimore Sun, August 7, 2017. (Ralph Musthaler / AP)

Figure 7.1 – Enhanced Fujita Wind Scale



Local National Weather Service (NWS) offices are responsible for issuing tornado warnings. Tornado warnings indicate that a tornado has been spotted or that Doppler radar detects a thunderstorm circulation capable of spawning a tornado. Nationally, tornado season is from March through August. According to the *United States Tornadoes*, July is the peak month for tornado activity in Maryland.

7.6 TORNADO HAZARD RISK & HISTORY

According to NOAA NCEI, during the time period of 1962 and 2020, there have been a total of eleven (11) tornados reported during eight (8) severe weather events in Wicomico County. Table 7.3 provides additional information on these events.

Table 7.3: Tornado Events

Location	Date	Event Narrative	Magn-itude	Width	Property Damage	Injuries
SW of Sharptown	June 24, 1962	No Report	F0	17 Yards	$300	0
Nr. Adkins Mill Park	October 8, 1965	No Report	F1	150 yards	$25,000	0
County	August 4, 1975	No Report	F1	77 Yards	$25,000	0
Nr. Fruitland	May 10, 1990	No Report	F1	23 Yards	$25,000	0
E. Side of Salisbury	May 10, 1990	No Report	F0	100 Yards	$25,000	0
Nr. Willards	May 10, 1990	No Report	F1	23 Yards	$25,000	2
Near Hebron	July 5, 2001	Several tree tops snapped or twisted.	F0	50 Yards	$3,000	0
Quantico	April 28, 2002	Tornado (F0) downed trees and sheared off numerous tree branches along 4 mile path that ended 2 miles southwest of Quantico.	F0	100 Yards	$5,000	0
2021 HMP Update						
Fruitland - Salisbury	August 7, 2017	Tornado initially touched down near Salisbury Univ. along HW13 & Dogwood Dr. damaging several businesses. It struck a strip mall along HW13 tossing vehicles around in parking lot. A concrete building in the area collapsed due to bay doors being open. Tornado most intense at time of touchdown near Univ. It tracked NE and damaged a home on Rogers Street.	EF1	150 yards	$750,000	0
Catchpenny - Quantico	August 4, 2020	Brief EF0 tornado developed over the Wicomico River and tracked NW across the Country Club S. neighborhood and Green Hill Country Club. Minor damage occurred to several homes in the back section of CC south. Siding, shingles, and gutters were torn from houses & numerous trees uprooted. Several trees also uprooted on the golf course of the Green Hill CC.	EF0	100 yards	$50,000	0
Mardela Springs	August 4, 2020	A damage survey conducted by the NWS Wakefield office found a path of storm damage consistent with an EF2 tornado. The tornado touched down near Athol Road just south of Mardela Springs, causing some downed trees and roof damage. It then moved across Main St., causing a house to shift off its foundation. A shed was also totally destroyed. Trees were stripped of bark.	EF2	150 yards	$230,000	0

Source: NOAA NCEI
***Note:** Estimated property damage is reported within the NCEI database.*

In terms of number of occurrences, the NOAA NCEI listed a total of eight (8) tornado events affecting Wicomico County from 1962-2020. According to the data, on average, Wicomico County experiences approximately 0.14 tornado events per year.

7.7 TORNADO VULVERABILITY

According to the information from the NOAA NCEI, there has been approximately $1.2 million in property damages due to tornado activity. Although no fatalities have been reported from tornados in Wicomico County, on May 10, 1990, an F1 tornado injured two people. The entire state of Maryland is subject to the possibility of strong tornados. Even though the possibility of such a tornado occurring in Wicomico County is low, it is a real danger and can occur at almost any time, anywhere in the County. However, design standards for all new development within Wicomico County are required to withstand 100 mph wind speeds.

According to a news report by WBAL in Baltimore, on August 4, 2020, a tornado generated by Tropical Storm Isaias moved a resident's house in Mardela Springs, Wicomico County more than 40 feet off its foundation.

Source: WBAL in Baltimore, August 4, 2020

7.8 HAIL HAZARD CHARACTERIZATION

Hail is only formed during a thunderstorm event. Property damage, specifically crop damage can be caused as a result of hail. Nationally hail causes approximately $1 billion in damage to property and crops each year. In fact, on April 10, 2001, hail caused $2 billion in damages in Kansas City. Due to the complexities and various factors involved in the formation of hail particle size and weight can vary tremendously. The typical size of hail is less than 2 inches in diameter; however, hail size may be up to seven inches in diameter as recorded in Nebraska.

According to *NOAA*, **hail** is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they form into ice.

7.9 HAIL HAZARD RISK & HISTORY

No property or crop damage was reported from hail events by the *NOAA, NCEI Database* for Wicomico County. This could be because if any damage did occur it was not significant enough to be reported. As shown on in Table 7.4, the majority of hail events that have occurred in Wicomico County are before the peak of the growing season which reduces the chance of crop damage.

Table 7.4: Hail Events

Location	Date	Event Narrative	Magnitude
Wicomico	May 15, 1967	No Report	1.25 inches
Wicomico	July 1, 1979	No Report	1.75 inches
Wicomico	August 27, 1992	No Report	1 inch
Salisbury	July 3, 1996	No Report	1.75 inches
Fruitland	March 29, 1997	No Report	1 inch
Delmar	June 2, 1998	No Report	.75 inches

Location	Date	Event Narrative	Magnitude
Fruitland	June 2, 1998	No Report	.75 inches
Salisbury	June 16, 1998	No Report	.75 inches
Salisbury	April 9,1999	No Report	1 inch
Fruitland	July 24, 1999	No Report	1 inch
Mardela Springs	May 22, 2001	No Report	1.25 inches
Quantico	May 22, 2001	No Report	1.25 inches
Quantico	May 26, 2001	No Report	.75 inches
Delmar	July 5, 2001	No Report	.75 inches
Hebron	April 28, 2002	No Report	1.75 inches
Salisbury	August 2,2002	No Report	.75 inches
Salisbury	August 2, 2002	No Report	1 inch
Salisbury	July 4, 2006	No Report	.75 inches
Hebron	May 9, 2009	Quarter size hail was reported on Quantico Road.	1 inch
Salisbury	May 29, 2009	Half dollar size hail was reported.	1.25 inches
Parsonburg	May 29, 2009	Golf ball size hail was reported.	1.75 inches
Wicomico	May 29, 2009	Half dollar size hail was reported.	1.25 inches
Willards	May 29, 2009	Golf Ball size hail was reported.	1.75 inches
Mount Hermon	June 3, 2009	Penny size hail was reported in the vicinity of Snow Hill and Johnson Road.	.75 inches
Tyaskin	June 3, 2009	Nickel size hail was reported.	.88 inches
Melson	June 3, 2009	Nickel size hail was reported.	.88 inches
Salisbury	August 1, 2011	Scattered severe thunderstorms in advance of a weak cold front produced large hail across portions of the Lower Maryland Eastern Shore.	1.75 inches
Delmar	August 19, 2011	Scattered severe thunderstorms in advance of a cold front produced damaging winds and large hail across portions of the Lower Maryland Eastern Shore. Quarter size hail was reported.	1.00 inches
2021 HMP Update			
Pittsville	June 24, 2016	Isolated severe thunderstorm along a frontal boundary produced large hail across portions of the Lower Maryland Eastern Shore. Golf ball size hail was reported near Pittsville.	1.75 inch

Source: NOAA NCEI
Note: *Estimated property damage is reported within the NCEI database.*

In terms of number of occurrences, the NOAA, NCEI listed a total of 21 hail event days affecting Wicomico County from 1967-2020. According to the data, on average, Wicomico County experiences approximately 0.39 hail events per year.

7.10 HAIL VULVERABILITY

Damage to crops is one of the most significant concerns during a hail event. Wicomico County has had the majority of its recorded hail events either before or at the beginning of the growing season. This reduces the amount of crop damage for the County. In addition to crop damage, property damage occurs during hail events. Auto dealerships are particularly vulnerable due to the large volume of product located outdoors. The scale of damage due to the number of cars on large open parking lots can oftentimes be significant, as it is accumulative impact.

7.11 LIGHTNING HAZARD CHARACTERIZATION

According to NOAA, lightning is created as a discharge of built-up energy due to the separation of positive and negative charges which are generated inside a thunderstorm. According to the National Weather Service (NWS), on average, approximately 49 people die each year nationally as a result of lightning strikes. In Maryland, there have been twelve (12) lightning deaths according to the *National Lightning Safety Institute*. All lightning is dangerous and even the

weakest thunderstorm produces lightning. People engaged in swimming, golfing, or hiking are at the highest risk for a lightning strike. Lightning strikes have resulted in over 15 thousand structural fires and burn approximately two million acres of forest per year in the United States.

7.12 LIGHTNING HAZARD RISK & HISTORY

As indicated in Table 7.5 below, lightning strikes have caused multiple structural fires and injured one person and killed another in Wicomico County within the twenty-three (23) years of reported data.

Table 7.5: Lightning Events

Location	Date	Event Narrative	Property Damage
Fruitland	June 15, 1998	Lightning strike caused a fire to a barn and also struck and killed a 20-year-old man.	$20,000
Salisbury	April 9, 2001	Lightning strike caused a fire to a chicken house.	$10,000
Fruitland	July 1, 2009	One person was struck by lightning. The individual was released after receiving medical attention.	Not Available
Salisbury	September 5, 2012	Lightning caused three house fires in a short period of time in the Salisbury city limits. Scattered thunderstorms in advance of a cold front produced lightning which caused several house fires across portions of the Lower Maryland Eastern Shore.	$75,000
2021 HMP UPDATE			
Hebron	June 21, 2016	Scattered severe thunderstorms in advance of a frontal boundary produced damaging winds across portions of the Lower Maryland Eastern Shore. The storms also produced lightning strikes which caused two fires. Lightning strike produced a garage fire.	$5,000

Source: NOAA NCEI
***Note:** Estimated property damage is reported within the NCEI database.*

In terms of number of occurrences, the NOAA NCEI listed a total of five (5) lightning events with either damages or injuries affecting Wicomico County from 1998-2020. According to the data, on average, Wicomico County experiences approximately 0.22 lightning events per year.

7.13 LIGHTNING VULNERABILITY

As shown in the hazard risk and history for lightning, structural fires do occur in the County as a result of lightning strikes. Fortunately, the damage is usually minor. Community lifelines and public facilities should be aware of the risks of such a hazard occurring, particularly power failure. Emergency backup generators should be installed at these facilities.

7.14 HIGH WIND / STRONG WIND EVENTS IN WICOMICO COUNTY

High and strong wind events can also occur in the County without the presence of thunderstorms. There are several reasons as to how winds can occur without the presence of thunderstorms, such as strong low-pressure systems, cold fronts, remnants of hurricanes, and other meteorological causes. Tables 7.6 and 7.7 list high wind and strong wind events, respectively, that have occurred in Wicomico County according to NOAA NCEI.

High wind events as characterized by *NWS* are winds that are over 50 knots (57.5 mph), and strong wind events are less than 50 knots.

Table 7.6: High Wind Events

Location	Date	Event Narrative	Magnitude (MPH)	Property Damage
Salisbury	November 2, 1999	Non-thunderstorm wind gust of 54 knots (62 mph) with trough passage in downtown Salisbury along Route 50.	62	Not Available
Countywide	September 1, 2006	The remnants of Ernesto along the Mid Atlantic coast combined with strong high pressure over New England 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 45 mph (39 knots) at Salisbury. The high winds caused numerous downed trees and power outages, along with significant structural damage.	45 – 66	5 million
Not Available	May 11, 2008	Ocean City Coast Guard Station measured a wind gust of 63 mph. High winds from strong low pressure downed trees and powerlines and caused some structural damage. There were widespread power outages.	63	$25,000
Salisbury	December 31, 2008	Wind gust of 54 knots (62 mph) was measured at Salisbury. Several trees were downed.	62	$2,000
Countywide	February 25, 2011	Wind gust of 59 mph was measured by SBY.	59	$2,000
Countywide	October 29, 2012	The very strong winds caused by Tropical Cyclone Sandy downed trees, produced minor structural damage, and caused scattered power outages.	58	$10,000
2021 HMP UPDATE				
Countywide	January 23, 2016	Strong Low Pressure moving from the Southeast United States northeast and off the Mid Atlantic Coast produced very strong wind gusts across portions of the Lower Maryland Eastern Shore. Wind gust of 50 knots (58 mph) was measured at SBY.	58	$0k
Countywide	March 2, 2018	Intense low pressure spinning off the southern New England coast produced very strong northerly winds across portions of the Lower Maryland Eastern Shore. The very strong winds downed numerous trees, produced structural damage, and caused power outages. The very strong winds downed trees, produced minor structural damage, and caused power outages. Wind gust of 53 knots (61 mph) was measured at SBY.	61	$25,000
Countywide	October 11, 2018	Tropical Cyclone Michael tracked from South Carolina northeast and off the Mid Atlantic Coast from Thursday morning, October 11 into early Friday morning, October 12. Very strong northwest winds on the back side of the storm produced damaging wind gusts across portions of the Lower Maryland Eastern Shore. Several trees were downed and there was minor structural damage.		$5,000

Source: NOAA NCEI

In terms of number of occurrences, the NOAA, NCEI listed a total of nine (9) high wind events affecting Wicomico County during the years 1994-2020. According to the data, on average, Wicomico County experiences approximately 0.41 high wind events per year.

Table 7.7: Strong Wind Events

Location	Date	Event Narrative	Magnitude (MPH)	Property Damage
Salisbury	February 10, 2008	Wind gust of 48 mph was measured at Salisbury.	48	$1,000
Salisbury	March 8, 2008	Wind gust of 42 knots (48 mph) was measured at Salisbury.	48	$1,000
2021 HMP Update				
No Strong Wind events were reported in the NCDC database since the 2016 HMP Planning Process.				

Source: NOAA NCEI
Note: *Estimated property damage is reported within the NCEI database.*

In terms of number of occurrences, the NOAA NCEI listed a total of two (2) strong wind events affecting Wicomico County from the years 2008-2020. According to the data, on average, Wicomico County experiences approximately 0.15 strong wind events per year.

7.15 HIGH WIND / STRONG WIND VULNERABILITY

As shown in the hazard risk and history for high/strong winds, damages can and do occur in the County as a result of high and strong winds. The primary vulnerability due to high/strong winds is from downed trees impacting power lines and other infrastructure, resulting in power outages, road blockages, and other infrastructure damage. Additionally, these wind events have the potential to be dangerous because they may not be associated with an anticipated hazard such as an approaching thunderstorm or other event.

7.16 CONCLUSION

Severe weather oftentimes results in power outages, which disrupts operations at facilities that provide vital services to and for the community. Continuous power at community lifeline facilities are a priority. Generators are an important part of any preparedness, mitigation, and continuity of operations planning.

Emergency generator back-up power at Wicomico County community lifelines facilities listed within Appendix D were reviewed by the Hazard Mitigation Planning Committee (HMPC) for this plan update. This review yielded the following updates:

- Since the implementation of the 2016 Wicomico County HMP Update, several facilities have upgraded their generator capabilities. The previously identified facilities of James M. Bennett High School and the Wicomico Youth and Civic Center have received updated and /or new generators.
- Additionally, plans are ongoing to install new generators at Salisbury Middle and Parkside High Schools.
- The recommendation for generators at the Wicomico County Solid Waste Complex is on-going and partially complete.
- Finally, the installation of generators at high priority pumping locations in Salisbury: Waverly Drive, College Avenue, and Cherokee Lanes have been completed.

Damages from severe weather can result in problems at communication towers. Impacts to communication towers are problematic especially during a hazard event. Review communication towers, specifically those used by Public Safety, for grounding and surge protection devices.

CHAPTER 8 – FLOODING

Updates to the Wicomico County Chapter 8 - Flooding included the following:

- Added New Watershed Map
- Updated Historic Event Tables
- Updated FEMA Special Flood Hazard Areas Map
- Reviewed and Updated Community Lifelines & Public Facilities At Risk to 1% and 0.2% Annual Chance Flood Events
- Added New At-Risk Community Lifelines and Public Facilities Mapping
- Added New Section – Facilities At Risk – Municipalities Of Wicomico County
- Added New At-Risk Municipal Owned Facilities Mapping
- Added New 1% Annual Chance Flood Event Mapping for each Municipality
- Review and Updated Loss Estimations for Community Lifelines and Public Facilities as well as Municipal Owned Facilities
- Added Loss Estimations for New Construction
- Added New Section - Facilities At Risk – Historic Districts, Structures & Cemeteries and Mapping
- Updated National Flood Insurance Program Data
- Updated Repetitive Loss Properties Data and Mapping
- Added New Section – Social Vulnerability
- Added New Section – Recent Mitigation Efforts
- Added New Conclusion Section

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

CHAPTER 8 – FLOODING

8.1 INTRODUCTION

The flood hazard was increased from a "medium" risk ranking in 2016 to a "medium-high" risk ranking in 2021. Factors used to compute risk rankings in 2021 included eight (8) parameters: death, injury, annualized events, geographic extent, property damage, crop damage, future probability, and community perspective. For more detail information on hazard ranking, refer to *Appendix A Hazard Identification and Risk Assessment*. According to hazard event data, six (6) flood and/or flash flood events have occurred since 2016, as well as numerous heavy rain events. As such, the flood hazard chapter was expanded during this plan update and additional data, analysis, and mitigation recommendations have been included.

8.2 HAZARD CHARACTERIZATION

Floods can be caused by the passage of thunderstorms, heavy rain events, hurricanes, snow melt or some combination of the above events.

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

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

The FEMA definition for flooding is "a general condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters or the rapid accumulation of runoff of surface waters from any source".

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

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

Flooding is the most common, destructive, and deadliest natural disaster in the nation, according to National Resource Defense Council (https://www.nrdc.org/stories/flooding-and-climate-change-everything-you-need-know).

Excerpt from 2021 Maryland State Hazard Mitigation Plan

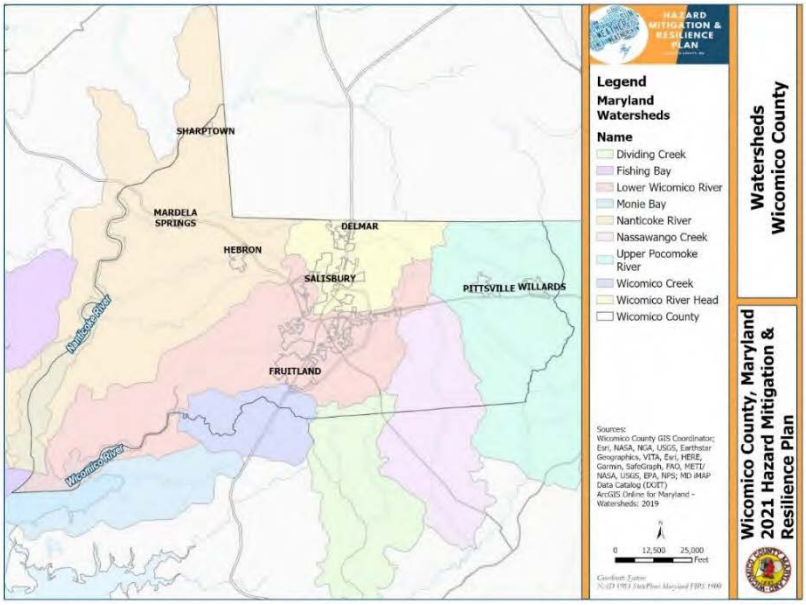
Flood location is influenced by local topography and the ground's capacity to hold water. Dense population centers and other developed areas are at risk for flash flooding because of the prevalence of impervious surfaces. Highways, roads, parking lots, and other paved areas prevent the ground from absorbing rainfall, thereby increasing runoff and the possibility for flood and flash flood events. Areas near water sources, such as rivers, creeks, or other water bodies are likely to experience flooding. Maryland is subject to flooding from several different sources. Flash floods tend to come after short periods of heavy rain and most often affect small streams and creeks. General flooding comes from more prolonged steady rain and tends to affect larger streams and rivers.

Major drainage basins within the County provide drainage directly into the Chesapeake Bay. The eastern one-third of the County drains south toward the Pocomoke River and its tributaries. The central portion of the county is drained by the Wicomico River which flows in a southwesterly orientation. The portion of the County west of a line extending from the Delaware state line south through Hebron to Nanticoke is drained by the Nanticoke River.

The maximum elevation within the Nanticoke River watershed is approximately 40-feet above sea level. The highest elevation within the Wicomico River and Pocomoke River watersheds in the County are 60-feet and 85-feet, respectively. The highest elevation in Wicomico County, 85-feet, is near the Town of Parsonsburg (USGS).

The irregular shoreline is a result of drowned river valleys formed by the gradually sinking land mass. This has led to a change in the overall drainage patterns due to widening rivers and creeks. Extensive estuaries and tidal basins have resulted, producing a myriad of waterways.

Map 8.1: Wicomico County Watersheds



8.3 HAZARD RISK & HISTORY

According to the FEMA *Flood Insurance Study*, Wicomico County has a low lying, relatively undisturbed topography, high seasonal water tables, poor drainage and high soil runoff characteristics. These factors combine to result in a high flooding potential. When heavy rainfall and elevated river discharges combine with storm tides, low lying areas adjacent to rivers and estuaries become inundated with saltwater. Wicomico County has been affected over recent years by flood, heavy rains, and flash flooding as shown in Tables 8.1, 8.2 and 8.3.

FLOOD

In terms of number of occurrences, the NOAA, National Centers for Environmental Information (NCEI) listed a total of nine (9) flood events affecting Wicomico County from 1996-2020; Table 8.1. NCEI defines flood as "any high flow, overflow, or inundation by water which causes damage. In general, this would mean the inundation of a normally dry area caused by an increased water level in an established watercourse, or ponding of water, that poses a threat to life or property." According to the data, on average, Wicomico County experiences approximately 0.36 flood events per year.

Table 8.1: Flood Events

Location	Date	Event Narrative
Salisbury	June 16, 1996	Two to two- and one-half inches of rain in one hour produced flooding of several streets and intersections in the city of Salisbury. The flooding was exacerbated due to backing up of water drainage systems.
Fruitland	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 six to ten inches. Pittsville reported 7.79 inches of rain. Salisbury reported 7.75 inches of rain.
Salisbury	October 29, 2012	Numerous roads were closed due to flooding. Storm total rainfall ranged from five to nine inches across the county. Storm total rainfall of 7.55 inches was reported at the Salisbury Wicomico Airport (SBY).
Salisbury	June 28, 2016	Rainfall totals between 3 and 7 inches fell from Salisbury to the western portion of Wicomico County. The heavy rainfall resulted in several road closures from washed out culverts. In addition, a few dams were topped. The most significant dam was along Highway 349 (Nanticoke Road), where the highway was closed. Part of Highway 13 was closed also near Parker Pond.
Salisbury	September 29, 2016	Several cars were stalled in high water across roadways in Salisbury. Water was also reported in some structures.
Mt. Hermon	September 29, 2016	Tilghman Road was closed due to flooding.
Salisbury	August 12, 2017	Emergency management and law enforcement officials reported that high water, flooding, and road closures continued across portions of the county due to the heavy rain that occurred on Saturday.
Delmar	May 18, 2018	Sinkhole was reported near the intersection of Melson Church Road and East Line Road in Delmar. Numerous roads remained closed due to ongoing flooding from heavy rainfall across portions of the county.
Jesterville	October 12, 2018	Numerous roads remained impassable or closed across much of the county due to lingering flooding.

Source: NOAA NCEI

***Note:** Only one (1) flood event reported property damage within NCEI database. The event occurred on September 29, 2016 and reported an estimated of $20,000 in property damage.*

Heavy Rain and Flash Flooding events are closely correlated. Heavy rains produced by Hurricane Irene caused widespread low-land flooding for much of the County, which washed out or closed several roadways. Total rainfall recorded ranged between six (6) to ten (10) inches in the County. The Town of Pittsville reported 7.79 inches, while the City of Salisbury reported

7.75 inches. In 2012, Hurricane Sandy produced heavy rain causing numerous roads to close due to the flooding. This storm produced a total rainfall from five (5) to nine (9) inches across the County. The City of Salisbury reported a total of 7.55 inches.

FLASH FLOOD

In terms of number of occurrences, the NOAA, NCEI listed a total of nine (9) Flash Flood events affecting Wicomico County from 2000-2020. According to the data, on average, Wicomico County experiences 0.43 Flash Flood events per year.

Table 8.2: Flash Flood Events

Location	Date	Event Narrative
Salisbury	May 25, 1995	Up to 3 feet of water at some intersections in and east of downtown Salisbury leaving several vehicles trapped and occupants being rescued.
Salisbury	June 16, 1996	Two and half inches of rain in one hour produced flooding of several streets and intersections in the city of Salisbury. The flooding was exacerbated due to backing up of water drainage systems.
Delmar	September 2, 2000	Slow-moving thunderstorms dumped heavy rain over portions of the Eastern Shore causing flooding of the East Line Road near Route 13.
Wango	September 1, 2002	Portions of Ben Davis Road and Wango Road closed due to high water; bridge on Bear Swamp Road washed out.
Powellville	May 17, 2004	Purnell Crossing Road was washed out between Willards and Powellville.
Salisbury	June 23, 2006	Roads were flooded in downtown area of Salisbury.
Wicomico	July 29, 2007	Several roads were reported closed due to excessive rainfall, for example, Camden Avenue due to 1 foot of water covering the road.
Salisbury	August 2, 2009	Numerous roads were flooded throughout the city with a water depth of 2 feet.
2021 HMP Update		
Salisbury	September 29, 2016	Numerous roads were closed around Salisbury and in areas across the county. Several evacuations occurred. Several homes were flooded, and dams were at emergency water levels.
Salisbury	August 12, 2017	Portions of Harbor Point Drive were washed out and were impassable. Numerous roads were closed due to standing water.
Powelllville	October 12, 2018	Numerous roads were impassable or closed across much of the county due to flash flooding. Also, flooding was reported at the Salisbury Zoo.

Source: NOAA NCEI

***Note:** Only one (1) flood event reported property damage within NCEI database. The event occurred on September 29, 2016, and reported an estimated of $50,000 in property damage.*

HEAVY RAIN

Flooding damaged roads and forced evacuations in Salisbury on Saturday, February 26, 2018, after heavy rains.

Source: DelmarveNow.com; City of Salisbury Image
https://www.delmarvanow.com/story/news/local/maryland/2018/02/26/chronic-flooding-learn-what-wicomicos-doing-problem/363791002/

In terms of number of occurrences, the NOAA, NCEI listed a total of fifty (50) heavy rain events affecting Wicomico County from the years 1998-2020. According to the data, on average, Wicomico County experiences approximately 2.2 heavy rain events per year.

Table 8.3: Heavy Rain Events

Location	Date	Event Narrative
Salisbury	January 27 to January 28, 1998	A Nor'easter produced heavy rain and strong winds across the Lower Maryland Eastern Shore. Rainfall totals ranged from 3 to 5 inches. This rainfall caused street flooding and flooding of poor drainage areas throughout the region.
Salisbury	February 4 to February 6, 1998	A Nor'easter produced heavy rain and strong winds across the Lower Maryland Eastern Shore. Rainfall totals 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.
Wicomico	October 24 to October 27, 2007	Rainfall amounts averaged between 2 to 3 inches across the County.
Parsonburg	December 10 to December 12, 2008	Rainfall amounts between 1 to 4 inches occurred across the County. 3.01 inches was measured at Parsonsburg.
Wicomico County Airport	November 11 to November 13, 2009	Salisbury recorded 3.95 inches of rain. Two and a half miles west southwest of Salisbury recorded 3.72 inches of rain.
Salisbury	March 29, 2010	Rainfall amounts of one to three inches occurred across the county. Salisbury reported 2.04 inches of rain. Showers and thunderstorms associated with low pressure and a cold front produced one to three inches of rain across portions of central and eastern Virginia from Sunday night, March 28th, into Monday evening March 29th.
Wicomico	May 16, 2014	Salisbury (SBY) reported 1.32 inches of rain. Heavy rain occurred along a frontal boundary across much of the Lower Maryland Eastern Shore. Rainfall amounts were mainly between one and two inches.
2021 HMP Update		
Salisbury	November 9-10, 2015	Rainfall amounts generally ranged between 1.5 inches and 2.8 inches across the county. Hebron (1 SSW) reported 2.83 inches of rain. Salisbury (3 WSW) reported 2.59 inches of rain.
Hebron	June 28, 2016	Rainfall total of 4.51 inches was measured at 1 mile south southwest of Hebron.
Parsonburg	June 28, 2016	Rainfall total of 2.23 inches was measured at 2 miles south southwest of Pittsville.
Siloam	June 28, 2016	Rainfall total of 6.22 inches was measured at 2 miles northwest of Shad Point.
Wicomico	July 29, 2016	Rainfall total of 2.57 inches was reported from July 28.
Delmar	September 19-22, 2016	Rainfall totals generally ranged from 1 inch to 4 inches across the county. Delmar reported 3.31 inches of rain. Hebron (1 SSW) reported 3.15 inches of rain. Pittsville (2 SSW) reported 3.12 inches of rain. Salisbury Wicomico Airport (SBY) reported 2.15 inches of rain.
Pittsville	September 28-30, 2016	Rainfall totals generally ranged from 3 to 9 inches across the county. Pittsville (2 SSW) reported 9.29 inches of rain. Hebron (1 SSW) reported 8.65 inches of rain. Salisbury (5.5 SW) reported 8.27 inches of rain. Parsonsburg (1 W) reported 5.88 inches of rain. Salisbury Wicomico Airport (SBY) reported 4.25 inches of rain. Delmar reported 3.26 inches of rain.
Hebron	October 8-9, 2016	Rainfall totals generally ranged from 3 to 5 inches across the county. Hebron (1 SSW) reported 3.96 inches of rain. Salisbury Wicomico Airport (SBY) reported 3.34 inches of rain. Pittsville (2 SSW) reported 3.33 inches of rain. Shad Point (2 NW) reported 3.10 inches of rain.
Salisbury	July 14, 2017	Minor street flooding was reported on East Main Street.
Delmar	July 15, 2017	Rainfall total of 1.49 inches was measured at Delmar.
Wicomico	July 15, 2017	Rainfall total of 1.95 inches was measured at the Salisbury Wicomico Airport (SBY).
Wicomico	July 15, 2017	Rainfall total of 2.19 inches was measured at Parsonsburg (1 W).
Salisbury	July 15, 2017	Rainfall total of 1.43 inches was measured at Salisbury (1 N).
Siloam	July 15, 2017	Rainfall total of 2.53 inches was measured at Salisbury (5.5 SW).
Hebron	July 15, 2017	Rainfall total of 2.20 inches was measured at Hebron (1 SSW).
Wicomico	July 29, 2017	Rainfall total of 4.03 inches was measured at Parsonsburg (1 W).
Salisbury	July 29, 207	Rainfall total of 4.60 inches was measured at Lakewood (1 ENE).
Wicomico	July 29, 2017	Rainfall total of 4.36 inches was measured at Salisbury Wicomico Airport (SBY).

Location	Date	Event Narrative
Parsonburg	July 29, 2017	Rainfall total of 5.81 inches was measured at Pittsville (2 SSW).
Delmar	August 8, 2017	Rainfall total of 4.08 inches was measured at Delmar.
Hebron	August 8, 2017	Rainfall total of 3.54 inches was measured at Hebron (1 SSW).
Manokin	August 8, 2017	Rainfall total of 4.31 inches was measured at Shad Point (2 NW).
Salisbury	August 8, 2017	Rainfall total of 3.69 inches was measured at Salisbury (1 N).
Parsonsburg	August 8, 2017	Rainfall total of 3.03 inches was measured at Parsonsburg (1 W).
Hebron	August 8, 2017	Rainfall total of 3.60 inches was measured at Hebron (1 SSW).
Fruitland	August 12, 2017	Rainfall total of 5.25 inches was measured near Fruitland.
Wicomico	August 13, 2017	Rainfall total of 7.59 inches was measured at Parsonsburg (1 W).
Wicomico	August 13, 2017	Rainfall total of 6.57 inches was measured at Salisbury Wicomico Airport (SBY).
Pittsville	August 13, 2017	Rainfall total of 6.76 inches was measured at Pittsville (2 SSW).
Hebron	August 13, 2017	Rainfall total of 4.36 inches was measured at Hebron (1 SSW).
Parsonburg	May 14, 2018	Rainfall total of 1.72 inches was measured at Mesonet Station PWLM2 (2 SSW Pittsville).
Hebron	May 14, 2018	Rainfall total of 2.23 inches was measured at Mesonet Station AU888, (1 SSW Hebron).
Manokin	May 14, 2018	Rainfall total of 2.12 inches was measured at Mesonet Station C1767, (2 NW Shad Point).
Wicomico	May 14, 2018	Rainfall total of 1.76 inches was measured at Salisbury Wicomico Airport (SBY).
Manokin	May 17-19, 2018	Three-day rainfall total was 4.80 inches at Mesonet Station C1767 (2 NW Shad Point).
Wicomico	May 17-20, 2018	Three-day rainfall total was 4.93 inches at SBY.
Hebron	May 17-19, 2018	Three-day rainfall total was 7.23 inches at Mesonet Station AU888 (1 SSW Hebron).
Wicomico	October 11-12, 2018	Rainfall total of 7.10 inches was reported at Salisbury Wicomico Airport (SBY). Rainfall total of 7.35 inches was reported at Lakewood. Rainfall total of 6.12 inches was reported at Pittsville (2 SSW).
Parsonburg	October 20, 2019	Rainfall total of 2.77 inches was reported at Powellville.
Wicomico	October 20, 2019	Rainfall total of 1.81 inches was reported at airport.
Wicomico	October 29-30, 2020	Rainfall totals between 1.5 inches and 2.5 inches were reported across the county.
Delmar	November 11-12, 2020	Rainfall totals generally ranged between two inches and five inches across the county. Rainfall total of 4.93 inches was reported at (0.2 NE) Delmar. Rainfall total of 4.24 inches was reported at (1.8 ENE) Fruitland. Rainfall total of 3.82 inches was reported at (1.6 WNW) Parsonsburg.
Salisbury	December 4-5, 2020	Rainfall totals generally ranged between two inches and five inches across the county. Rainfall total of 4.74 inches was reported at (3.4 SSE) Salisbury. Rainfall total of 3.66 inches was reported at (1.8 ENE) Fruitland. Rainfall total of 3.09 inches was reported at SBY. Rainfall total of 2.88 inches was reported at (0.2 NE) Delmar.

Source: NOAA NCEI

Note: *Property damage for heavy rain within NCEI database was either not available or not reported.*

Several heavy rain events listed in Table 8.3 indicate that these events were associated with the passage of Nor'easters. Finally, seven (7) heavy rain events resulted in rainfall of five (5) inches or more.

8.4 VULNERABILITY

Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). Flood zones are the geographic areas that FEMA has defined according to their varying levels of flood risk. The flood zones for Wicomico County are described in Table 8.4.

Table 8.4: Flood Zone Descriptions

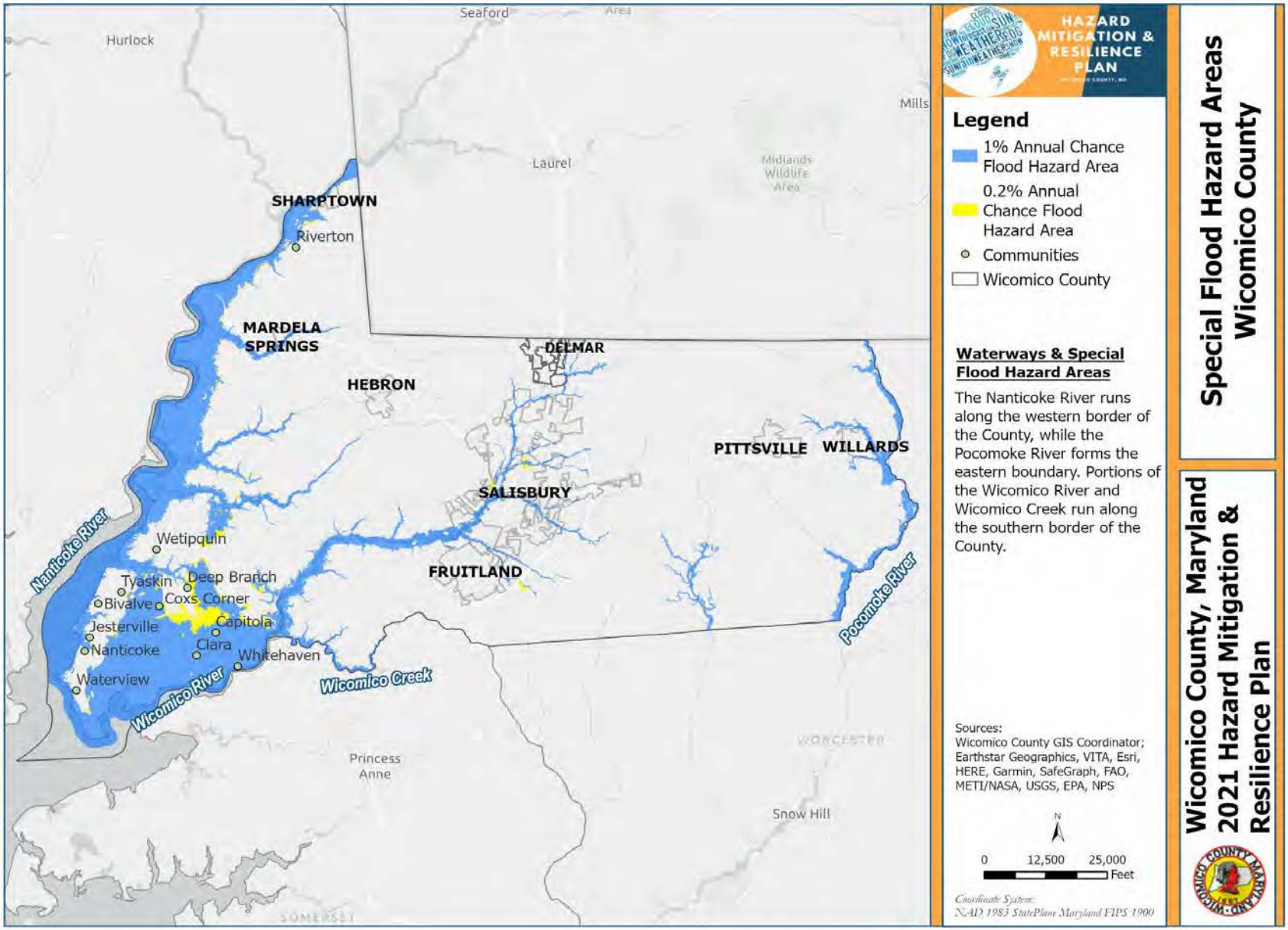
% Annual Chance	Flood Zone	Description
High Risk Areas		
1% Annual Chance Flood Hazard	A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
	AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
High Risk – Coastal Area		
1% Annual Chance Flood Hazard	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 Area		
0.2% Annual Chance Flood Hazard	Zone X 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. *Note: private insurance companies, other than NFIP, may have different requirements.*

Source: FEMA

As depicted below on Map 8.2, the western and southern portions of Wicomico County are most vulnerable to flood risk. The western area is within high-risk areas for both riverine and coastal flooding (Zones A, AE and VE). Several communities, such as Coxs Corner, Clara, Capitola, and Whitehaven are located within the southern tip of the Wicomico County and are within the riverine high-risk area (Zone AE). While other numerous communities are in close proximity to high-risk areas (Zones A and AE). For example, Wetipquin, Deep Branch, Tyaskin, Nanticoke, Jesterville, Bivalve, Waterview and Riverton are on the fringe of high-risk Zone AE. These communities, specifically those located within high-risk Zone AE are prone to flooding during a 1% annual chance flood event due to the Nanticoke River. Mitigation measures such as installing flood vents should be taken to minimize or avoid damage caused by flooding.

Additionally, moderate to low-risk zone known as 0.2% annual chance flood hazard area should be considered for flood mitigation opportunities. For instance, flood insurance is available to property owners in these areas at a reasonable rate. Considering future conditions due to increased storm activity, these opportunities should be provided to the communities.

Map 8.2: FEMA Special Flood Hazard Areas



8.5 FACILITIES AT RISK – UNINCORPORATED AREAS OF WICOMICO COUNTY

COMMUNITY LIFELINES & PUBLIC FACILITIES

During the 2021 Plan Update, community lifelines and public facilities were assessed for flood vulnerability. Detailed information about community lifelines and public facilities was provided in Chapter 4 - Coastal Storms on page 4-18. The special flood hazard area, also known as the 1 percent annual chance flood hazard area, was mapped along with community lifelines and public facilities to assess flood vulnerability. Community lifelines and public facilities listed on Table 8.5 are located within each corresponding flood hazard area. Twenty-seven (27) community lifelines and public facilities (structures) are located within 1 percent annual chance flood hazard area (Flood Zone A, AE, VE). A total of six (6) community lifelines and public facilities (structures) are located within 0.2 percent annual chance flood hazard area (Flood Zone X Shaded).

Table 8.5: Community Lifelines and Public Facilities- Special Flood Hazard Areas

Facility Type	Number of Facilities	Map ID # / Facility Name	Address of Facility	City
1% ANNUAL CHANCE FLOOD HAZARD AREA				
County Owned	15	1 / Tyaskin Park	4778 Tyaskin Road	Tyaskin
		2 / Westside Solid Waste	20906 Nanticoke Road	Bivalve
		3 / Whitehaven Ferry	23865 River Street	Quantico
		5 / Riverside Boat Ramp	Riverside Drive	Salisbury
		6 / Housing Authority	613 Delaware Avenue	Salisbury
		8 / Bivalve Wharf	Bivalve Wharf Road	Bivalve
		9 /11 Nanticoke Harbor (2)	20411 Harbor Road	Nanticoke
		12 / Housing Authority	611 Delaware Avenue	Salisbury
		13 / Housing Authority	609 Delaware Avenue	Salisbury
		14 / Wetipquin Boat Launch	21664 Wetipquin Road	Tyaskin
		10 / Upper Ferry Harbor	5420 N Upper Ferry Road	Salisbury
		7 / Tourist Information Center/ Leonard's Mill Park	8480 Ocean Highway	Salisbury
		4 / Cedar Hill Park & Marina	20945 Harbor View Road	Bivalve
		27 / Adkins Park	5168 Powellville Road	Pittsville
Fire	1	26 / Salisbury Fire Dept. – Station 16	325 Cypress Street	Salisbury
Sanitary	2	15 / Salisbury Sewage Pumping Plant	100 Delaware Avenue	Salisbury
		16 / Salisbury Pump Station M Park	N Park Drive	Salisbury
Tower	1	17 / Tower	5635 Plantation Lane	Salisbury
Above Ground & Underground Storage Tanks	8	18-20 / Perdue Inc (3 above ground tanks)	521 Willow Street	Salisbury
		21-22 / Taylor Oil Co., Inc. (2 above ground tanks)	333-335 Lake Street	Salisbury
		23 / Tru Arc Welding	1535 Northwood Drive	Salisbury
		24 / Valet Cleaners	223 Lake Street	Salisbury
		25 / Walter Maycocks	600 West Main Street	Salisbury
0.2% ANNUAL CHANCE FLOOD HAZARD AREA				
County Owned	4	28 / Housing Authority	627 Jefferson Street	Salisbury
		29 / Housing Authority	615 Jefferson Street	Salisbury
		30 / Housing Authority	700 Jefferson Street	Salisbury
		31 / Housing Authority	625 Jefferson Street	Salisbury
Police	1	32 / Salisbury Police Department	699 W. Salisbury Parkway	Salisbury
Underground Storage Tank	1	33 / Top Ten	825 West Isabella Street	Salisbury

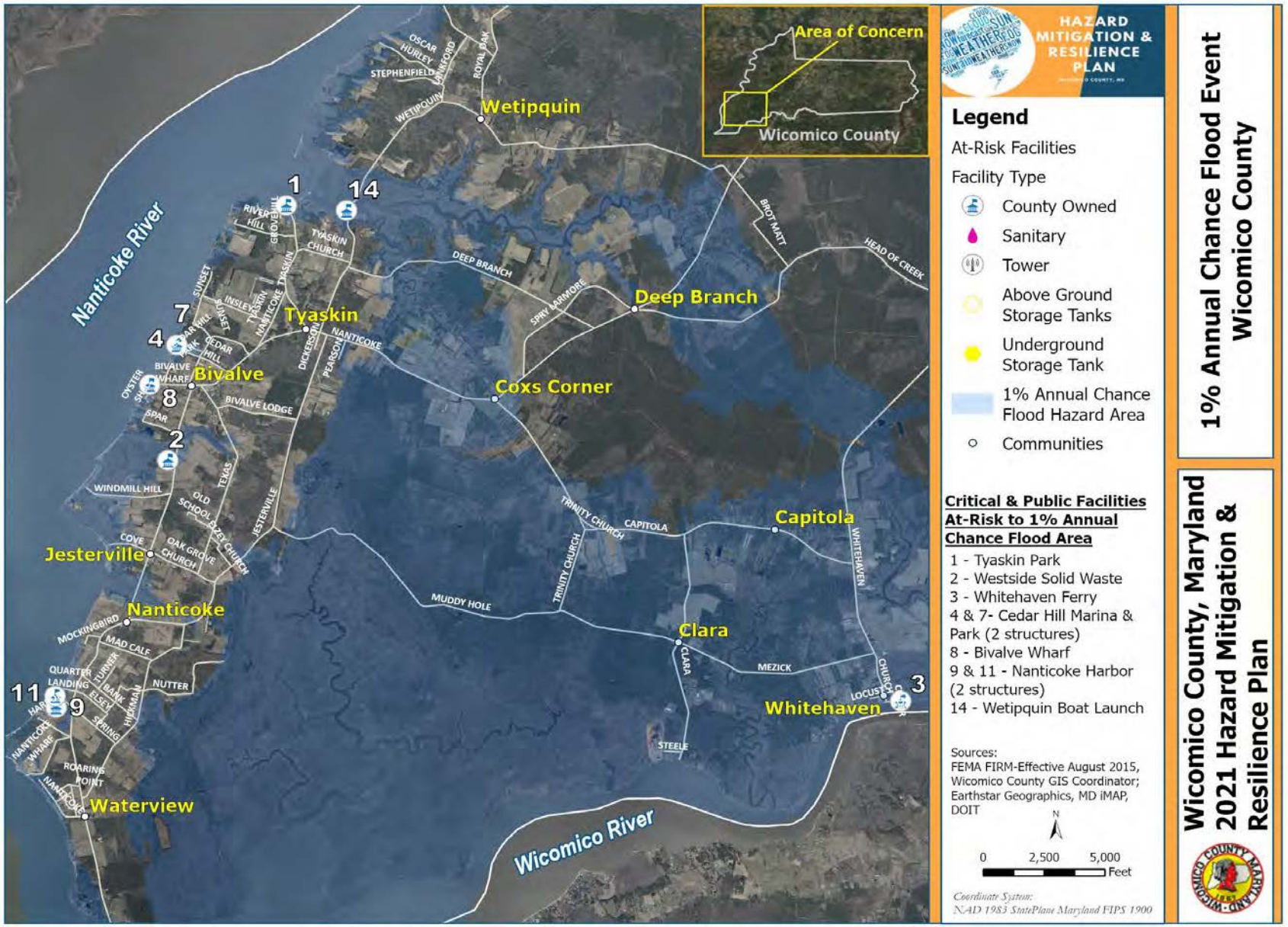
Source: Smith Planning and Design
Note: Parcels without structures were not included.

The followings maps, Map 8.3, 8.4 and 8.5, depict the location of community lifelines and public facilities within the 1% and 0.2% annual chance flood hazard areas. The majority of community lifelines and public facilities vulnerable to the flood hazard are located in and around Salisbury and the unincorporated areas of the County, which are intersected by Nanticoke and Wicomico Rivers. Facilities are both depicted on the map and labeled to correspond with Table 8.5 to ensure proper identification of each vulnerable facility.

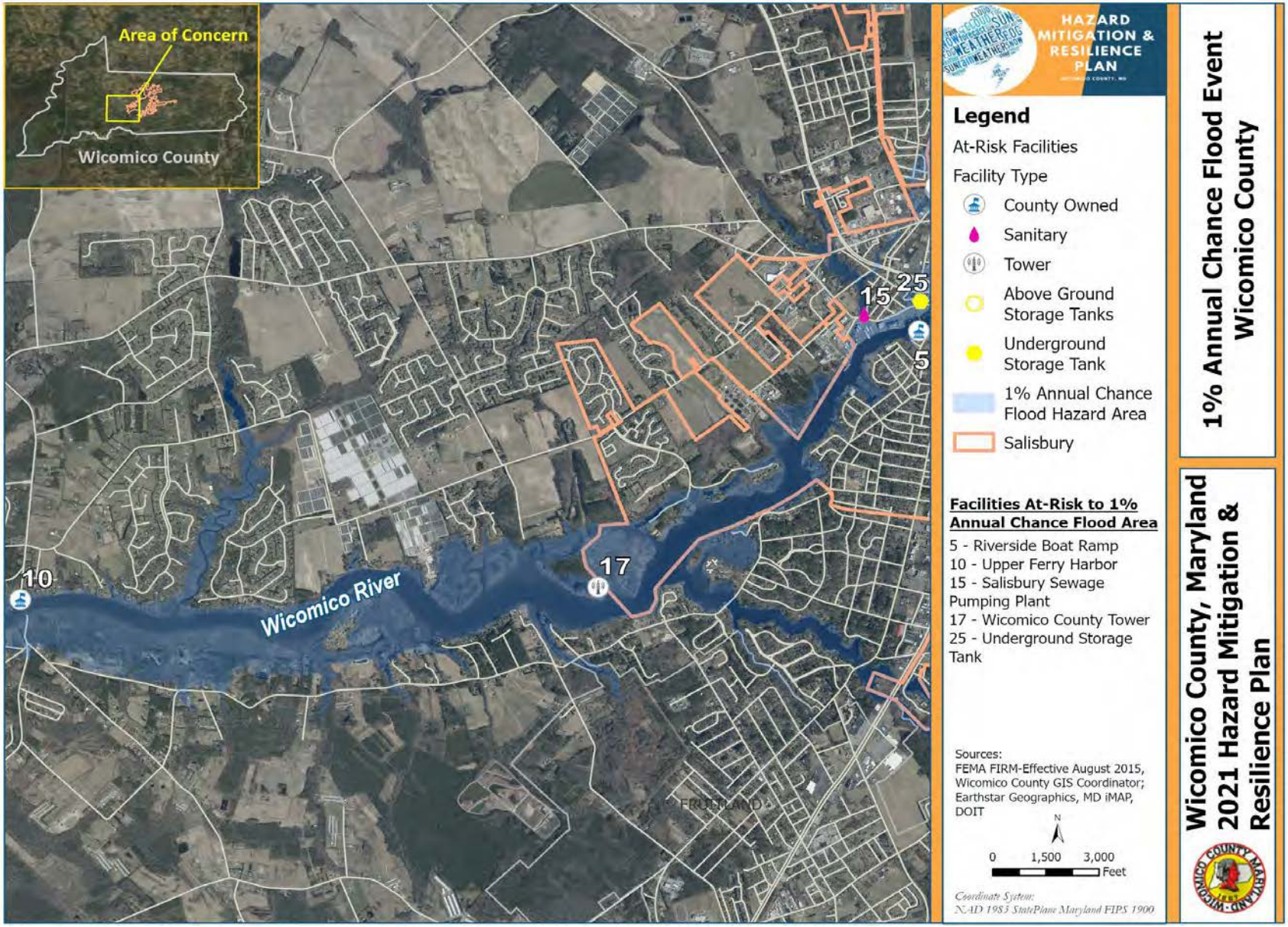
- Map 8.3 depicts a total of nine (9) public facilities located along the Nanticoke River and therefore at-risk to the 1 percent annual chance flood event.
- Maps 8.4 and 8.5 depict the tributaries of the Wicomico River, which transects the City of Salisbury. Facilities located in close proximity to the 1 percent annual chance floodplain of the Wicomico River, or its tributaries have a higher potential of flooding.
- Table 8.5 lists sixteen (16) of the twenty-seven (27) community lifelines and public facilities, located within the City of Salisbury and within the 1 percent annual chance flood hazard area.
- Table 8.5 lists six (6) of the community lifelines and public facilities located within the 0.2% annual chance flood hazard area, within the City of Salisbury. These facilities are depicted on Map 8.6. The 0.2% annual chance flood hazard area is a minimal flood hazard area and as such, property owners are not required to obtain flood insurance.

Changing climate conditions resulting in increased storm activity and severity are projected to impact current flood hazard areas including high, moderate and minimal. As such, flood mitigation actions and recommendations should err on the side of caution and include projected future conditions.

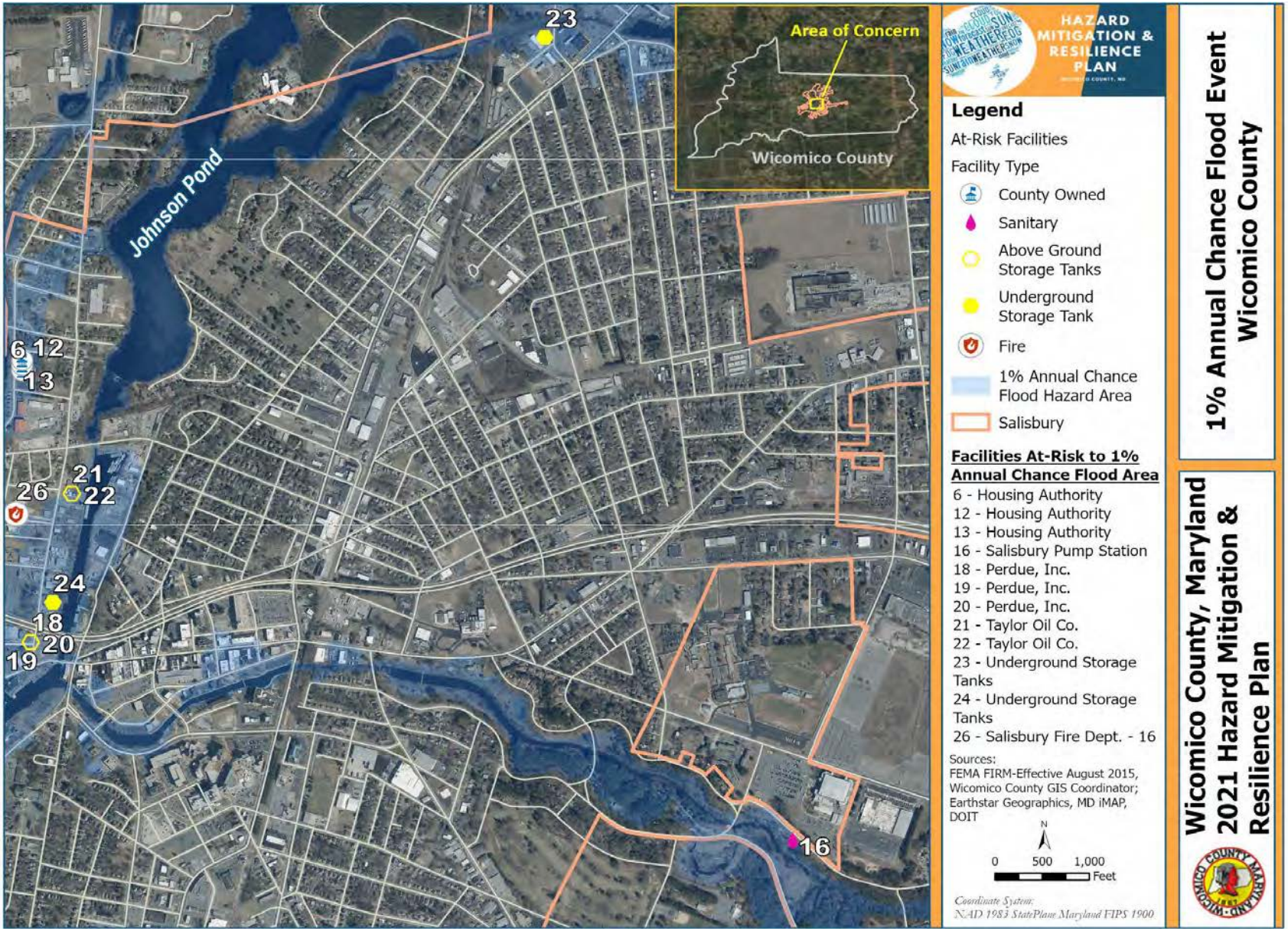
Map 8.3: At-Risk Community Lifelines and Public Facilities – Wicomico County Southwest



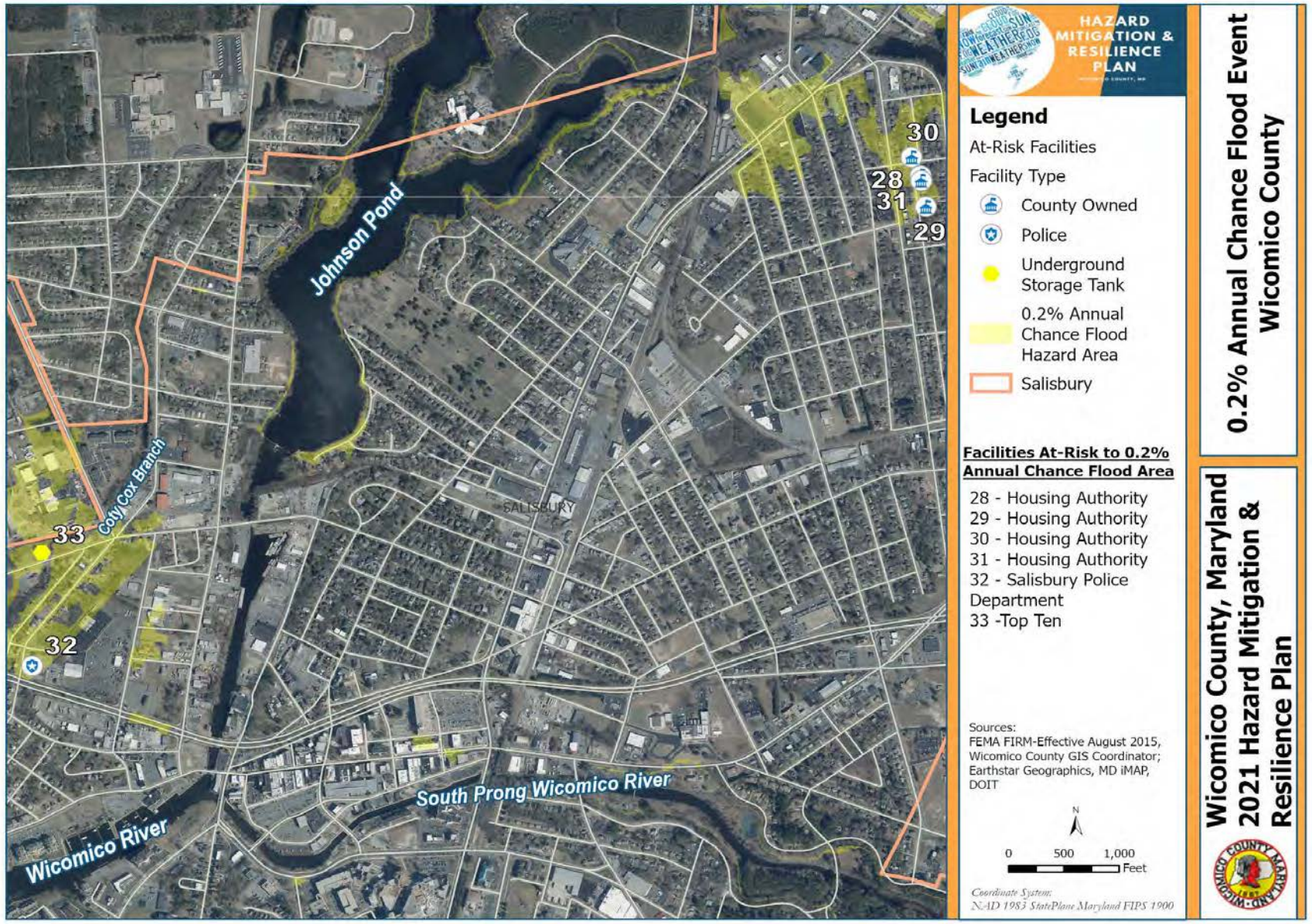
Map 8.4: At-Risk Community Lifelines and Public Facilities – West of Salisbury and City of Salisbury



Map 8.5: At-Risk Community Lifelines and Public Facilities – In & Around City of Salisbury



Map 8.6: At-Risk Community Lifelines and Public Facilities – 0.2% Annual Chance Flood Event



8.6 FACILITIES AT RISK – MUNICIPALITIES OF WICOMICO COUNTY

MUNICIPAL OWNED FACILITIES

Assessing flood vulnerability of municipal owned facilities (structures) was added as a new element during this plan update. Both the 1 and 0.2 percent annual chance flood hazard areas was mapped along with municipal facilities to determine which facilities were located within flood hazard areas.

Municipal owned facilities listed on Table 8.6 and depicted on Map 8.7 are located within the 1 and 0.2 percent annual chance flood hazard areas. A total of ten (10) facilities are vulnerable to the 1 percent annual chance flood hazard and two (2) municipal owned facilities within the 0.2 percent annual chance flood hazard area, all of which are within the City of Salisbury.

While the coastline of Sharptown is affected by the 1 percent annual chance flood hazard, there are no municipal owned facilities within the flood hazard area. The remaining five (5) municipalities did not own facilities within the flood hazard areas.

Table 8.6: Municipal Owned Facilities- Special Flood Hazard Areas

Municipal Owned	Number of Facilities	Map ID # / Facility Name	Address of Facility
1% ANNUAL CHANCE FLOOD HAZARD AREA			
Salisbury	10	1 / Parking Garage	115 E Market Street
		2 / Parking Garage	101 E Market Street
		3 / Fire Training	317 Lake Street
		4 / Fire Training	325 Lake Street
		5 / DPW - Water & Sewer Branch	400 W Isabella Street
		6 / Municipal Park	500 E Main Street
		7 / Port of Salisbury Marina	506 W Main Street
		8 / Housing Authority	621 Delaware Avenue
		9 / Lake Street Park	704 Lake Street
		10 / City Barn	Lake Street
0.2% ANNUAL CHANCE FLOOD HAZARD AREA			
Salisbury	2	11 / Housing Authority	300 Delaware Avenue
		12 / Salisbury Zoo & Park	501 S Park Drive

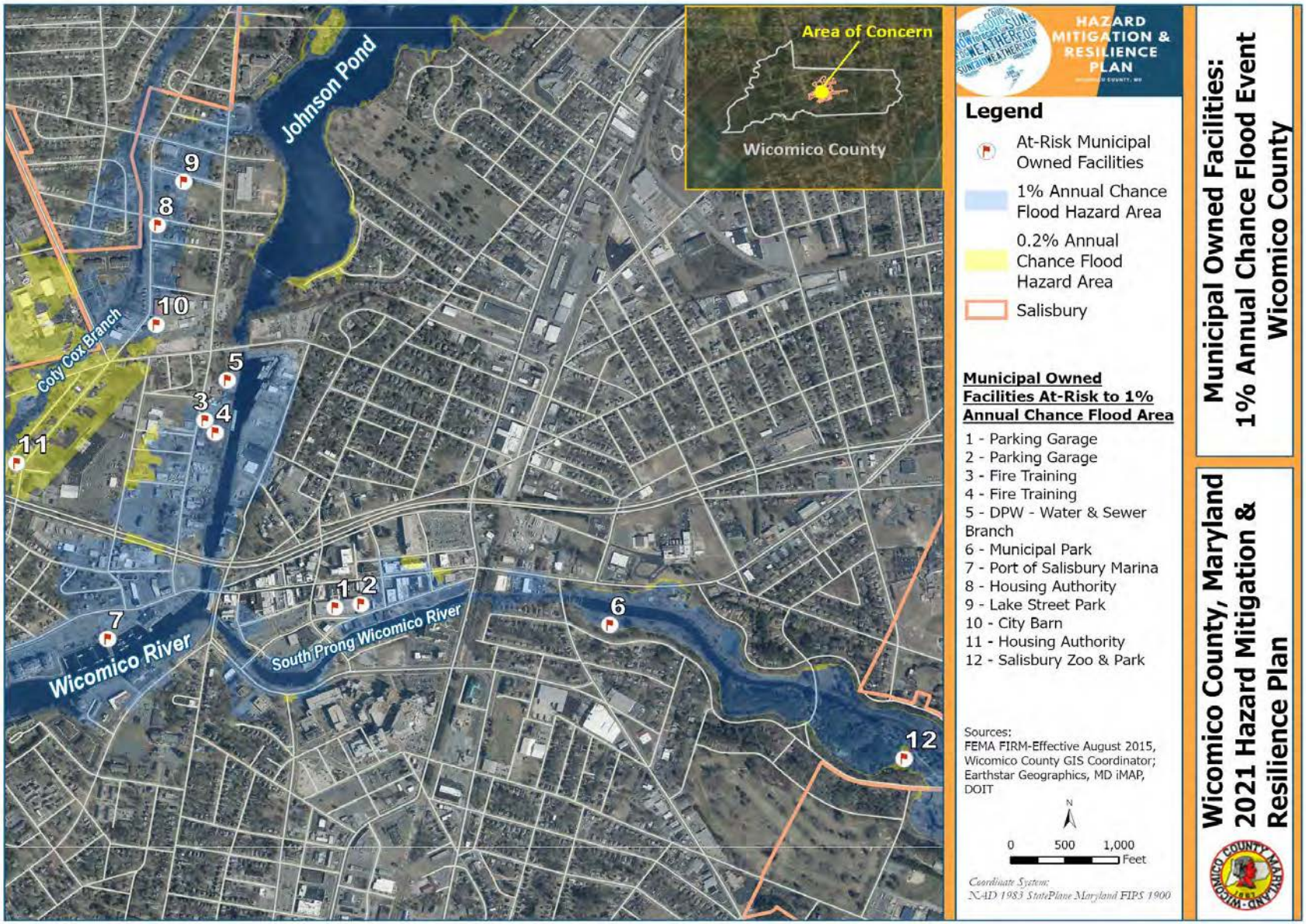
Source: Smith Planning and Design
Note: Parcels without structures were not included.

City of Salisbury FaceBook Post – October 12, 2018

Fitzwater Street** from River's Edge to **Germania Circle

Water is still RISING in some areas. Please find alternate routes to avoid affected areas. DO NOT ATTEMPT TO DRIVE THROUGH HIGH WATER.

Map 8.7: At-Risk Municipal Facilities – City of Salisbury



COMMERCIAL & RESIDENTIAL STRUCTURES AT RISK - MUNICIPAL

Commercial and residential structures located within the seven (7) municipalities of Wicomico County were assessed to determine flood vulnerability using the one percent annual chance flood hazard area. This assessment including mapping products was added as a new element during the plan update. Assessment results indicate that commercial and residential structures within the City of Fruitland (Map 8.10) and the Towns of Delmar (Map 8.8), Hebron (Map 8.9), Mardela Springs (Map 8.11), Pittsville (Map 8.12), and Willards (Map 8.15) are not located within 1 percent annual chance flood hazard area.

Salisbury

The 1% annual chance floodplain intersects the City of Salisbury's boundary through several waterways. A total of 380 structures, both residential and commercial, are located within the 1% annual chance flood hazard area. At-risk structures per waterway are listed below and depicted on Map 8.113.

- Wicomico River: 86 structures
- Coty Cox Branch: 102 structures
- Peggy Branch: 57 structures
- Schumaker Pond: 71 structures
- Tony Tank Pond: 3 structures
- Morris Prong: 2 structures

Sharptown

Nanticoke River's 1% annual chance floodplain intersects the Town of Sharptown’s limits. A total of eighteen (18) structures are located within 1% annual chance flood hazard area (Map 8.114).

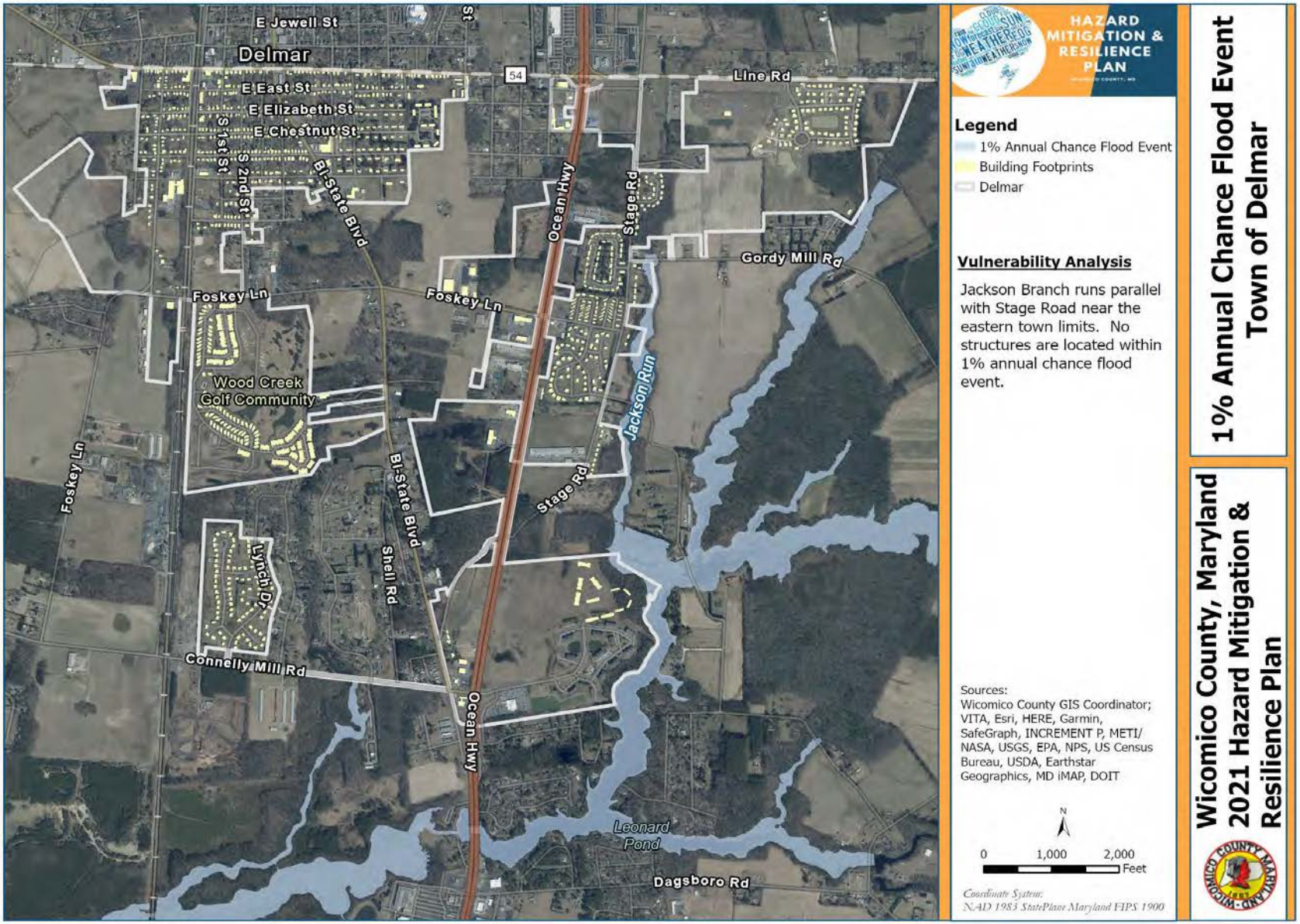
Fruitland

While the one percent annual chance floodplain along the eastern border of the City of Fruitland is in close proximity to structures, assessment results indicated that the building footprints are not within the flood hazard area.

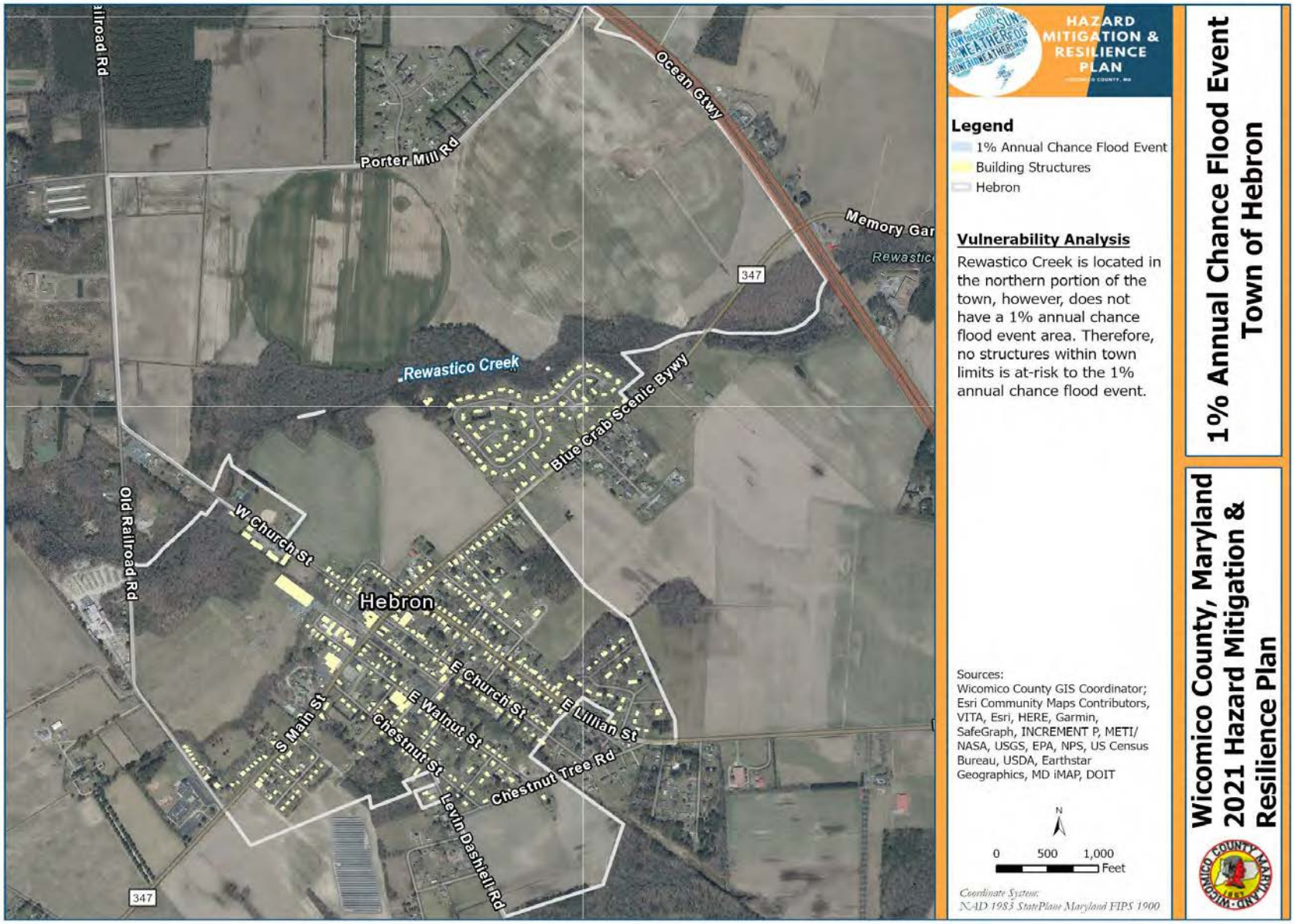
> Information gathered from employees who have been employed by the City for over 20 years, there has been no severe flooding in Fruitland’s jurisdiction and no property damage due to flooding.
>
> *Source: Marc Henderson, the City of Fruitland representative – 4/14/2021*

Note: Flood vulnerability assessment results were shared with and reviewed by municipal representatives.

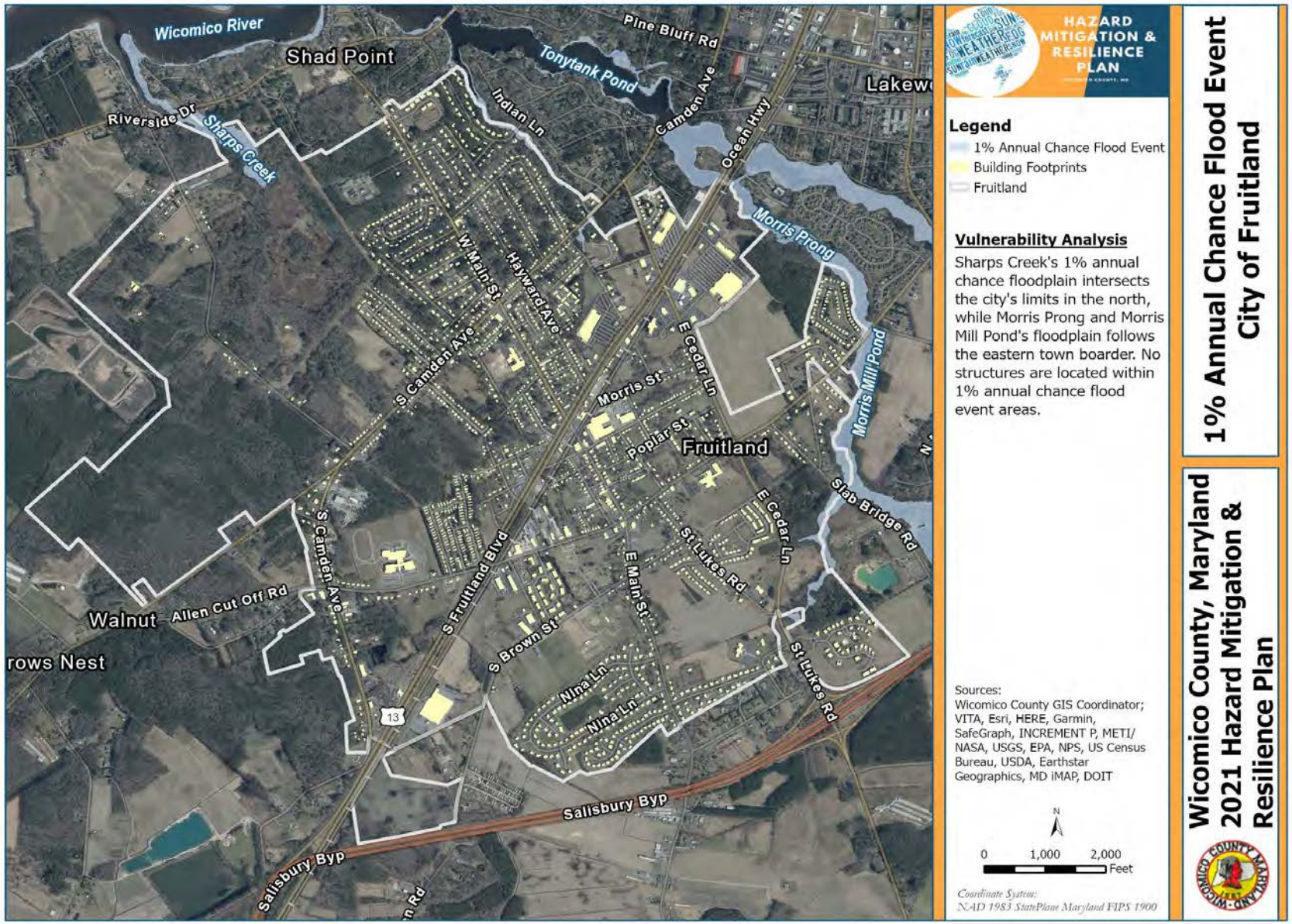
Map 8.8: Town of Delmar – 1% Annual Chance Flood Event



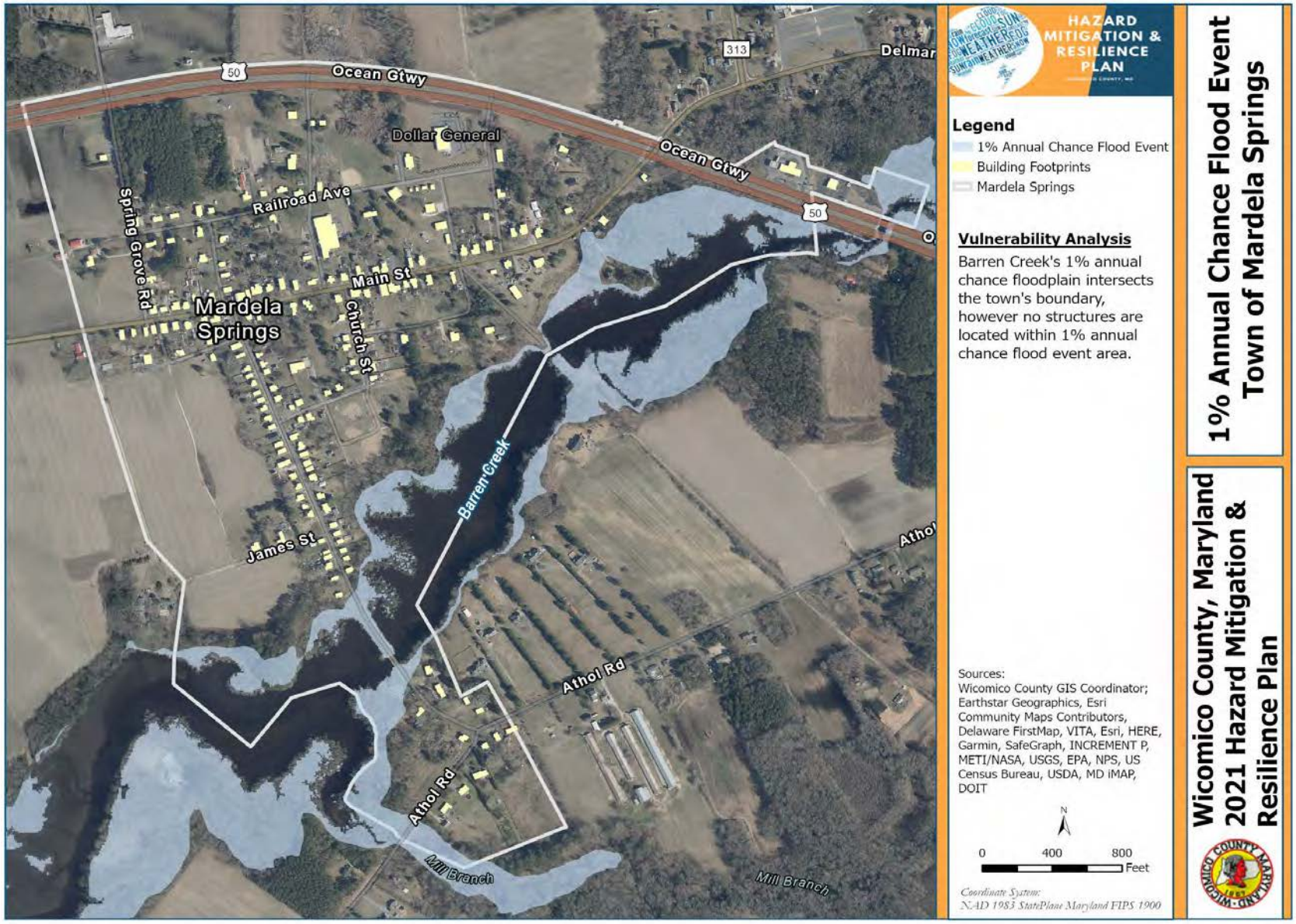
Map 8.9: Town of Hebron – 1% Annual Chance Flood Event



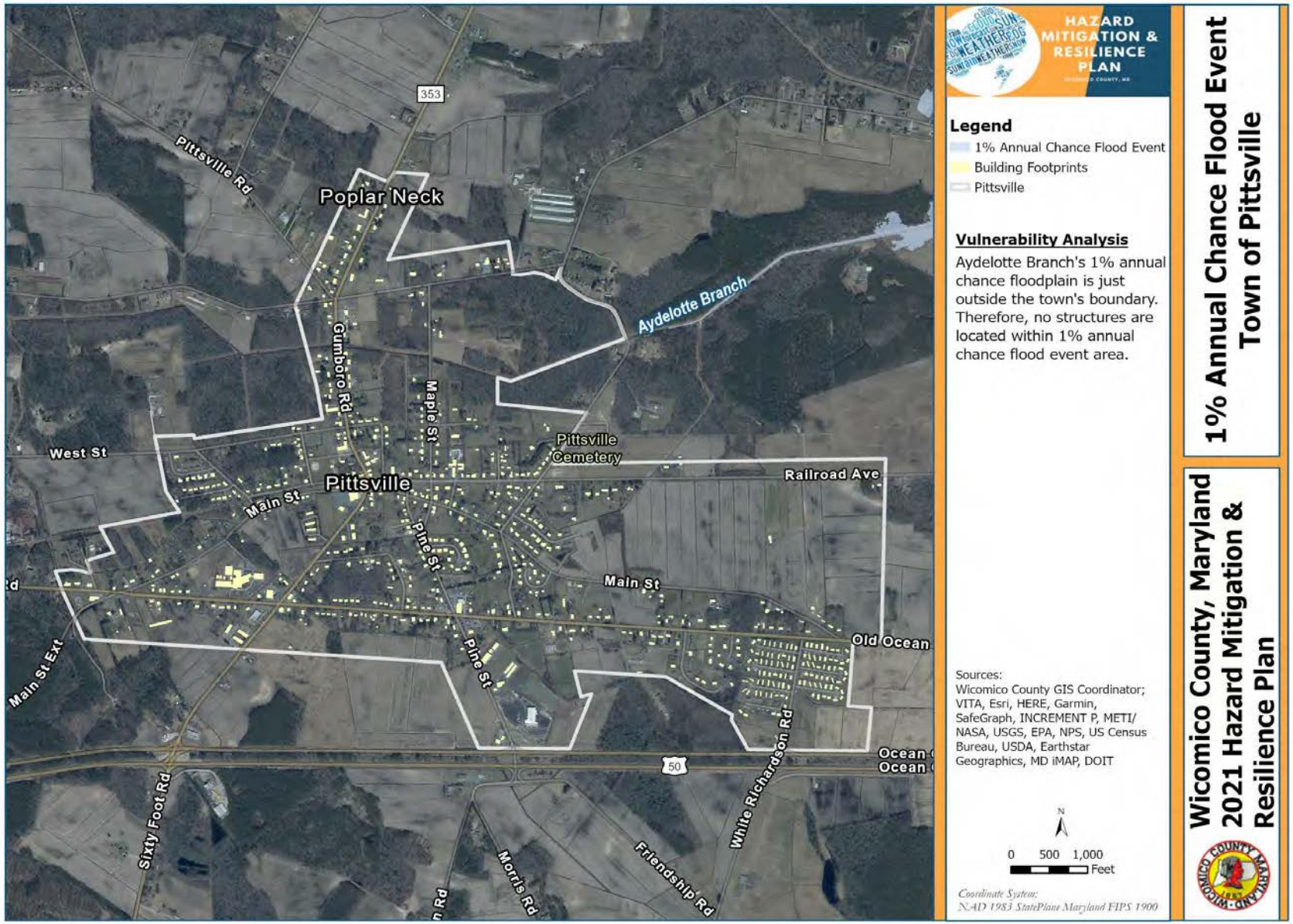
Map 8.10: City of Fruitland – 1% Annual Chance Flood Event



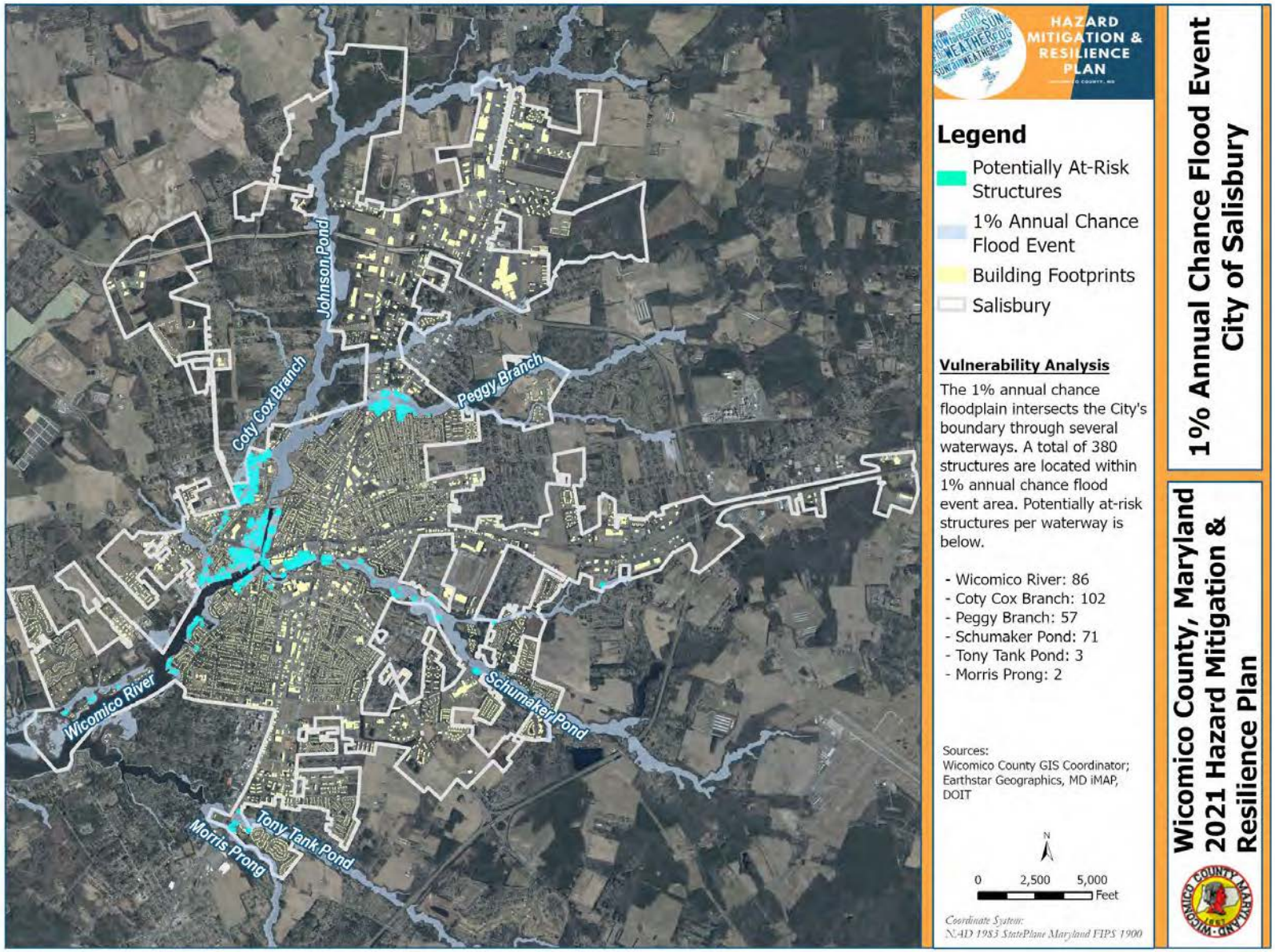
Map 8-11: Town of Mardela Springs – 1% Annual Chance Flood Event



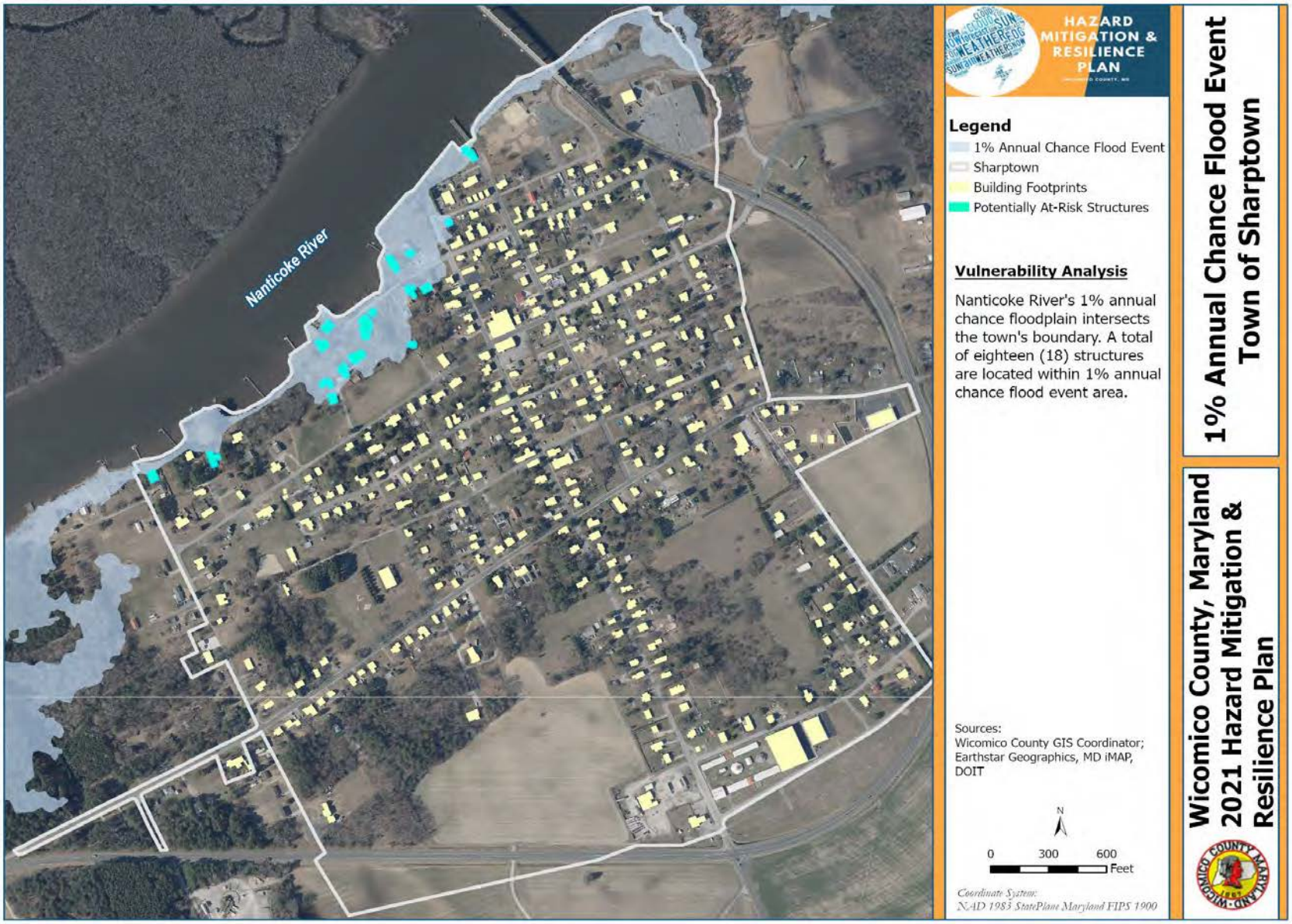
Map 8-12: Town of Pittsville – 1% Annual Chance Flood Event



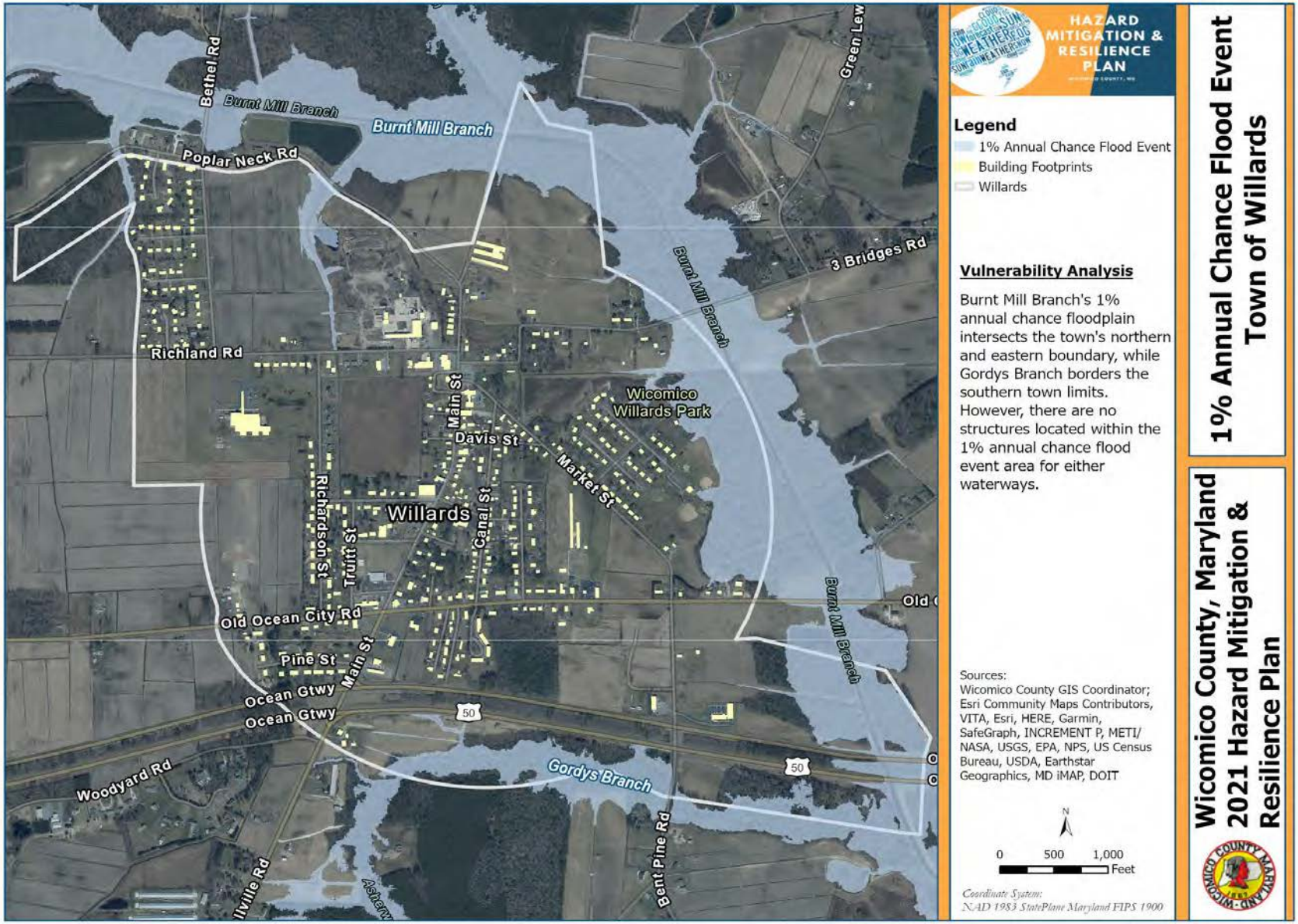
Map 8.13: City of Salisbury – 1% Annual Chance Flood Event



Map 8.14: Town of Sharptown – 1% Annual Chance Flood Event



Map 8.15: Town of Willard – 1% Annual Chance Flood Event



8.7 FACILITIES AT RISK – HISTORIC DISTRICTS, STRUCTURES & CEMETERIES

As a new element to the plan update historic districts, structures, and cemeteries at risk to the 1% annual flood hazard area were determined. Historic districts, structures, and cemetery data provided by the Wicomico County GIS Coordinator. Numerous historic districts are within the 1 percent annual chance flood hazard area. These historic districts include:

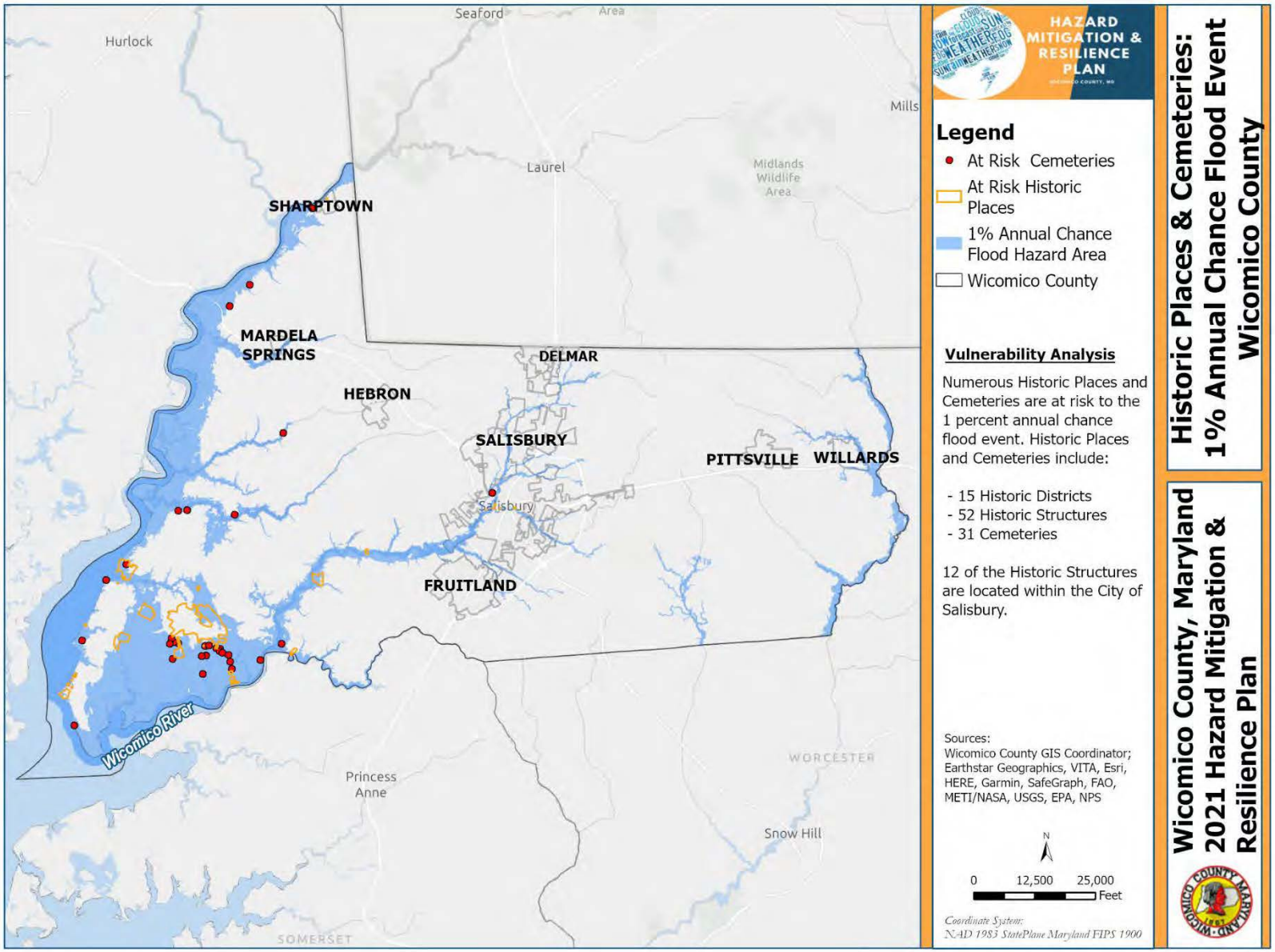
- Newtown Historic District
- Nanticoke Historic District
- Bivalve
- Tyaskin Survey District
- Sharptown Survey District
- Riverton Survey District
- Mardela Springs Survey District
- Quantico Historic District
- Capitola Survey District
- Willards Survey District
- Forktown, Fruitland, Fruitland Survey District
- Salisbury-Ocean City: Wicomico Regional Airport Survey District
- Camden Historic District (a.k.a. Newton)
- Powellville Survey District
- Main Street Commercial District
- Whitehaven National Register Historic District

Furthermore, 52 historic structures are at risk to the 1 percent annual chance flood hazard as well as 31 cemeteries, depicted in Map 8.16.

John Wesley Methodist Church
Located on Capitola Road in Tyaskin. This church is at-risk to the 1% annual chance flood event.

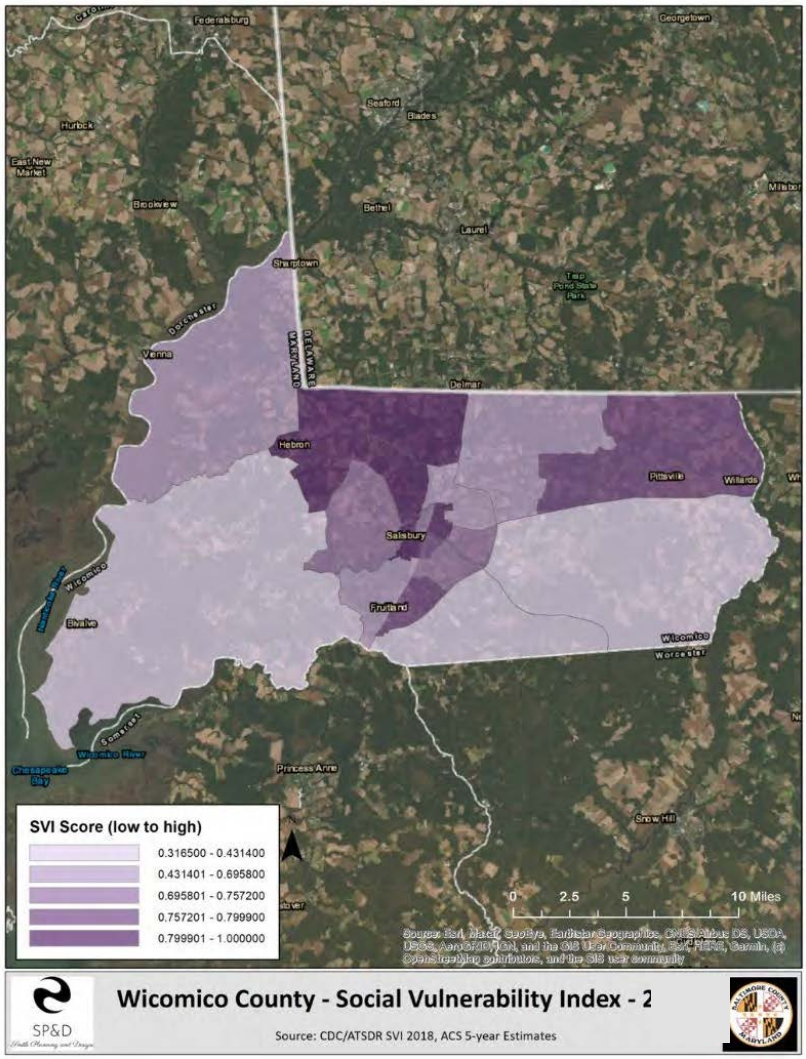
Source: Maryland Historical Trust Google StreetMap

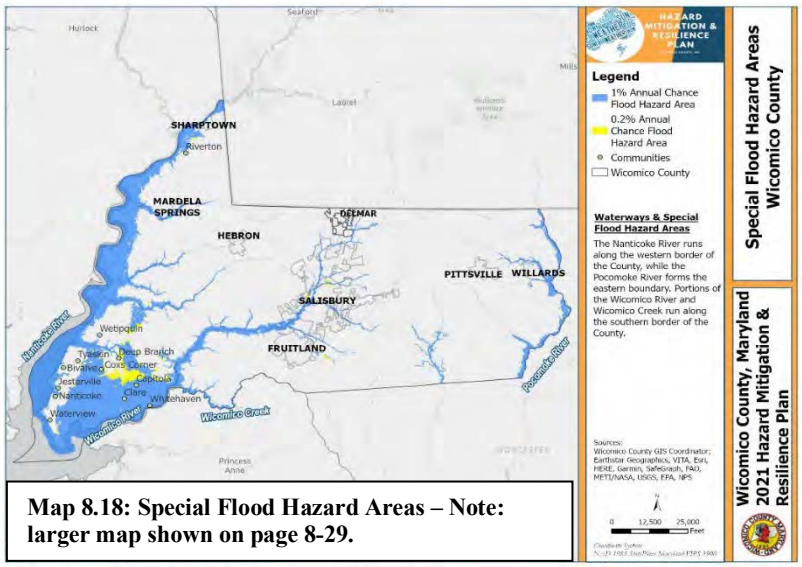
Map 8.16: Historic Places & Cemeteries – 1% Annual Chance Flood Event



8.8 SOCIAL VULNERABILITY

Map 8.17: Wicomico County Social Vulnerability Index





Map 8.18: Special Flood Hazard Areas – Note: larger map shown on page 8-29.

The Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) uses fifteen (15) U.S. Census variables to calculate SVI scores that can help local officials identify communities within the county that may need additional support before, during, and/or after disasters. Map 8.14 was developed for the plan update and provides a visual depiction of the SVI scores, by shaded zones, for Wicomico County. Higher social vulnerability regions are indicated by dark purple shading.

Using the information depicted on both Maps 8.17 and 8.18, the intersecting or overlapping areas of SVI score census blocks and flood hazard areas can be determined. Areas with lower social vulnerability scores as indicated on Map 8.17 by light purple shading in the western-southwestern portion of the county overlap with the majority of the flood hazard areas as shown on Map 8.15 within the county. Areas with the highest SVI scores indicated by dark purple that overlap with flood hazard areas are concentrated in and around the City of Salisbury and the Towns of Delmar and Willards. Other shaded zones within the county, such as in and around Mardela Springs, show an overlap of moderate SVI scores and flood hazard areas.

8.9 LOSS ESTIMATES

UNINCORPORATED COMMUNITY LIFELINES & PUBLIC FACILITIES

Loss estimates for community lifelines and public facilities located in the 1% and 0.2% annual chance flood hazard areas were assessed. Structure improvement values using the most recent Maryland Tax Assessment value were included in Table 8.7.

Table 8.7: Loss Estimates for Community Lifelines and Public Facilities

Facility Type	Facility Name	Loss Estimate (Structure Improvement Values)	Total
1% ANNUAL CHANCE FLOOD HAZARD AREA			
County Owned	Tyaskin Park	$5,800	$1,249,700
	Westside Solid Waste	$2,700	
	Whitehaven Ferry	$1,300	
	Riverside Boat Ramp	$56,700	
	Housing Authority	$45,700	
	Bivalve Wharf	$1,700	
	Nanticoke Harbor (2)	$160,400	
	Housing Authority	$45,700	
	Housing Authority		
	Wetipquin Boat Launch	$9,900	
	Upper Ferry Harbor	$1,500	
	Tourist Information Center/ Leonard's Mill Park	$672,900	
	Cedar Hill Park & Marina	$179,700	
	Adkins Park	$65,700	
Fire	Salisbury Fire Dept. – Station 16	$7,618,600	$7,618,600
Sanitary	Salisbury Sewage Pumping Plant	$98,900	$150,500
	Salisbury Pump Station M Park	$51,600	
Tower	Tower	*$175,000	$175,000
Above Ground & Underground Storage Tanks	Perdue Inc (3 above ground tanks)	**$1,500	$6,000
	Taylor Oil Co., Inc. (2 above ground tanks)	**$1,500	
	Tru Arc Welding	**$1,500	
	Valet Cleaners	**$1,500	
	Walter Maycocks	**$1,500	
		Total	**$9,199,800.00**
0.2% ANNUAL CHANCE FLOOD HAZARD AREA			
County Owned	Housing Authority	$21,200	$123,000
	Housing Authority	$51,800	
	Housing Authority	$23,600	
	Housing Authority	$26,400	
Police	Salisbury Police Department	$8,124,800	$8,124,800
Underground Storage Tank	Top Ten	**$1,500	$1,500
		Total	**$8,249,300.00**

Source: Smith Planning and Design, Maryland Property View- Parcel Dataset June 2020
**Average cost for a cell tower.*
***Average cost for above and underground storage tanks*

MUNICIPAL OWNED

Loss estimates for municipal owned facilities, City of Salisbury, located in the 1% and 0.2% annual chance flood hazard areas were assessed. Current assessment values within the City of Salisbury's parcel database are listed in Table 8.8.

Table 8.8: Loss Estimations for Municipal Owned Facilities

Municipal Owned	Facility Name	Loss Estimate (Current Assessment Value)
1% ANNUAL CHANCE FLOOD HAZARD AREA		
Salisbury	Parking Garage	$2,598,700
	Fire Training	$88,433
	Municipal Park	$1,057,267
	City Barn	$1,733,767
	Parking Garage	$2,224,100
	DPW - Water & Sewer Branch	$303,733
	Lake Street Park	$99,433
	Housing Authority	$16,800
	Port of Salisbury Marina	$742,400
	Fire Training	$47,133
Total		**$8,911,766**
0.2% ANNUAL CHANCE FLOOD HAZARD AREA		
Salisbury	Housing Authority	$23,100
	Salisbury Zoo & Park	$2,556,000
Total		**$2,579,100**

Source: Smith Planning and Design & City of Salisbury – Parcel Database

LOSS ESTIMATION BY LAND USE – COUNTYWIDE

Loss estimates for the previous planning process were calculated in dollars for all facilities, including community lifelines and public facilities by land use using Maryland Tax Assessment values listed in Table 8.9. This information was reviewed, and new information was included for this plan update in Table 8.10.

Table 8.9: 2016 Loss Estimates for All Facilities by Land Use

Land Use	Loss Estimates (Structure Improvement Value)		
	1% Annual Chance Flood Event		
Flood Zone	**A**	**AE**	**VE**
Agricultural	474,650	10,837,950	1,316,250
Apartments	1,207,000	142,000	0
Commercial	26,703,800	8,925,400	8,300
Commercial Condominium	997,400	263,400	0
Commercial Residential	198,800	0	0
Country Club	0	0	0
Exempt	0	219,440	0
Exempt Commercial	39,616,700	9,132,600	19,700
Industrial	3,047,300	3,471,900	12,500
Marsh Land	0	35,790	0
Residential	4,878,860	64,264,050	5,856,550
Residential Commercial	0	0	0
Residential Condominium	398,000	113,000	0
Town House	322,830	965,630	0

Source: S&S Planning and Design and Maryland Department of Planning

In determining loss estimations for the 2021 Plan update, structures constructed between 2017 and April 2021 were derived from permit data provided by Wicomico County Permit and Inspections Division. Loss estimates were included for these new structures using Maryland Tax Assessment improvement values. Results indicated thirty-seven (37) new structures have been constructed within the 1 percent annual chance flood event, listed in Table 8.10.

Table 8.10: 2021 Loss Estimates for new Construction by Land Use

Land Use	Loss Estimates- 1% Annual Chance Flood Event
Agricultural - (1 structure)	$690,200
Commercial – (2 structures)	$626,000
Residential - (30 structures)	$5,920,300

Source: Wicomico County Permit and Inspections Division and Smith Planning and Design

Source: Wicomico County Nuisance Flood Plan - 2020

8.10 NATIONAL FLOOD INSURANCE PROGRAM

FEMA's National Flood Insurance Program (NFIP), Insurance Report of Maryland, released on July 31, 2021, details various statistics pertaining to flood insurance policies and claims in Wicomico County and its municipalities. Tables 8.11 and 8.12 provide detailed information.

Total policy coverage for the unincorporated areas of Wicomico County and its municipalities has increased since the last plan update. Previously the Town of Pittsville did not have any policies issued, however, during this planning cycle, five (5) policies were issued.

Table 8.11: NFIP Insurance Report - Policies

Location	Number of Policies			Total Coverage		
	2011 Plan	2016 Plan	2021 Plan	2011 Plan	2016 Plan	2021 Plan
City of Fruitland	9	10	12	$2,485,000	$ 3,360,000	$3,860,000
Town of Pittsville	-	-	5	-	-	$1,190,000
City of Salisbury	224	222	242	$51,887,600	$ 57,305,300	$78,198,400
Town of Sharptown	7	6	6	$1,787,900	$ 1,465,300	$1,501,200
Town of Willards	1	3	0	$350,000	$980,000	$0
Unincorporated Area	419	456	456	$104,828,700	$ 120,315,900	$129,751,600
County Total	660	697	721	$161,339,200	$183,426,500	$214,501,200

Source: Federal Emergency Management Agency NFIP Insurance Report, Maryland, July 31, 2021

Total claims paid since 1978 increased minimally during this planning cycle. Table 8.12 lists the cumulative claims since 1978. Since the previous plan, the City of Salisbury had seven (7) new claims, the Town of Sharptown had two (2), and the unincorporated portion the county had two (2) new claims. The county total claims in 2016 was $3,359,391, whereas the total in 2021 was $3,946,509, an increase of $587,117.60 in total claims.

Table 8.12: NFIP Insurance Report - Claims

Location	Total Claims Since 1978			Total Paid Since 1978		
	2011 Plan	2016 Plan	2021 Plan	2011 Plan	2016 Plan	2021 Plan
City of Fruitland	1	2	2	$0	$3,516	$3,516
City of Salisbury	37	67	74	$487,667	$1,587,438	$2,104,860
Town of Sharptown	3	4	6	$490,289	$490,289	$532,782
Town of Willards	0	0	0	$0	$0	$0
Unincorporated Area	51	106	108	$472,372	$1,278,148	$1,305,351
County Total	92	179	190	$1,450,328	$3,359,391	$3,946,509

Source: Federal Emergency Management Agency NFIP Insurance Report, Maryland, July 31, 2021

Additionally, a National Flood Insurance Program (NFIP) Survey was completed by Wicomico County Land Use Coordinator, Department of Planning & Zoning. The completed survey is within Appendix H: Local NFIP Survey and details local floodplain identification and mapping, floodplain management, and flood insurance information.

8.11 REPETITIVE LOSS PROPERTIES

Considering the number of flood insurance policies and the amount of claims reported, identifying areas of repetitive loss within a community is a good indicator 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 flooding damage.

FEMA defines a Repetitive Loss Property (RLP) 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. A repetitive loss property may or may not be currently insured by the NFIP.

FEMA defines a Severe Repetitive Loss Property as:

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

In review of the Repetitive Loss Property (RLP) data, the number of properties have increased over the last decade, detailed in Table 8.13.

Table 8.13: Repetitive Loss Properties Over the Past Decade – National Flood Insurance Program

May 2012	September 2015	May 2021
2 Repetitive Loss Properties • 2 Residential • Location: o Salisbury – 2	**17 Repetitive Loss Properties** • 5 Non-Residential • 12 Residential • Location: o Salisbury – 7 o Nanticoke – 5 o Whitehaven – 2 o Tyaskin – 1 o Bivalve – 1 o Parsonburg – 1	**21 Repetitive Loss Properties** • 2 Condominiums • 20 Residential • Location: o Salisbury – 8 o Nanticoke – 6 o Whitehaven – 2 o Tyaskin – 2 o Bivalve – 2 o Parsonsburg – 1 **1 Severe Repetitive Loss Properties** • Residential o Bivalve – 1

In May of 2010, there were only two repetitive loss properties that exist in Wicomico County. Both properties were residential and located in Salisbury.

In September 2015, there were seventeen (17) repetitive loss properties that exist in the county. These included five (5) non-residential and twelve (12) residential properties. These seventeen (17) RLPs were in the communities of:

- Salisbury – 7
- Nanticoke – 4
- Whitehaven – 2
- Tyaskin – 1
- Bivalve – 2
- Parsonsburg – 1

The structures in the 2015 listing located in Bivalve and Nanticoke were affected by the Nanticoke River, while structures in Whitehaven and Salisbury are affected by the Wicomico River. Tyaskin Creek is the source of flooding for the residential property in the Tyaskin community and the Waste Gate Creek affects the property in Parsonsburg.

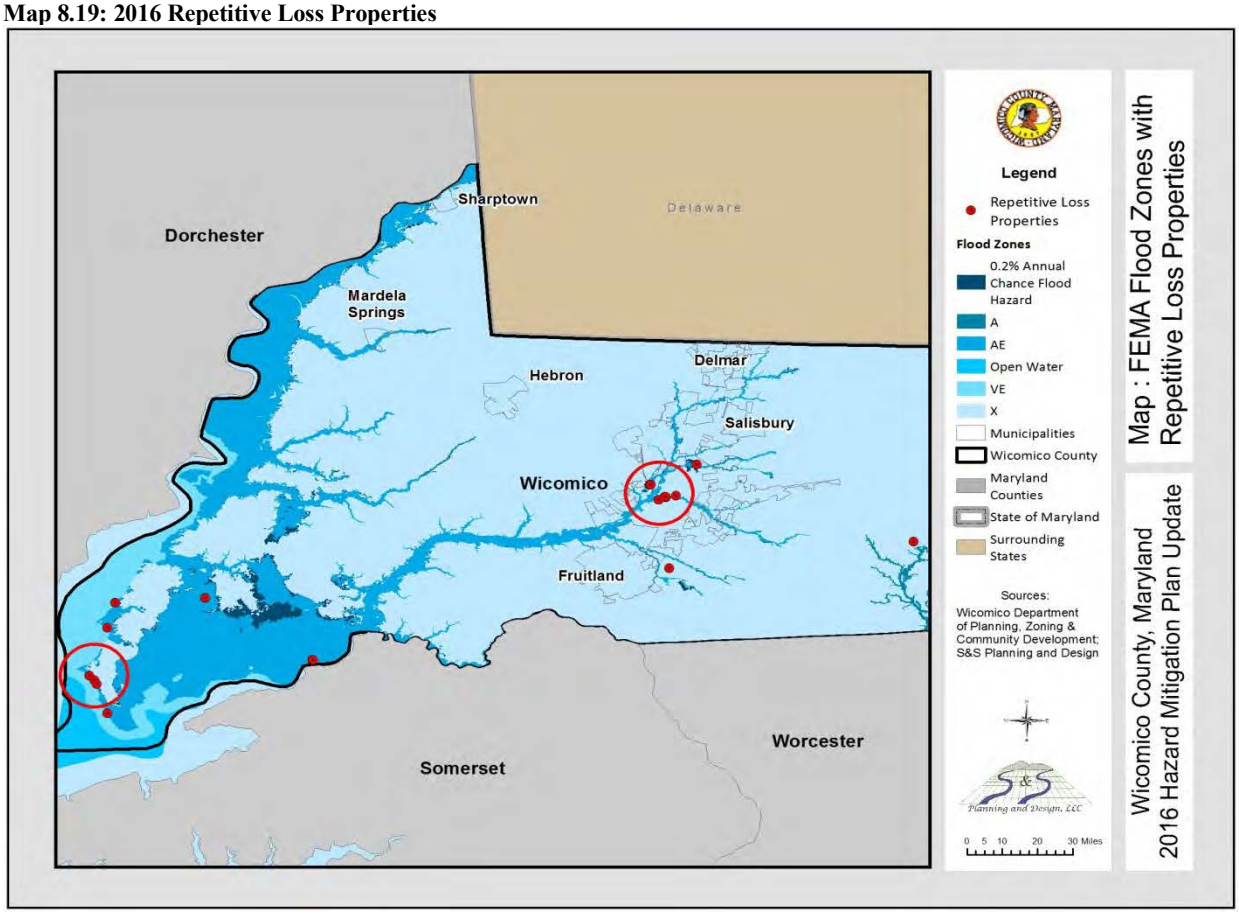
According to Repetitive Loss Property data provided on May 14, 2021, by Wicomico County Land Development Coordinator, Department of Planning & Zoning, there are currently twenty-two (22) repetitive loss properties within the county. Twenty (20) are single family properties and two (2) units are within condominiums. Repetitive loss properties are located in the following communities:

- Bivalve: 3 single family properties
- Nanticoke: 6 single family properties
- Parsonsburg: 1 single family property
- Whitehaven: 2 single family properties (part of the Whitehaven National Register Historic District)
- Salisbury: 6 single family properties and 2 condominium units
- Tyaskin: 2 single family properties

In reviewing the most recent list of repetitive loss properties, two areas have a high concentration of repetitive loss. One area is located in the City of Salisbury, while the other is located in the southwest portion of the county, specifically the communities of Nanticoke, Bivalve, Tyaskin, and Whitehaven. The area of concentration in Salisbury and the southwest portion of the county consists of residential properties.

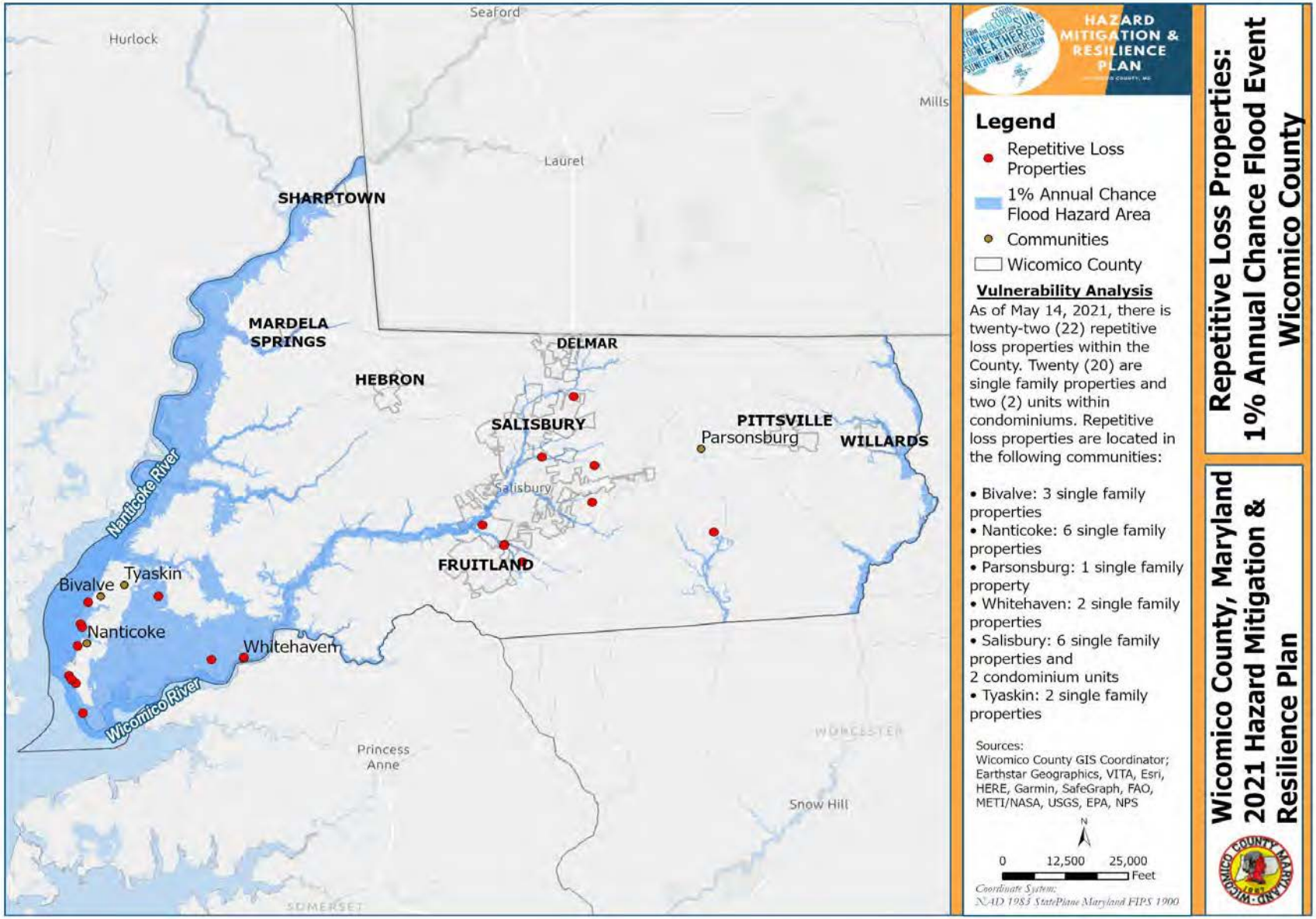
Map 8-19 depicts repetitive loss properties reported in the 2016 Hazard Mitigation Plan, while Map 8-20 illustrates the current 2021 repetitive loss properties. As shown on the maps, red dots denoting repetitive loss properties have increased from 2016 to 2021.

Map 8.19: 2016 Repetitive Loss Properties



Previous mitigation actions included house elevations, filling in basement, and installation of flood vents. New mitigation actions are currently underway in the community of Nanticoke. Grant applications have been submitted for elevation projects, one of which includes a repetitive loss property. In addition, a flood acquisition grant application for a severe repetitive and repetitive loss property has been submitted and approved. Additional information on these projects is provided in the Current Mitigation Efforts section on page 8-42. Finally, repetitive loss properties are those properties that should be listed as a priority potential mitigation project as described in *Chapter 14 - Mitigation Strategies*.

Map 8.20: 2021 Repetitive Loss Properties



8.12 FREQUENTLY FLOODED AREAS

In 2010 and 2016, the Hazard Mitigation and Resilience Planning Committee (HMRPC) identified frequently flooded locations throughout Wicomico County and its municipalities. These frequently flooded locations are problematic to the community at large resulting in road closures and access issues. In addition, road closures impact evacuation routes and access to neighborhoods, community lifelines and public facilities. Tables 8.14 and 8.15 lists roadways that frequently flood. These tables were reviewed by municipalities and the Hazard Mitigation and Resilience Planning Committee.

During the 2021 plan update process, municipalities were requested to provide updates to previously identified repetitive flooding locations and add any new locations. Several new flood related issues were identified and added to the listing as denoted by **"*NEW"**. Furthermore, status updates were provided, as applicable.

Through grant funding, the Town of Hebron completed a Stormwater Management Survey in August 2019. The results of the survey indicated no additional issue beside those noted in Table 8.14.

There is no flooding on local streets in the Towns of Willards and Pittsville. Flooding does occur at the intersection of State Route 346 (Old Ocean City Road) and State Route 353 (Gumboro Road) in Pittsville. Flooding has increased at this intersection over the years; however, the road is still passable.

Note: In October 2018, Maryland passed Maryland House Bill (HB 1427), which requires local jurisdictions that experience nuisance flooding to develop a plan to address nuisance flooding. Wicomico County developed a 2020 Nuisance Flood Plan addressing tidally influenced nuisance flooding. Additionally, the City of Salisbury completed a Nuisance Flood Plan in 2019. Both the Wicomico County and the City of Salisbury Nuisance Flood Plans have been integrated in Chapter 4 Coastal Storm.

Table 8.14: Municipal Roadways Flood Related Issues

Flood Related Issue	Evacuation Issue (Y/N)	SWM or ElevationProblem	2016 Ranking (High, Medium, Low)
Municipal Roads			
City of Salisbury Coty Cox Flood Relief.	Yes	SWM	**High**
Status Update: Completed			
City of Salisbury East Main Street Storm Drain	No	SWM	Medium
Status Update: Remove. Design was completed. Stormwater project upstream was completed and flooding has ceased.			
City of Salisbury Vine Street Flood Relief	N/A	SWM	Medium
Status Update: Completed			
City of Salisbury Germania Circle Regional SWM System & Property Acquisition	Yes	Elevation	**High**
Status Update: Most properties are rentals and no interest in acquisition, however public outreach on flooding will continue in this area.			
City of Salisbury Market Street and Baptist Street	No	Storm Drains & Flood Mitigation	**High**
Status Update: After completion of the Main Street projects and developing bioretention areas on Green Street, these areas only flood during major events.			
City of Salisbury Fitzwater Street and Lake Street	Yes	Storm Drains & Flood Mitigation	**High**
Status Update: Repaving of the roadway has elevated the road's crown causing flooding issues.			
City of Salisbury Johnson Pond Dam	No	Sluice Gates & Access	Medium
Status Update: Gate improvements have been designed. Alternative improvements are being considered.			
City of Salisbury Beaglin Park Dr. Dam	No	Sluice Gates & Access	Low
Status Update: Access to the dam gates is still an issue. A platform is needed for boat access.			
City of Fruitland Intersection of Poplar and Anderson St.	No	SWM	Medium
City of Fruitland Morris Ave. at Moore Ave.	Yes	SWM	**High**
City of Fruitland North Division at Morris Mill Dam	Yes	SWM	**High**
City of Fruitland North and South Brown St. from St. Luke's to Crown Rd.	Yes	SWM & Elevation	**High**
Town of Hebron Culver St.	No	Elevation – Low Spot	Medium
Town of Hebron Downing St.	No	Elevation – Low Spot/Drainage	Low
Town of Hebron Corner of Howard St. and East Walnut St.	No	Elevation – Low Spot	Low
Town of Hebron Corner of Chestnut Tree Rd. and East Walnut St.	No	Elevation – Low Spot/Drainage	Medium
Town of Hebron Corner of Northeast Railroad Ave and North Main St.	No	Elevation – Low Spot	Medium
***NEW Town of Hebron** Corner of Main St & Maryland Ave	No	Elevation – Low Spot	N/A
Town of Mardela Springs Main St. and Main St. Extended to Route 50.	Yes	SWM	Low
Town of Mardela Springs Bridge St. to Main St. and Athol Rd.	Yes	SWM	Low
Town of Mardela Springs Station St. to Route 50	Yes	SWM	Low
Town of Mardela Springs Spring Grove Rd. to Route 50	Yes	SWM	Low
Town of Mardela Springs Bratton St. to Route 50	Yes	SWM	Low

Table 8.15: Countywide Roadways Flood Related Issues

Flood Related Issue	Evacuation Issue (Y/N)	SWM or ElevationProblem	2016 Ranking (High, Medium, Low)
Wicomico County Roads			
Morris Mill Dr	No	Elevation: Low Spot/Drainage	Low
Texas Road; segment between Old School St and Oak Grove/ Church Rd	Yes	Private Ditches	Low
Civic Avenue at Nursing Home - SHA issue on County Road	Yes	Elevation – Low Spot / Drainage	**High**
Morris Leonard Rd. east of Zion Church Rd.	No	Elevation – Low Spot	Low
Little Lane at S turns	No	Elevation – Low Spot/Drainage	Low
Norris Twilley Rd. at Cross Rd.	No	Elevation – Low Spot/Drainage	Low
Purnell Crossing Rd. at bridge and Mt. Pleasant intersection	No	Elevation – River Flooding	Medium
Quinton Rd. at Norris Twilley Rd.	No	Elevation – River Flooding	Low
Bear Swamp Rd.	No	Elevation – Low Spot/Drainage	Low
Mt. Olive Rd.	No	Elevation – LowSpot/Drainage	Low
Wango Rd.	No	Elevation – LowSpot/Drainage	Low
Melson Church Rd. at Rt. 54 (County replaced this pipe, any backup due to Delaware)	No	Elevation – Low Spot	Low
Athol Rd. off Rt. 50	No	Elevation – Low Spot	Low
Sharps Point Road at Fruitland line	No	Elevation – Low Spot/Drainage	Low
Norris Twilley Rd. at Cross Rd.	No	Elevation – Low Spot/Drainage	Low
Purnell Crossing Rd. at bridge and Mt. Pleasant intersection	No	Elevation – Low Spot	Low
Quinton Rd. at Norris Twilley Rd.	No	Elevation – Low Spot	Low
Pemberton Dr. past Crooked Oak Rd.	No	Elevation – Low Spot	Low

8.13 RECENT MITIGATION EFFORTS

WICOMICO COUNTY

Wicomico County has two (2) projects underway and has submitted three (3) grant applications.

- **Hunter's Mill Pond Rehabilitation:** This project will renovate and enhance an aging stormwater detention basin at the most downstream point of the Hunter's Mill subdivision, serving an unincorporated area of Wicomico County. It will increase the storage capacity of the basin so that it can handle more intense storm events without allowing downstream flooding. The project will also add water quality treatment features to reduce downstream pollution. The existing facility was built in the 1980's and serves a drainage area of approximately 195 acres.

- **Rockawalkin Creek Ditch Reestablishment:** The most downstream area of concern to address flooding issues within the Pratt Road watershed is to re-construct and stabilize a main drainage ditch flowing through the subdivision of West Nithsdale and entering into Rockawalkin Creek. This is the final drainage ditch prior to discharge into the Rockawalkin Creek and the final outfall of the watershed. The ditch banks have been damaged, and deposits have been left in the bottom of the ditch. The area needs to be re-grubbed; the bottom of the ditch needs to be regraded to maintain positive drainage and to improve the hydraulics. Once regraded, the ditch bottom and side slopes need to be stabilized with a soil stabilization matting to prevent further erosion. A series of stone check dams throughout the entire length of the ditch also need to be installed to slow the runoff to non-erosive velocities to prevent future erosion.

Grant Applications Submitted

- **Nanticoke Drive Elevation Project 1**
  - This structure is a **repetitive loss property** identified in the 2016 Hazard Mitigation Plan as well as the 2021 Plan update and has submitted claims in 2003 and 2012. Recommendations for mitigation include the lot to be graded to allow for positive drainage away from the structure, adding fill to the crawl space area, add engineered flood opening, raising the equipment servicing the home, elevating the home an additional three (3) feet, and create positive run-off to the river via swales.
- **Nanticoke Drive Elevation Project 2**
  - It is proposed to elevate the structure two (2) feet and regrade the crawl space area to prevent damage from major weather events. This structure is located in close proximity to three (3) repetitive loss properties. This structure is within the 1 percent annual chance flood event.
- **Cove Road Acquisition Project**
  - This project consist of acquiring two (2) structures and surrounding marsh land. The structures are **repetitive loss properties** identified in the 2016 Hazard Mitigation Plan as well as the 2021 Plan update. Claims have been filed in the past for these structures.

Additional mitigation projects within the county include:

- Bear Swamp Road Bridge Replacement
- Pemberton Drive Bridge Work
- Numerous Culvert Replacements to Reduce Flooding
- MSA Projects

CITY OF SALISBURY

The City of Salisbury provided the following mitigation efforts recently initiated or completed within the next five (5) years.

1. The North Prong Park project has been in the 5-year Capital Improvement Plan (CIP). This project goals are to purchase industrial lands and convert them into open space/park land. The city is in the process of purchasing lands and performing environmental assessments.

2. The Market Street Shoreline Rehabilitation project will stabilize an existing natural shoreline that is experiencing significant erosion. This is funded in FY22.

3. Northwood and Brewington Branch culvert replacement is also funded in FY22. This project consists of replacing a large box culvert that has experienced wash outs in large storm events.

4. The city adopted an Environmental Policy Task Force Report in January 2021. The report included items for resilience and sustainability in the areas of:

    - 1 Energy Use and Emissions;
    - 2 Water/Sewer/Stormwater;
    - 3 Public Open Space;
    - 4 Transportation; and,
    - 5 Education and Outreach.

    Specific projects have included a nuisance flooding education campaign and information about drinking water standards.

5. The city adopted a Vision Zero action plan for safe roads. Numerous projects are funded to help pedestrians have safe access throughout the city.

6. The Naylor Mill Road bridge replacement project is in the design phase. This is the full replacement of a bridge that was identified by the State for needing replacement. Mill Street bridge has also been identified for replacement and the design in pending funding.

7. The city is evaluating flood gates along Lake Street in coordination with upgrades to the Fire Station No. 16 stormwater management system.

8. The Fitzwater Pump Station on Fitzwater Street has been relocated across the street and all components are above the flood level. The old station has been demolished. This

project was identified in the 2017 Wicomico County Hazard Mitigation Plan and completed during this past planning cycle.

Additionally, the city works with Wicomico Environmental Trust on environmental protection projects. The city also works with Chesapeake Bay Trust on an annual grant program for stormwater restoration and outreach.

Finally, the City of Salisbury has an Emergency Operations Notification System. The city also relies on Wicomico County 911 Center to activate the civil defense alerting system for hazard warning.

TOWN OF HEBRON

Through grant funding, the Town of Hebron completed a Stormwater Management Survey in August 2019. The Town also reported that they work with their vulnerable population community including the local foodbank and churches. They also participate in the Community Emergency Response Team (CERT). Finally, the Town of Hebron posts storm related information on social media.

TOWN OF SHARPTOWN

The Town of Sharptown received a grant from the Maryland Department of Natural Resources (DNR) to complete a shoreline erosion project along the Nanticoke River in the form of bulkhead repair. This project is expected to be completed in 2021. In addition, the Town of Sharptown utilizes the County's hazard warning/notification system.

TOWN OF WILLARDS

The Town of Willards utilizes the County's hazard warning/notification system.

TOWN OF PITTSVILLE

The Town of Pittsville utilizes the County's hazard warning/notification system.

CITY OF FRUITLAND

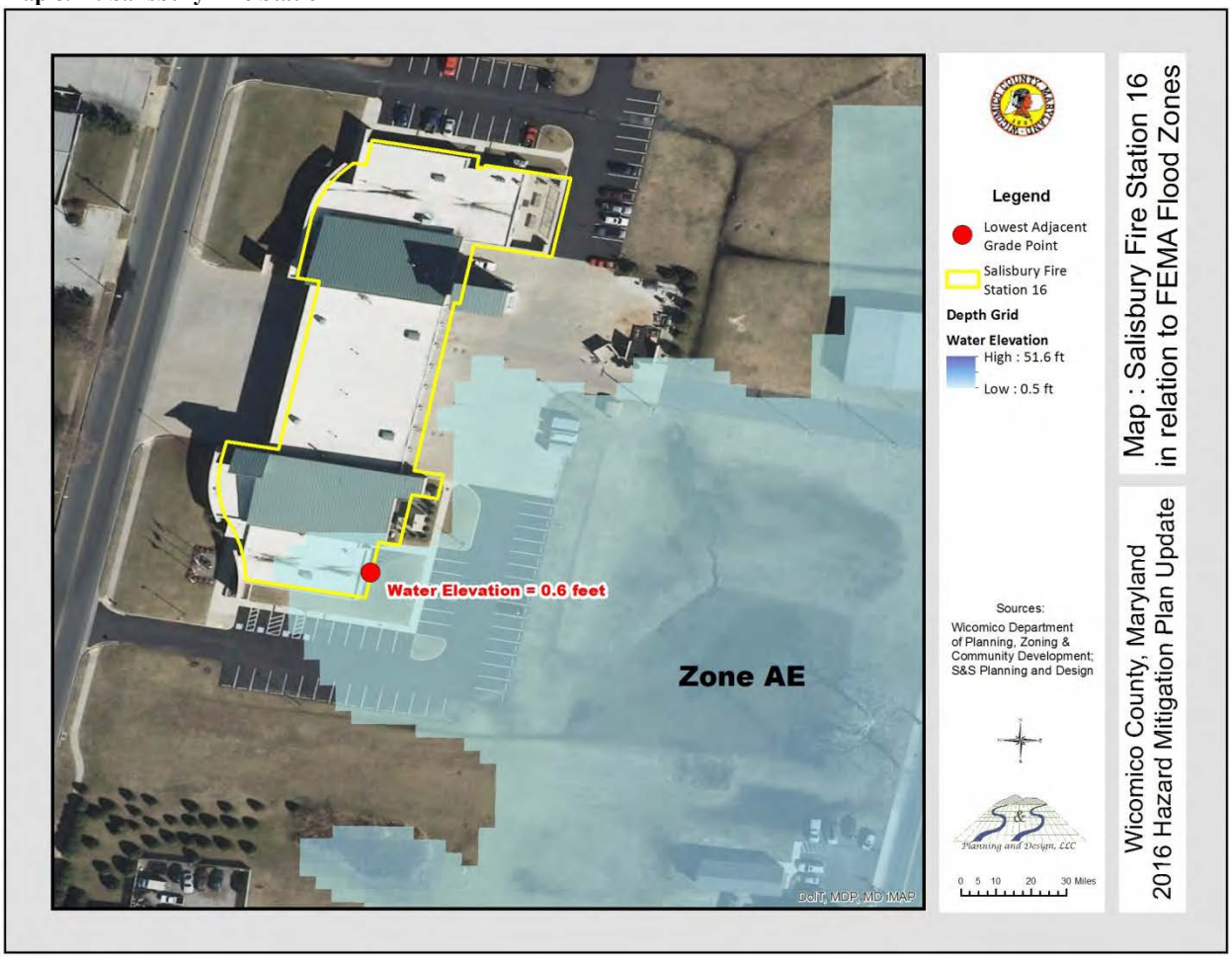
The City of Fruitland utilizes the County's hazard warning/notification system.

8.14 CONCLUSION

COMMUNITY LIFELINES & PUBLIC FACILITIES

The City of Salisbury Fire Station No. 16 is partially located within the 1% annual chancel flood hazard area (Zone AE). Fire Stations are considered community lifelines. Community lifelines are those facilities intended to provide services to the community in the event of a disaster.

Map 8.21: Salisbury Fire Station



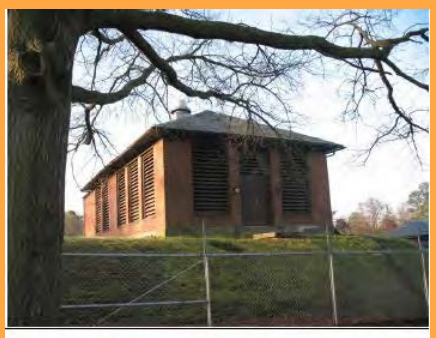
Representatives from the Salisbury Fire Station indicated that there is no history of flooding at the facility, flooding occurs at the rear of the building in the parking lot. One past flood related issue was reported. This issue involved the stormwater management pond, which overflowed causing water to flow up to the parking lot but did not overtop the parking lot. Flood mitigation addressing both current and future conditions are recommended.

Additionally, two (2) utilities within the City of Salisbury are located within the 1% annual chance flood hazard area and include:

- Salisbury Northside Pump Station on Delaware Avenue
- Salisbury Park Water Treatment Plant on North Park Drive

The **Salisbury Northside Pump Station** located on Delaware Avenue has not reported any flooding issues. The facility itself is located on elevated ground.

The **Salisbury Park Water Treatment Plant** located on North Park Drive includes three (3) structures, which do not have a history of flooding. As shown in the images below, the aerator building is on elevated ground and the pump building is at level ground. The storage building is below grade, however, has not experienced flooding.



Photograph 2-3: Aerator Building Looking from the North

Photograph 2-1: Pump Building Looking from the East

Photos Source: City of Salisbury

In terms of current and future conditions, consideration for potential flood impacts to the City of Salisbury Police Department located at 699 W. Salisbury Parkway should be explored. While the Police Department is within the moderated risk area (0.2 percent annual chance flood hazard area), due to increasing storm activity and severity, flood impacts could potentially escalate over time.

SOCIAL VULNERABILITY

Targeted public information and messaging related to the flood hazard, and consideration for a diverse population should be countywide, however additional concentration in the areas in and around the City of Salisbury and the Towns of Delmar and Willards. These areas indicate both high Social Vulnerability Index (SVI) score and flood hazard areas. Other areas within the county, such as in and around Mardela Springs, show an overlap of moderate SVI scores and flood hazard areas.

In addition, the Wicomico County Housing Authority has various properties located within flood hazard areas. These properties should be considered for flood mitigation.

Table 8.16: Community Lifelines and Public Facilities- Special Flood Hazard Areas

Facility Type	Number of Facilities	Map ID # / Facility Name	Address of Facility	City
1% ANNUAL CHANCE FLOOD HAZARD AREA				
County Owned	3	7 / Housing Authority	613 Delaware Avenue	Salisbury
		12 / Housing Authority	611 Delaware Avenue	Salisbury
		13 / Housing Authority	609 Delaware Avenue	Salisbury
0.2% ANNUAL CHANCE FLOOD HAZARD AREA				
County Owned	4	28 / Housing Authority	627 Jefferson Street	Salisbury
		29 / Housing Authority	615 Jefferson Street	Salisbury
		30 / Housing Authority	700 Jefferson Street	Salisbury
		31 / Housing Authority	625 Jefferson Street	Salisbury

HISTORIC DISTRICTS, STRUCTURES & CEMETERIES

As part of the plan update, historic districts, structures, and cemeteries were assessed for flood vulnerability. Results indicated that 52 historic structures are at risk to the 1 percent annual chance flood hazard as well as 31 cemeteries. Flood risk reduction solutions and adaption for historic structures should be further explored. Special considerations for maintaining the historic integrity of a property while reducing the impacts of floods oftentimes requires technical assistance.

FREQUENTLY FLOODED LOCATIONS

The county and municipalities should continue to update and maintain Tables 8.14 and 8.15. Consideration for projects on roadways identified as having frequent flooding issues could be potentially prioritized within Capital Improvement Planning (CIP). A mechanism for prioritization and scoring within the CIP should be developed.

REPETITIVE LOSS PROPERTIES

The communities of Nanticoke, Tyaskin, Bivalve, and Whitehaven continue to have the greatest number of repetitive loss properties. Concentration of flood mitigation and resilience efforts in these areas should be applied throughout this planning cycle.

CHAPTER 9 – WINTER WEATHER

Updates to the Wicomico County Chapter 9 – Winter Weather included the following:

- Updated Event Tables 9.1 & 9.2 for additional recorded Extreme Cold and Winter Weather Events.
- Integrated aspects of the Wicomico County Extreme Temperatures Preparedness and Response Plan.
- Added pre-event mitigation triggers and actions.
- Reviewed social vulnerability index and incorporated into chapter.
- Updated conclusions and identified potential outstanding generator needs and recommendations for updates to the 2016 *Wicomico County Preparedness and Response Plan for Extreme Temperatures Version 2.4 including recent amendments.*

CHAPTER 9 – WINTER WEATHER

9.1 HAZARD CHARACTERIZATION

Winter weather can cause a wide variety of impacts including school, government and business closings, traffic accidents, power outages, loss of communication, and damage to buildings such as a roof collapsing due to the amount of snow pack. Sleet, freezing rain, snow, and extremely cold temperatures are all associated with winter storms and winter weather. Flooding and flash flooding may also occur from warming temperatures that result in rapid snowmelt and subsequent runoff.

A winter storm warning is issued when snowfall is expected to accumulate more than four (4) inches in twelve (12) hours. The most significant snowstorms in Maryland history have had accumulations ranging from 12 to over 50 inches, and typically tend to occur in the months of January or February.

9.2 HAZARD RISK & HISTORY

Historic record winter storm events, i.e. blizzards, occurred in Wicomico County in January of 1996, February of 2010 and January of 2018; areas of the County reported between six (6") and thirteen (13") inches of snow.

The *National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI)* reported one (1) extreme cold event and seventy four (74) significant winter storm or winter weather events (including events categorized as a blizzard or ice storm) for the County from the period of 1996-2020; selected event details and descriptions are provided in Tables 9.1 and 9.2, respectively. While many of the winter storm/weather events are provided in the previous HMP and in the *NCEI*, only past events that indicated accumulations of five (5) inches or greater are provided herein; however, all winter storm/weather events listing in the *NCEI* since the previous HMP update are included.

Table 9.1: Extreme Cold Events

Date	Event Narrative
February 5-7, 1996	An arctic air mass settled over the mid-Atlantic states resulting in record breaking cold across the lower Maryland eastern shore. The temperature dropped to 1 below zero at the Salisbury airport on the morning of the 5th.
2021 HMP Update	
No Extreme Cold events were reported in the NCEI database since the 2016 HMP Plan Update.	

Source: NOAA NCEI

Source: www.delmarvanow.com – January 4, 2018 – Picture from Susan Parker video

Table 9.2: Winter Storms – Winter Weather – Blizzard – Significant Snow and Ice Events

Date	Event	Event Narrative
January 6, 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.
February 2, 1996	Winter Storm	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 inches.
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	Wicomico county including Salisbury received 6 to 9 inches, and Somerset county picked up 6 inches. Winds gusted over 30 mph, producing blowing and drifting snow during the late afternoon and evening hours.
February 22, 2001	Winter Storm	A winter storm produced 3 to 6 inches of snow across the Lower Maryland Eastern Shore. The specific snow total for Salisbury Airport in Wicomico county 5-6 inches. Schools were dismissed early and most were closed the following day due to slippery road conditions.
February 15, 2003	Winter Storm	6 inches fell in Delmar. Local law enforcement agencies reported numerous accidents. Schools were closed Monday, February 17th due to very slippery road conditions.
December 18, 2009	Winter Storm	Snowfall amounts were generally between four and fourteen inches across the county.
January 30, 2010	Winter Storm	Snowfall amounts were generally between seven and eleven inches across the county. Salisbury reported 11.0 inches of snow. Parsonsburg reported 10.2 inches of snow. Sharptown reported 8.0 inches of snow. Low pressure moving off the coastal Carolinas produced between six and thirteen inches of snow across the Lower Maryland Eastern Shore from Saturday morning into Saturday night January 30th.
February 9-10, 2010	Blizzard	Snowfall amounts were generally between five and ten inches across the county. Sharptown reported 10.0 inches of snow. Salisbury reported 8.0 inches of snow. Snow, heavy at times, occurred with northwest winds 30 to 40 mph with gusts to 50 mph, resulting in poor visibilities and even whiteout conditions.
February 5-6, 2010	Winter Storm	Snowfall amounts were generally between twelve and twenty inches across the county. Pittsville reported 20.0 inches of snow. Sharptown reported 19.0 inches of snow. Mardela Springs reported 18.0 inches of snow. Salisbury Airport reported 14.0 inches of snow. Fruitland reported 12.0 inches of snow. Low pressure moving off the coastal Carolinas produced between six and twenty inches of snow across the Lower Maryland Eastern Shore from Friday afternoon, February 5th, through Saturday afternoon February 6th.
December 25-27, 2010	Winter Storm	Snowfall amounts were generally between eight and thirteen inches across the county. Pittsville reported 12.5 inches of snow. Fruitland reported 11.8 inches of snow. Low pressure moving north just off the Mid Atlantic Coast produced between four and fifteen inches of snow across the Lower Maryland Eastern Shore from Saturday evening, December 25th, into early Monday morning December 27th. Also, the storm produced near blizzard conditions over portions of the area.
March 16-17, 2014	Winter Storm	Snowfall amounts between 5.0 inches and 7.0 inches occurred across the county, with 7.0 inches of snowfall reported in Mardela Springs and 1 mile east of Salisbury. A complex area of low pressure developed along a stalled cold front across the Southeast United States with weak high pressure over New York, creating snow across the Lower Maryland Eastern Shore.
2021 HMP Update		
February 16-17, 2015	Winter Storm	Snowfall amounts were generally between five inches and eight inches across the county. Salisbury and Pittsville reported 8.0 inches of snow. Parsonsburg reported 6.0 inches of snow.
February 26, 2015	Winter Storm	Snowfall amounts were generally between three inches and seven inches across the county. Fruitland reported 7.0 inches of snow. Salisbury and Delmar reported 5.0 inches of snow.
March 1, 2015	Winter Weather	Ice accumulations ranged from a trace to .15 inch. Mardela Springs reported .15 inch of ice.
March 5, 2015	Winter Storm	Snowfall amounts were generally between two inches and five inches across the county. Sharptown reported 4.5 inches of snow. Salisbury (2 N) and Pittsville Manor reported 4.0 inches of snow. Delmar reported 3.5 inches of snow.

Date	Event	Event Narrative
January 22, 2016	Winter Storm	Snowfall totals were generally between 3 inches and 8 inches across the county. Salisbury reported 6.0 inches of snow. Westbury Acres reported 4.8 inches of snow.
February 15, 2016	Winter Storm	Snowfall totals were generally between 3 inches and 5 inches across the county. Delmar, Maple Plains, and Pittsville reported 5.0 inches of snow. Salisbury reported 4.0 inches of snow.
March 3-4, 2016	Winter Storm	Snowfall totals were generally between 4 inches and 6 inches across the county. Salisbury reported 5.2 inches of snow. Hebron reported 4.5 inches of snow.
January 30, 2017	Winter Weather	Snowfall totals were generally between 0.5 inch and 2 inches across the county. Hebron reported 1.5 inches of snow. Salisbury Airport (SBY) reported 0.5 inch of snow.
January 3-4, 2018	Blizzard	Snowfall totals ranged between six inches and thirteen inches across the county. Very strong north to northwest winds of 30 to 45 mph affected the area, producing blowing snow and poor visibilities. Pittsville reported 13.0 inches of snow. Salisbury Wicomico Airport reported 12.5 inches of snow. Hebron reported 9.0 inches of snow. Parsonsburg reported 6.4 inches of snow. Travel and clean up were severely hampered by significant drifting of snow.
March 21-22, 2018	Winter Weather	Snowfall totals ranged between one inch and three inches across the county. Pittsville reported 1.5 inches of snow. Parsonsburg reported 1.0 inch of snow.
December 9, 2018	Winter Weather	Snowfall totals generally ranged between one half inch and two inches across the county.
January 12-14, 2019	Winter Storm	Snowfall totals generally ranged between three inches and four inches across the county. Delmar reported 4.0 inches of snow. Parsonsburg (2 WNW) reported 3.7 inches of snow. Salisbury-Wicomico Airport reported 3.5 inches of snow.
February 1, 2019	Winter Weather	Snowfall totals generally ranged between one half inch and one inch across the county. Delmar reported 1.0 inch of snow. Salisbury reported 0.9 inch of snow.

Source: NOAA NCEI

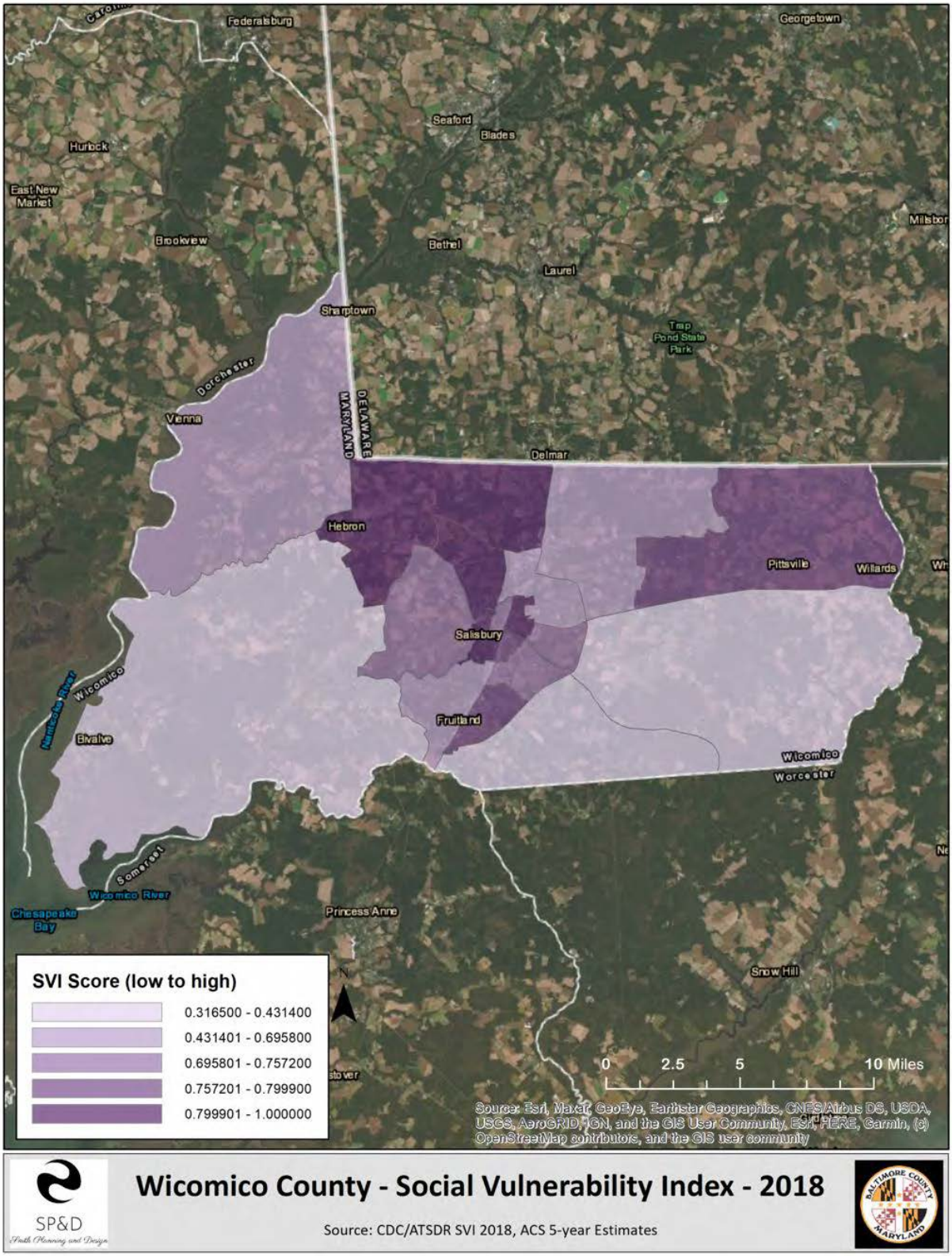
In terms of number of occurrences, the NOAA NCEI listed a total of 75 winter storm and/or winter weather events affecting Wicomico County from the period of 1996-2020. Therefore, Wicomico County experiences, on average, approximately 3.0 substantial winter storm or winter weather events per year.

9.3 SOCIAL VULNERABILITY INDEX

According to the CDC, "Social Vulnerability" refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss.

Therefore, it is important to identify areas or populations within any community that may be more vulnerable to external environmental factors such as extreme cold and winter weather. Map 9.1 provides a broad illustration of the Social Vulnerability Index (SVI) for Wicomico County. Understanding the SVI within Wicomico County can facilitate the implementation of mitigation measures to address impacts to communities when extreme cold and winter weather events occur. Areas shown as having the highest SVI score are depicted in dark purple and include the Towns of Hebron, Willards, Pittsville and the City of Salisbury.

Map 9.1: Wicomico County Social Vulnerability Index



9.4 VULNERABILITY

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

Winter storms and winter weather's underlying hazards can significantly affect the environment and everyday lives for many individuals. Potential impacts may include:

- **Roads** – Roadways are impacted by freezing rain, sleet, and black ice can dramatically worsen the driving hazard by creating dangerously slick, icy road conditions. The melting/refreezing process can occur for many days after a storm, and will only end once all moisture is melted and evaporated, and roads are dry.
- **Ice Accrual** – Freezing rain accumulation on trees can cause large limbs or whole trees to snap and possibly fall on homes, cars, and powerlines. This can create a very dangerous environment outdoors as well as widespread power outages.
- **Visibility** – Heavy snow can create dangerous driving conditions commonly referred to as "white out" conditions. The lack of visibility combined with slick, snow covered roads greatly increases the probability of an accident.
- **Loss of Power (Heating Hazards)** – As a result of power outages during very cold conditions, residents may be forced to find alternative means to heat their homes. Carbon monoxide poisoning is a concern due to improperly ventilated heating sources from space or kerosene heaters, furnaces, gas water heaters, gas stoves, fireplaces, and blocked chimneys.
- **Dangerously Cold Temperatures** – When temperatures fall into the teens and single digits, it becomes more dangerous to be outside for prolonged periods of time. Some major threats include wind chill, frostbite, and hypothermia.
- **Aircraft Icing** – Icing poses a major threat to air travel, resulting in lengthy flight delays and cancellations.

Wicomico County has developed and approved a plan to address and respond to extreme temperature events. An Excerpt from the Cold Weather Section is provided below that address and describe pre- event (mitigation) triggers and actions.

Phase 1: Pre-Event (Mitigation)

- **Triggers:**
  - The NWS has predicted a weather system that will impact the county with colder than normal temperatures, which may or may not be accompanied with precipitation and/or including a Wind Chill Advisory or Warning.
    - DES will monitor weather forecasts for temperature and precipitation. Multiple resources will be used for the most reliable forecast for Wicomico County and may include: National Weather Service Wakefield Va. or other reliable resources.

- Conditions could potentially meet the definition of an **Extreme Cold Event** as defined in this plan.

Extreme Cold Event- an extreme cold event is a weather condition with excessively low temperatures or a combination of cold temperatures and wind that has the potential to cause cold-related illnesses or injuries. An extreme cold event is defined in hours, a day, or series of days when:

- The minimum temperature or wind chill is forecasted to be approximately -5 degrees Fahrenheit or lower.
- Weather or environmental conditions are such that a high incidence of cold-related illnesses or injuries can reasonably be expected.

- **Actions:**
  - DES will schedule a routine conference call and brief partners on the potential weather impact of an extreme cold event and review current plans and response measures that would be taken, should additional actions be warranted during the storm or immediately after.
  - Identify sheltering resources available in the community to manage populations greater than the resources that are normally available, including American Red Cross and Salvation Army.
  - Identify transportation assets for individuals unable to self-transport.
  - Identify roles and expectations of agencies, should an Incident Command Structure be put forth and/or sheltering operations are put in-place.
  - Distribution of Press Releases to managing health and decreasing risk during cold weather.

9.5 CONCLUSION

Continuous power at facilities used for shelter operations and as warming centers are a priority. Continuity of operations at designated critical facilities is necessary to meet community needs and resiliency goals.

To that end, emergency generator back-up power at Wicomico County critical facilities listed within Appendix D were reviewed by the Hazard Mitigation Planning Committee (HMPC) for this plan update. This review yielded the following updates:

- Since the implementation of the 2016 Wicomico County HMP Update, several facilities have upgraded their generator capabilities. The previously identified facilities of James M. Bennett High School and the Wicomico Youth and Civic Center have received updated and /or new generators.
- Additionally, plans are ongoing to install new generators at Salisbury Middle and Parkside High Schools.
- The recommendation for generators at the Wicomico County Solid Waste Complex is on-going and partially complete.
- Finally, the installation of generators at high priority pumping locations in Salisbury: Waverly Drive, College Avenue, and Cherokee Lanes have been completed.

The *Wicomico County Preparedness and Response Plan for Extreme Temperatures Version 2.4* with recorded amendments was reviewed for this plan update. The following recommendations have been included in Chapter 14 Mitigation Strategies.

- Review and update extreme cold weather press release templates from December 2016.
- Review and update 2019 Partner Notifications List- Attachment C.
- Review 2016 Warming Center Information. Review Social Vulnerability Index- Figure 9.1 for areas shown as having the highest Social Vulnerability Index (SVI) score which include the Towns of Hebron, Willards, Pittsville, and the City of Salisbury. Ensure that warming centers are located within or near those areas shown as having the highest SVI scores.

CHAPTER 10 – EXTREME HEAT, DROUGHT & WILDFIRES

Updates to the Wicomico County Chapter 10 – Extreme Heat, Drought and Wildfire included the following:

- Updated Event Tables for Extreme Heat, Drought, and Wildfire Events
- Added Maryland Department of the Environment (MDE) Drought Status
- Added Maryland Department of the Environment (MDE) Drought Restrictions
- Added new Facility and Woodlands Map- Wildfire Vulnerability
- Added potential Mitigation Actions Items for Heat Hazard

CHAPTER 10 – EXTREME HEAT, DROUGHT & WILDFIRES

10.1 INTRODUCTION

The hazard risks from extreme heat, drought and wildfire typically occur during the same months of the year, specifically from April to November. Wildfires and drought can cause both ecological and socioeconomic problems and have the potential to affect a large portion of the population.

10.2 EXTREME HEAT & DROUGHT HAZARD CHARACTERIZATION

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

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

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

Drought & Extreme Heat
Droughts occur when a long period passes without substantial rainfall. A heat wave combined with a drought is a very dangerous situation.

Extreme heat poses a growing and inequitable threat. Cities across the United States must plan now to increase urban heat resilience in the face of climate change and the Urban Heat Island (UHI) effect. Planners are well poised to use existing regulatory tools and plans to mitigate the inequitably distributed risk associated with the UHI effect, reduce greenhouse gas emissions contributing to climate change, and help prepare for extreme heat events. By working with colleagues across agencies and sectors to help coordinate comprehensive approaches to heat mitigation and management, planners can help their communities become more resilient to extreme heat.

- *Extreme Heat Event:* A weather condition with excessive heat and/or humidity that has the potential to cause heat-related illnesses. An Extreme Heat Event is defined as a day or series of days when:
  - The heat index is forecasted to be 105 degrees or higher, or:
  - The National Weather Service has issued a Heat Advisory (Heat Index projected to be 105-109 degrees), or;
  - The National Weather Service has issued an Excessive Heat Warning (Heat Index of 110 degrees or higher for at least 3 hours), or;
  - Weather or environmental conditions are such that a high incidence of heat-related illnesses can reasonably be expected, or;

- The Health Officer has declared an Extreme Heat Event based on weather and/or environmental conditions that may lead to a high incidence of heat-related illnesses.

10.3 EXTREME HEAT & DROUGHT HAZARD RISK & HISTORY

As noted in *Chapter 3: Hazard Identification*, extreme heat and drought are normally not a severe problem in Wicomico County. However, dry conditions do occur, impacting water service to County residents and businesses. The *National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI)* reported the following events as extreme heat or drought for Wicomico County.

Table 10.1: Extreme Heat Events

Location	Date	Event Narrative	Property Damage
Unknown	May 18 to May 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 18th. Then on May 19th, 20th and the 21st.	Not Available
Countywide	July 21-23, 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.	0
Countywide	July 5- July 8, 2012	High temperatures ranged from the mid-90s to lower 100s and low temperatures ranged from the mid-70s to lower 80s across the county from July 5th through July 8th. High Pressure centered just to the west of the Middle Atlantic Region produced hot and humid weather over the Lower Maryland Eastern Shore from July 5th through July 8th. High temperatures ranged from the mid-90s to lower 100s, and low temperatures ranged from the mid-70s to lower 80s across the area.	0
2021 HMP Update			
No additional Extreme Heat events were reported in the NCEI database since the 2016 HMP Update			

Source: NOAA NCEI

Table 10.2: Drought Events

Date	Event Narrative	Crop Damage
September 1, 1995 to September 30, 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.	Not Available
November 1 to November 30, 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.	$6 Million
2021 HMP Update		
No additional Extreme Heat events were reported in the NCEI database since the 2016 HMP Update		

Source: NOAA NCEI

The worst drought in Maryland occurred from December 1929 to February 1931, with 1930 being the driest year since 1869 (*U.S. Weather Bureau 1930*). During the 15-month agricultural drought, rainfall was 21.5 inches below normal. Crop losses in 1930 dollars were estimated at $40 million.

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

10.4 DROUGHT VULNERABILITY

According to the Maryland Department of the Environment (MDE), the drought status for the Eastern Region, which includes Wicomico County, has been at normal as of July 31, 2021. This information is maintained and updated by MDE and may be obtained on their website.

The *Water Resources Element* of the *2017 Wicomico County Comprehensive Plan* includes important data pertaining to the County water supply. For instance, there are no impoundments used for water supply in Wicomico County; residents rely exclusively on groundwater for water supply. This can be problematic, as was the case from May 2007 to August 2007, when approximately 120 wells in Somerset and Wicomico Counties had to be replaced due to prolonged drought conditions that occurred in previous years.

During periods of drought, Maryland implements mandatory water use restrictions including the following prohibited uses:

- Watering of lawns;
- Water of gardens and irrigation, except for agriculture and certain commercial uses;
- Restrictions on irrigation and watering of golf courses;
- Washing of paved surfaces such as streets, roads, sidewalks, driveways, garages, parking areas, tennis courts and patios;
- Use of water for washing or cleaning of mobile equipment including automobiles, trucks, trailers, and boats;
- Use of water to fill and top off swimming pools; and,
- Homeowner power-washing of buildings, fences, decks, or other structures.

Note: There are additional exceptions to the Maryland Water Use Restrictions listed above.

The USGS Water Science for Maryland, Delaware, and the District of Columbia monitors conditions and host a MD-DE-DC Drought Watch at: http://md.water.usgs.gov/drought/index.html. Real time Maryland streamflow data is available, as well as drought status and resources.

10.5 WILDFIRE HAZARD CHARACTERIZATION

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 insulation, 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 from humans, such as arson and accidents from equipment operations.

10.6 WILDFIRE HAZARD RISK & HISTORY

In Maryland, wildfires and brushfires have forced school closings, disrupted telephone services by burning fiber optic cables, damaged railroads, other infrastructure, and adversely affected tourism, outdoor recreation, and hunting. The peak months for wildfire activity in Maryland by rank order are April, March, and November (spring and fall). In the spring months, increasing daytime temperatures, low relative humidity, and wind combine to dry surface litter, which promotes the ignition and spread of wildfires. After forest canopies are established, the forest floors become shaded, moisture levels increase, and fire hazard decreases. In the fall typically there are depleted soil moisture conditions, low streamflow conditions, and increased insulation of the forest floor due to reduced leaf canopies.

The Maryland Department of Natural Resources Forest Service handles statistics on wildfires. Table 10.3 lists the number of wildfires and the amount of acreage burned in Wicomico County from 1988 to 2020.

Table 10.3: Wildfire Events

Year	Number of Fires	Acres Burned
1988	125	1,461.5
1989	46	481.9
1990	41	609.8
1991	26	1,090.8
1992	28	199.9
1993	30	370.3
1994	35	33.7
1995	65	28.1
1996	22	29.3
1997	65	43.2
1998	70	89.8
1999	52	36.9
2000	34	74.1
2001	57	39.0
2002	46	33.3
2003	17	6.4
2004	26	45.1
2005	32	31.9

Year	Number of Fires	Acres Burned
2006	40	46.4
2007	29	121.7
2008	39	50.5
2009	14	3.1
2010	14	43.2
2011	13	19.2
2012	12	42.3
2013	9	4.1
2014	4	0.8
2015	5	4.1
2016	6	1.9
2017	2	2.0
2018	9	14.8
2019	8	27.9
2020	2	2.3
Annual Average	**31 fires**	**29.2 acres**

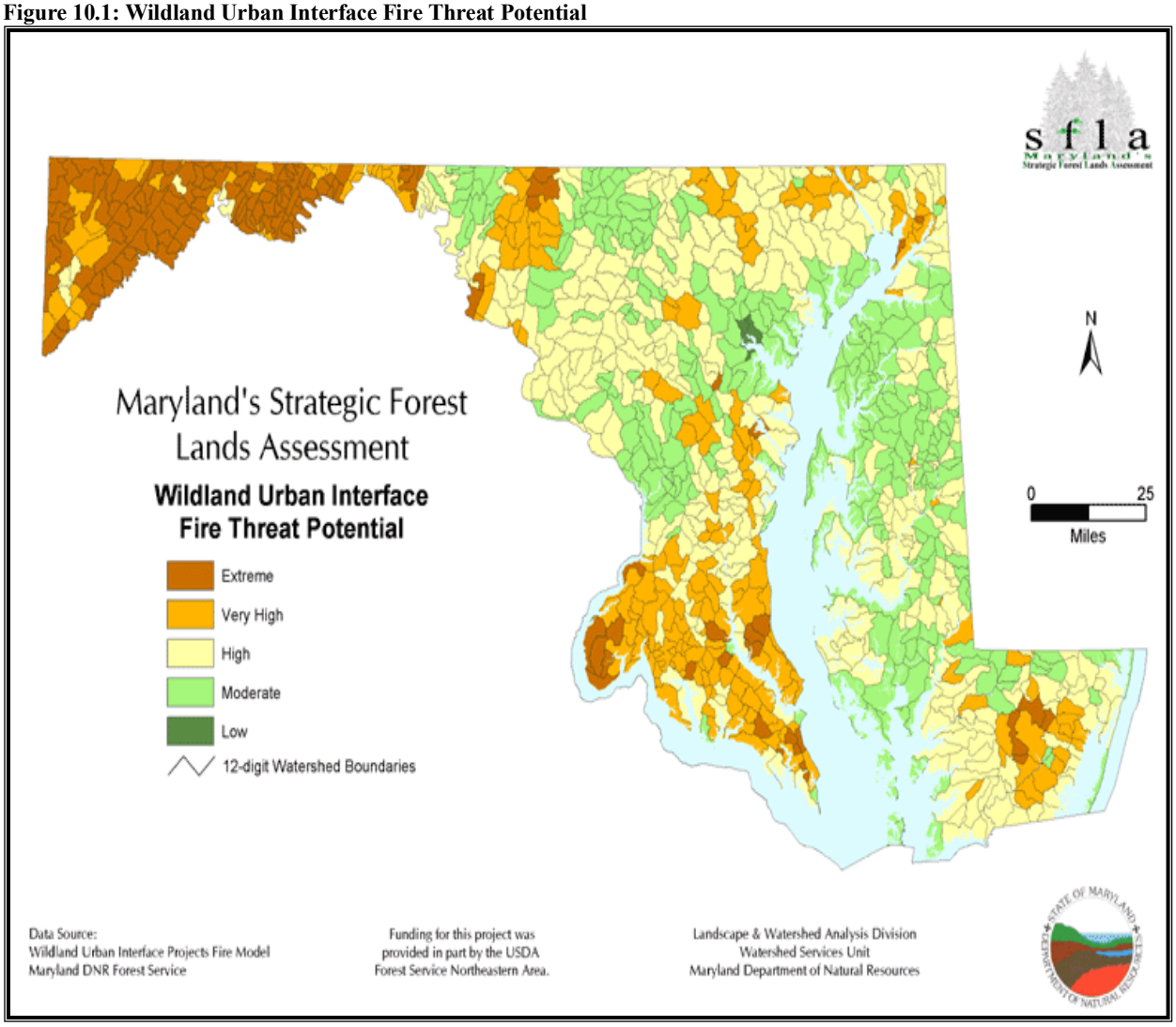
Source: Maryland DNR Forest Service
NOTE: Wildfire responses by the Maryland Forest Service do not represent all wildfire statistics in the County.

In terms of number of occurrences, the Maryland Forest Service listed a total of 1,023 wildfire events affecting Wicomico County during the years 1988 through 2020. Based on this data, Wicomico County experiences approximately 31 wildfire events per year. A trend in the data provided in Table 10.3 shows that the number of fires and the acres burned per year has generally decreased over the years in Wicomico County. There are several explanations for the decrease in wildfires, including wildfire awareness in the County, loss of forest land due to urban sprawl, and increased response times by fire departments.

10.7 WILDFIRE VULNERABILITY

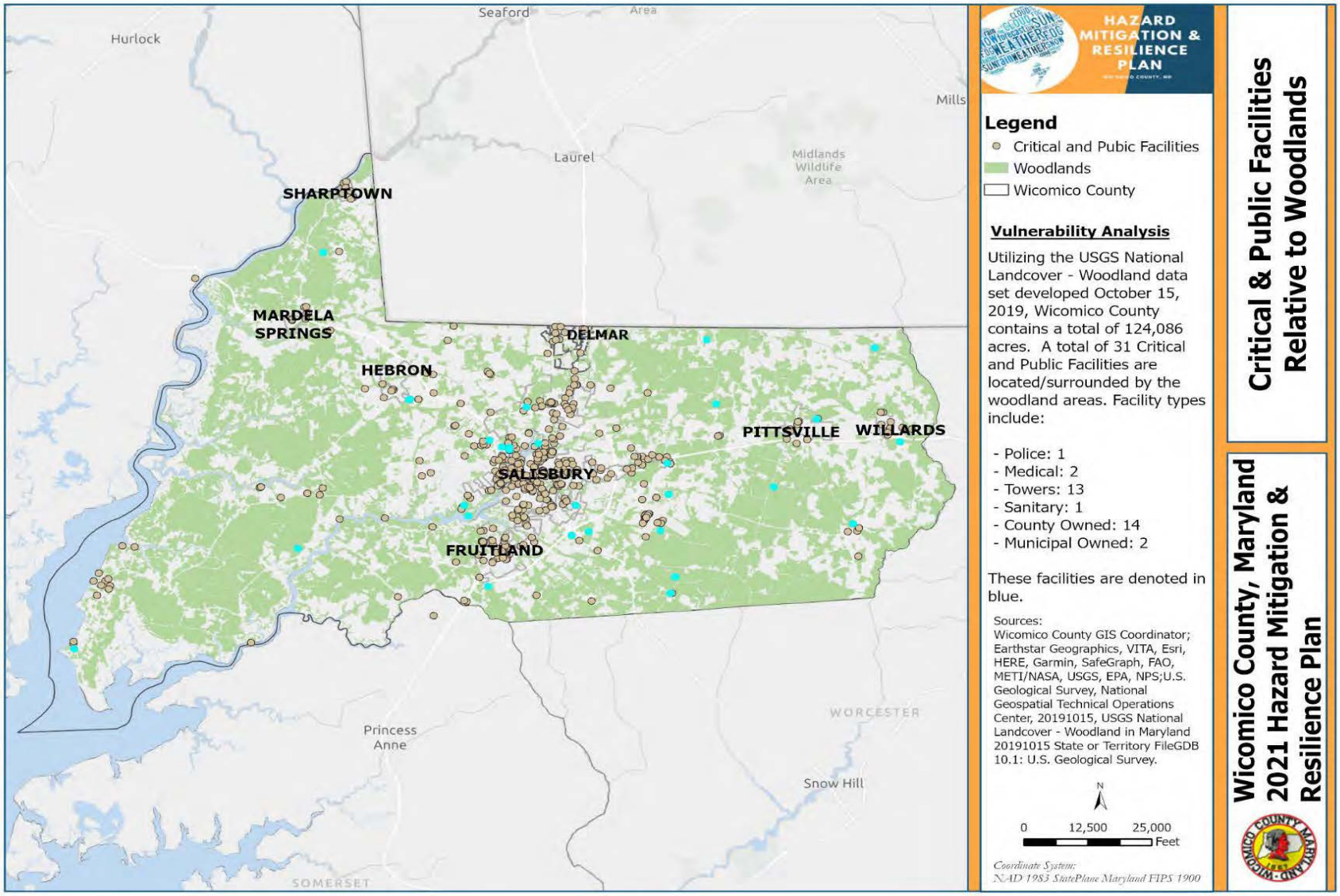
Maryland's Strategic Forest Lands Assessment is conducted by the Maryland Department of Natural Resources with financial assistance from the United States Department of Agriculture Forest Service and is composed of many types of vulnerability studies applying to the forests of Maryland. Figure 10.1 depicted below shows one of the studies conducted on wildland urban interface fire threat potential.

Figure 10.1: Wildland Urban Interface Fire Threat Potential



According to the figure, when compared to other counties in the state of Maryland, Wicomico County appears to have a moderate-to-high fire threat potential. In terms of forest cover, the woodlands of Wicomico County along with the location of critical and public facilities within the County, combine to determine their wildfire vulnerability.

Map 10.1: Facility Locations Compared to Woodlands



Analyzing Map 10.1 depicted above, Wicomico County has a considerable amount of woodlands. A wildfire could affect some facilities located outside of municipalities where the ratio of woodland to urban interface is considerably higher than in municipalities, where the high amount of impervious surfaces creates a barrier for wildfires. However, from analyzing the Critical and Public Facilities Relative to Woodlands Map above, the majority of facilities at high risk for wildfire consist of utility towers and storage tanks.

10.8 CONCLUSION

In reviewing Map 10.1: Facility Locations Compared to Woodlands, the potential Wildland-urban interface area(s) and concentrated areas of critical facilities in Wicomico County are moderate. Upon further analysis, critical and public facilities depicted in the Map 10.1, specifically when viewed up close, do not appear to be at significant risk to wildfire given the built-up environment within the county where the facilities are predominantly located.

In order to address Extreme Heat, Wicomico County could consider the following mitigation actions:

- Increase building energy efficiency through weatherization and the use of "cool" surfaces can reduce waste heat generated by indoor cooling and mechanical systems. Decreasing vehicle use through the planning of transit and active transportation modes is another waste heat reduction strategy. These strategies also have the co-benefit of reducing greenhouse gas emissions and local contributions to climate change.

- As heat risks increase, it is important to educate and inform the public about the dangers of heat and how to avoid them. Continue efforts to conduct public information and awareness campaigns throughout the summer months.

- A cooling center is a location, typically an air-conditioned or cooled building that has been designated as a site to provide respite and safety during extreme heat. This may be a government-owned building such as a library or school, an existing community center, religious center, recreation center, or a private business such as a coffee shop, shopping mall, or movie theatre. Some counties have set up cooling sites outdoors in spray parks, community pools, and public parks. Sometimes temporary cool spaces are constructed for events such as a marathon or outdoor concert.

CHAPTER 11: PANDEMIC & EMERGING INFECTIOUS DISEASE

During the 2021 Plan Update process the stakeholder group identified a new hazard to be included as a chapter in the hazard mitigation plan. The Chapter, **Pandemic and Emerging Infectious Diseases,** was added to the Plan with the most recently available data.

Updates to this chapter include the following new sections:

- How are Pandemics and Emerging Infectious Diseases a Threat to Wicomico County?
  - Overview of Epidemics and Pandemics
  - The difference between pandemic, epidemic, and emerging infectious disease
- Contributing factors to pandemic and emerging infectious disease risk
- History of notable pandemics and epidemics
- Vulnerability Assessment
  - COVID-19
  - Social Vulnerability
- Capability Assessment and Mitigation Strategies
- 2021 Mitigation Goals and Action Items

WICOMICO COUNTY HAZARD MITIGATION AND RESILIENCE PLAN

11.1 HOW ARE PANDEMICS AND EMERGING INFECTIOUS DISEASES A THREAT TO WICOMICO COUNTY?

We live in an ever-connected world and the benefits seem limitless. At present, the average U.S. citizen can travel coast-to-coast in less than six hours. A round trip flight out of BWI airport to Los Angeles can be purchased for just about $200. When we travel, however, there are additional costs than the ticket price – this has been made devastatingly clear in the face of a year-long global pandemic. As demonstrated by the COVID-19 pandemic, not only has human health been jeopardized, but also the social and economic well-being of the world.

Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people. **Epidemics** occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts.

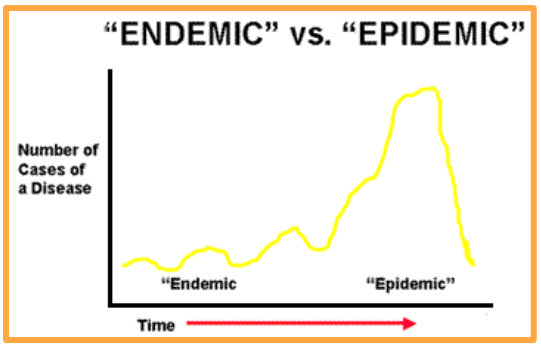
Source: Centers for Disease Control and Prevention CDC.gov

EPIDEMIC

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 Wicomico County.

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 each 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 11-1 provides a visual representation of the difference between endemic and epidemic.

According to the Center for Disease Control (CDC), epidemics may commonly result from:



Source: Health.mo.gov

- A recent increase in amount or virulence of the agent;
- The recent introduction of the agent into a setting where it has not been before;
- An enhanced mode of transmission so that more susceptible persons are exposed;
- A change in the susceptibility of the host response to the agent, and/or;
- Factors that increase host exposure or involve introduction through new portals of entry.

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.

PANDEMIC

The CDC defines a pandemic as "an epidemic that has spread over several countries or continents, usually affecting a large number of people." Similarly, according to the World Health Organization (WHO) a pandemic is defined as "the worldwide spread of a new disease." A pandemic occurs when a new strain of a virus appears for which people have little or no immunity. As a result, it spreads easily from person to person around the world, causing widespread illness and death. Individuals, families, caregivers, healthcare workers, and teachers can all take steps to prepare for a pandemic before it happens.

EMERGING INFECTIOUS DISEASES

According to the CDC, emerging infectious diseases are those whose incidence in humans has increased in the past two decades or threaten to increase in the near future. These diseases, which respect no national boundaries, can challenge efforts to protect workers as prevention and control recommendations may not be immediately available. These diseases include:

- New infections resulting from changes or evolution of existing organisms
- Known infections spreading to new geographic areas or populations
- Previously unrecognized infections appearing in areas undergoing ecologic transformation
- Old infections reemerging as a result of antimicrobial resistance in known agents or breakdowns in public health measures.

11.2 CONTRIBUTING FACTORS TO PANDEMIC AND EMERGING INFECTIOUS DISEASE RISK

Evidence suggests that the likelihood of pandemics has increased over the past century because of increased global travel and integration, urbanization, changes in land use, and greater exploitation of the natural environment. These trends likely will continue and will intensify. Significant policy attention has focused on the need to identify and limit emerging outbreaks that might lead to pandemics and to expand and sustain investment to build preparedness and health capacity.

The most common risk factors related to pandemics and infectious diseases include the following:

- Pandemics have occurred throughout history and appear to be increasing in frequency, particularly because of the increasing emergence of viral disease from animals.
- Pandemic risk is driven by the combined effects of spark risk (where a pandemic is likely to arise) and spread risk (how likely it is to diffuse broadly through human populations).
- Some geographic regions with high spark risk, including Central and West Africa, lag behind the rest of the globe in pandemic preparedness.
- Probabilistic modeling and analytical tools such as exceedance probability (EP) curves are valuable for assessing pandemic risk and estimating the potential burden of pandemics.
- Influenza is the most likely pathogen to cause a severe pandemic. EP analysis indicates that in any given year, a 1 percent probability exists of an influenza pandemic that causes nearly 6 million pneumonia and influenza deaths or more globally.

11.3 HISTORY OF PANDEMIC AND EMERGING INFECTIOUS DISEASES

The following section provides historical context and narrative for some of the worst epidemics, disease outbreaks, and pandemics to ever occur within the United States. This section discusses the following: COVID-19 pandemic, smallpox pandemic, yellow fever epidemic, cholera pandemic, scarlet fever epidemic, typhoid fever epidemic, H1N1 pandemic, and diphtheria epidemic. Note: this is not an all-inclusive historical account of pandemics, epidemics, and emerging infectious diseases that have occurred in the United States.

Novel COVID-19: 2019 – Present

The Novel COVID-19 pandemic has exploded since cases were first reported in Wuhan, Hubei Province, China in December 2019. As of January 15, 2021, the CDC estimates that 83.1 million total infections occurred between February and December of 2020. Of those cases, 70.4 million are estimated to have been symptomatic, and an estimated 4.1 million led to hospitalizations.

Individuals of all ages are at risk for infection and severe disease. However, the probability of fatal disease is highest in people aged over 65 years and those living in a nursing home or long-term care facility. Others at highest risk for COVID-19 are people of any age with certain underlying conditions, especially when not well-controlled. In addition, COVID-19 can spread between people who are in close contact with one another (within about 6 feet), via respiratory droplets produced when an infected person coughs, sneezes or talks, and by persons who are asymptomatic. Symptoms, or a combination of symptoms, can appear 2-14 days after exposure. Note: COVID-19 is an evolving pandemic. As such, symptoms and best practices to manage the spread of the virus are still being updated and adjusted by health professionals.

Smallpox: 1633-1634

Smallpox came to North America in the 1600s. Symptoms included high fever, chills, severe back pain, and rashes. It began in the Northeast and the Native American population was ravaged by it as it spread westward.

In 1721, more than 6,000 cases were reported out of a Boston population of 11,000. Around 850 people died from the disease.

In 1770, Edward Jenner developed a vaccine from cow pox. It helps the body become immune to smallpox without causing the disease.

Yellow Fever: 1793

During the humid summer of 1793, refugees fleeing a yellow fever epidemic in the Caribbean Islands sailed into Philadelphia, carrying the virus with them.

Yellow fever causes yellowing of the skin, fever, and bloody vomiting. During the 1793 outbreak, it is estimated that the 10 percent of the Philadelphia's population died and many others fled the city to avoid the illness.

A vaccine was developed and then licensed in 1953. One vaccine is enough for life and is mostly recommended for those nine months and older, particularly if one lives or travels to high-risk areas.
The Centers for Disease Control and Prevention (CDC) provides a list of countries where the vaccine is recommended for travel on their website.

Present: Mosquitoes are the key to how this disease spreads, particularly in areas such as Central America, South America, and Africa. Eliminating mosquitoes has been successful in controlling yellow fever. While yellow fever has no cure, someone who does recover from the illness becomes immune for the rest of their life.

Cholera (three waves): 1832-1866

The United States had three (3) serious waves of cholera, which is an infection of the intestines, between 1832 and 1866. The pandemic began in India and swiftly spread across the globe through trade routes.

New York City was the first U.S. city to feel the impact. Between 5 and 10 percent of the total population died in large cities. It is unclear what ended the pandemic, but it may have been the change in climate or the use of quarantine measures. By the early 1900s, cholera outbreaks had ended.

Present: Cholera is responsible for nearly 95,000 deaths a year worldwide, according to the CDC. Modern sewage and water treatment have helped eradicate cholera in some countries, but the virus is still present elsewhere.

Vaccinations for cholera are available for those planning to travel to high-risk areas. The best way to prevent cholera is to wash your hands regularly with soap and water and avoid drinking contaminated water.

Scarlet Fever: 1858

Scarlet fever is a bacterial infection that can occur after strep throat. Like cholera, scarlet fever epidemics came in waves. Scarlet fever most commonly affects children ages 5 to 15; it is rare in children under 3. Adults who are in contact with sick children have an increased risk. Studies once indicated that scarlet fever declined due to improved nutrition, but new research suggests that improvements in public health were more likely the cause.

Present: There is no vaccine to prevent strep throat or scarlet fever. It is important for those with strep throat symptoms to seek treatment quickly. Your doctor will typically treat scarlet fever with antibiotics.

"Typhoid Mary": 1906-1907

One of the biggest typhoid fever epidemics of all time broke out between 1906 and 1907 in New York City. Mary Mallon, often referred to as "Typhoid Mary," spread the virus to about 122 New Yorkers during her time as a cook on an estate and in a hospital unit.

About 5 of the 122 New Yorkers who contracted the virus by Mary Mallon died. The CDC cites a total of 13,160 deaths in 1906 and 12,670 deaths in 1907. Typhoid fever can cause sickness and red spots to form on the chest and abdomen.

A vaccine was developed in 1911, and an antibiotic treatment for typhoid fever became available in 1948.

Present: It is rare to contract typhoid fever today, but it can spread through direct contact with people who have the virus, as well as consumption of contaminated food or water.

H1N1 Flu: 1918

H1N1 is a strain of flu that still circulates the globe annually. In 1918, it was the type of flu behind the influenza pandemic, sometimes called the Spanish flu (though it did not actually come from Spain).

After World War I, cases of the flu slowly declined. None of the suggestions provided at the time (wearing masks, drinking coal oil) were effective cures. Today's treatments include bed rest, fluids, and antiviral medications.

Present: Influenza strains mutate every year, making last it is important to receive an annual vaccination to decrease the personal risk for the flu.

Diphtheria Epidemic: 1921-1925

Diphtheria peaked in 1921, with 206,000 cases. It causes swelling of the mucous membranes, including in your throat, which can obstruct breathing and swallowing. Sometimes a bacterial toxin can enter the bloodstream and cause fatal heart and nerve damage.

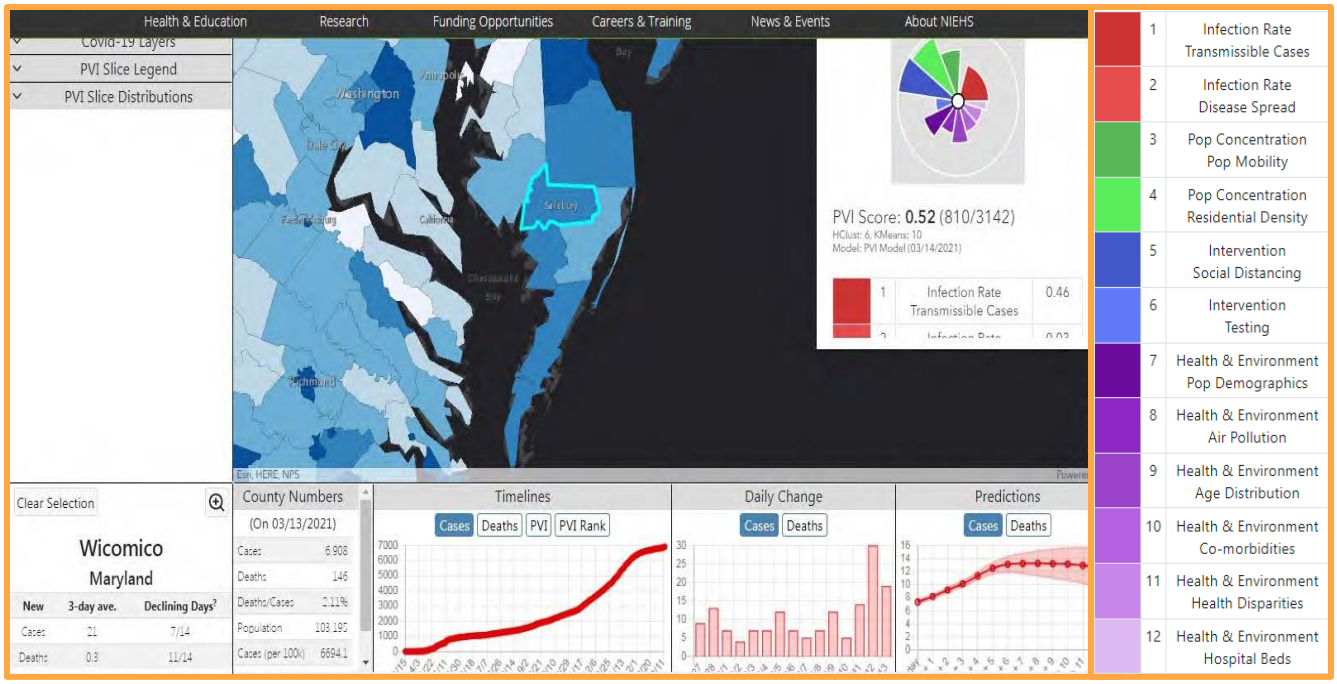
A vaccine was produced by researchers in the mid-1920's, which led to a sharp decline in infection rates in the United States.

Present: Today more than 80 percent of children in the United States are vaccinated, according to the CDC. Those who contract the disease are treated with antibiotics.

11.4 VULNERABILITY ASSESSMENT

COVID-19 PANDEMIC VULNERABILITY ASSESSMENT

The National Institute for Environmental Health Services (NIEHS) provides a COVID-19 Pandemic Vulnerability Index (PVI) to be utilized in assessing vulnerability at the county-level for the entire country. According to the source, the dashboard creates risk profiles, called PVI scorecards, for every county in the United States. It is continuously updated with the latest data. The PVI summarizes and visualizes overall risk in a special version of a pie chart, called a radar chart, where different data sources make up pieces of the pie. Infection rates, depicted in red slices, are labeled 1 and 2. Intervention rates, noted in blue slices 5 and 6, are highly variable and are updated daily. Population concentration and density are fixed values describing general demographic information, and these are shown in green slices 3 and 4. Health and Environmental variables are shown in the purple slices 7-12.



Source: https://covid19pvi.niehs.nih.gov/

SOCIAL VULNERABILITY ASSESSMENT

In the sphere of social science and public health science, policy, and practice, the terms *vulnerable*, *at risk,* and *special* are used in different contexts to describe overlapping segments of the U.S. population. In social science literature, vulnerability has been defined as "the potential for loss"; county-level socioeconomic and demographic data can be used to construct an index of social vulnerability to environmental hazards to guide research and interventions. Other researchers have published comprehensive models of vulnerability that are based on likely inequities in health and health care for use in health services research and public health practice.

When discussing vulnerability in terms of public health, vulnerability may be defined as "increased exposure to infection; increased susceptibility to severe disease, including complications, hospitalizations, and death; and lack of access to health care."
With these definitions in mind, Wicomico County should consider the following four questions – developed by the CDC – when addressing the needs of vulnerable populations during a pandemic, epidemic, or disease outbreak:

1. Why is the population considered vulnerable?
2. What are the unique issues, concerns, and needs of each vulnerable population?
3. What strategies can protect these populations?
4. What specific approaches are needed for vulnerable populations, their families, and their health care and service providers to ensure their protection?

As in the previous hazard chapters, the CDC Social Vulnerability Index (SVI) was reviewed and utilized to measure social vulnerability as it relates to Wicomico County. The social vulnerability index developed by the CDC and the Agency for Toxic Substances and Disease Registry (ATSDR) addresses the first question by identifying vulnerable populations at a census tract level for all counties in the United States. Understanding where populations have an increased vulnerability and exposure to hazards, including epidemics, while not predictive, can help emergency managers and public health officials take actions to reduce the impacts to these communities before an event or distribute needed recovery dollars after an event. All populations have value and should have the option to contribute to emergency management and hazard mitigation. Continued collaboration with the Lower Shore Vulnerable Population Workgroup will serve to further engage the community early and often, allowing residents to grow into partners in response, and emergency managers and public health officials to grow into community allies.

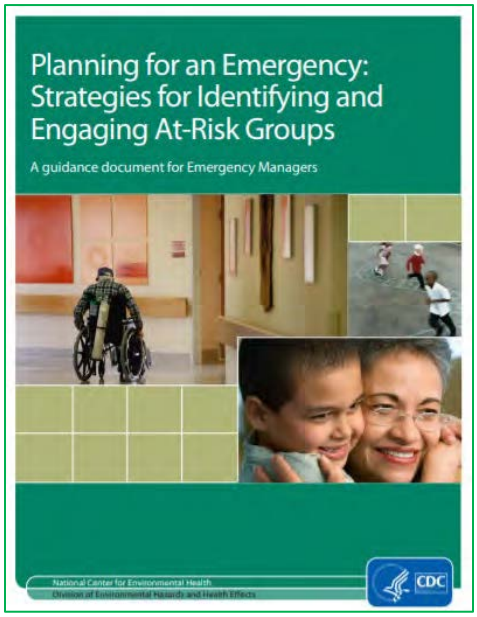
Lower Shore Vulnerable Populations Workgroup

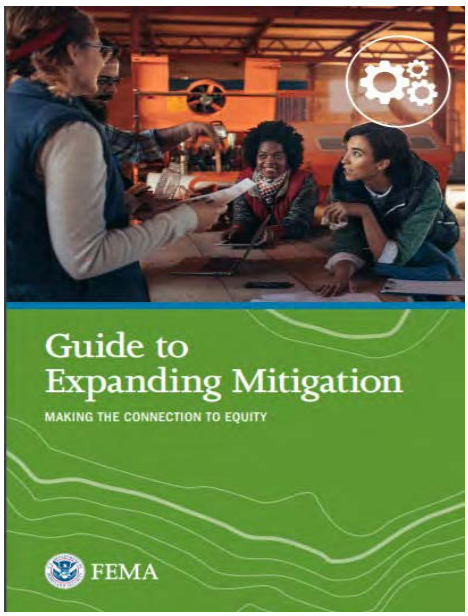
During the plan development process the Lower Shore Vulnerable Populations Workgroup reviewed the project website public survey. In addition, the language workgroup added hazard mitigation as an agenda item for several meetings including:

- March 2, 2021; and,
- March 24, 2021.

Additional integration of social equity is needed, therefore adding social vulnerability to the 2021 Plan is a step in this direction.

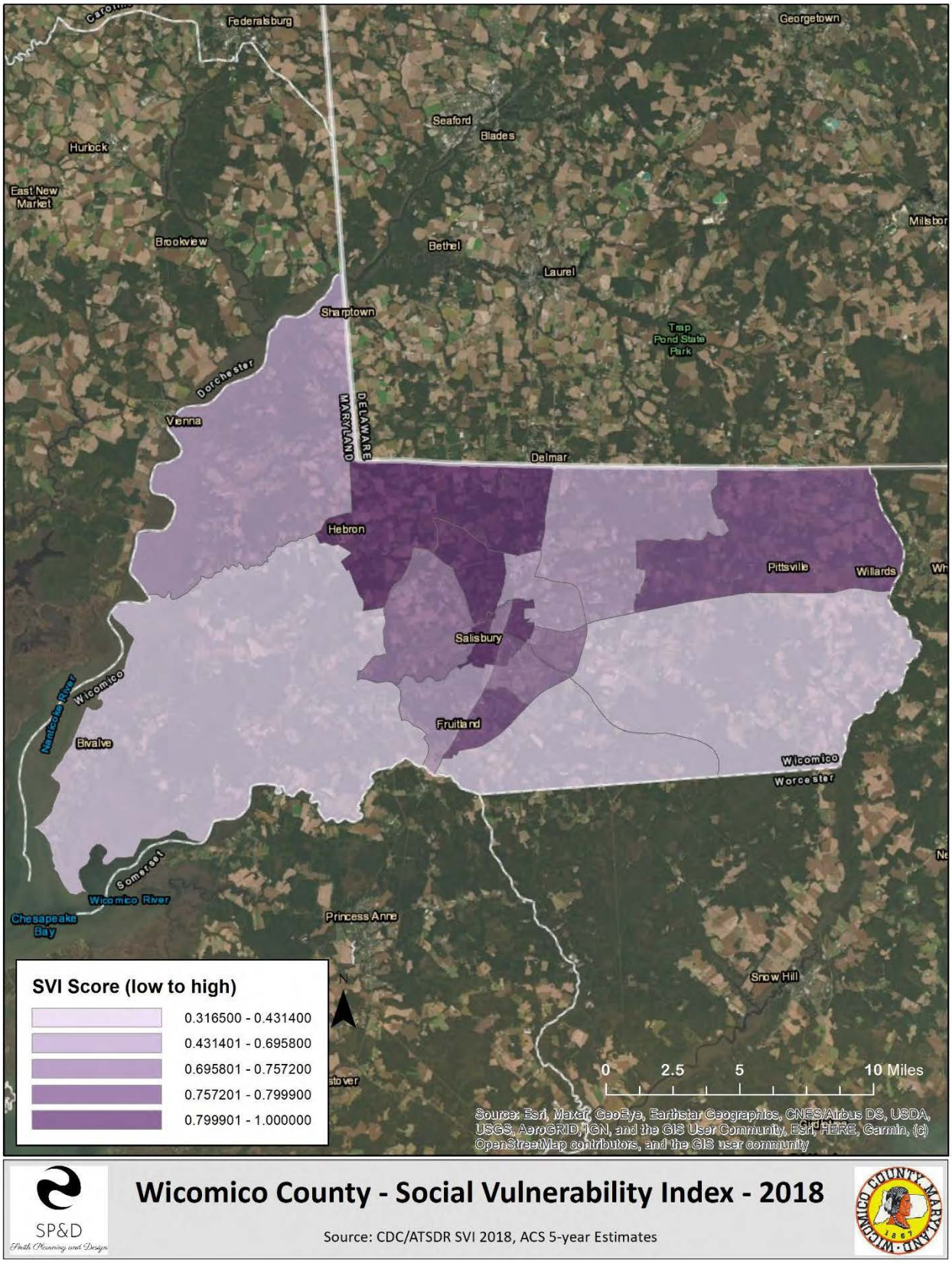
Refer to *Planning for an Emergency: Strategies for Identifying and Engaging At-Risk Groups* published by CDC as a resource about characteristics that influence vulnerability and FEMA's *Guide to Expanding Mitigation: Making the Connection to Equity*.





The SVI has been conducted for Wicomico County at the census tract level and is mapped on the follow page. The SVI utilizes ACS 5-year estimates. The darker census tracts indicate areas of higher social vulnerability while the lightest tracts indicate relatively low social vulnerability.

Map 11.1: Wicomico County Social Vulnerability Index



11.5 CAPABILITY ASSESSMENT

Amidst the rising number of cases in early 2020, local governments had to quickly provide information to as many residents as possible in an effective and safe (i.e., socially distanced) manner. Having a robust website and online technical capabilities is a key element in dispersing information and creating a safe and informed population. Wicomico County currently has the following services available to the public:

- Vaccine Information
- Testing Appointments
- Latest COVID-19 Stats
- Information on Executive Orders
- Links to Resources (e.g., CDC website, MD Dept. of Health website, covidLINK, and information for businesses)

Wicomico's Health Department website includes relevant information about the vaccine(s), statistics, how the vaccine is allocated, priority groups, and vaccine registration. There are instructions for testing and receiving a vaccination.

Source: https://www.wicomicohealth.org/

Hotel Mass Sheltering Guidelines

In the event of a mass-casualty incident in Wicomico County that involves significant health hazards (e.g., pandemic), the following guidelines developed by the Wicomico Department of Emergency Services would go into effect:

- Practice social distancing. Stay at least 6 feet (about 2 arms' length) from other people outside of your household.
- Please stay in your assigned room. Your meals/water and any other items needed will be delivered to your room.
- Follow CDC COVID-19 preventive actions—wash your hands often, cover coughs and sneezes, and follow shelter policies for wearing face coverings. Avoid sharing food and drink with anyone if possible.
- Avoid touching your eyes, nose, and mouth.
- Avoid touching high-touch surfaces, such as handrails, as much as possible. If not possible, wash hands or use hand sanitizers immediately after you touch these surfaces.
- Keep your living area clean and disinfect frequently-touched items such as toys, cellphones, and other electronics.
- Place used tissues in the trash.
- If you feel sick when you arrive at the hotel or start to feel sick while sheltering, tell staff immediately.

Source: Wicomico County Department of Emergency Services, 2020

11.6 MITIGATION STRATEGIES

The CDC recommends the following "guiding principles" to consider when developing and implementing mitigation strategies:

1. Community mitigation efforts aim to reduce the rate at which someone infected comes in contact with someone not infected or reduce the probability of infection if there is contact. The more a person interacts with different people, and the longer and closer the interaction, the higher the risk of COVID-19 spread.

2. Each community is unique. Appropriate mitigation strategies should be based on the best available data. Decision making will vary based on the level of community transmission and local circumstances. Refer to Table 11-1.

3. The characteristics of the community and its population, health system and public health capacity, and the local capacity to implement strategies are important when determining community mitigation strategies.

4. As communities adjust mitigation strategies, they should ensure that the healthcare system capacity will not be exceeded. Precautions should be taken to protect health care professionals and other critical infrastructure workers. Communities need to assure healthcare systems have adequate staffing, a surplus of inpatient and ICU beds, and critical medical equipment and supplies such as PPE.

5. As communities adjust mitigation strategies, they should ensure public health capacity will not be exceeded. Public health system capacity relies on detecting, testing, contact tracing, and isolating those who are or might be sick, or have been exposed to known or suspected COVID-19 cases; it is important to stop broader community transmission and prevent communities from having to implement or strengthen further community mitigation efforts.

6. Attention should be given to people who are at higher risk for severe illness when determining and adjusting community mitigation strategies.

7. Certain settings and vulnerable populations in a community are at particularly high risk for transmission. This includes but is not limited to congregate settings such as nursing homes and other long-term care facilities, correctional facilities, and the homeless population.

8. Mitigation strategies can be scaled up or down, depending on the evolving local situation, and what is feasible, practical, and legal in a jurisdiction. Any signs of a cluster of new cases or a reemergence of broader community transmission should result in a re-evaluation of community mitigation strategies and a decision on whether and how mitigation might need to change.

9. Cross-cutting community mitigation strategies can be organized into the following categories: promoting behaviors that prevent spread; maintaining healthy environments; maintaining healthy operations; and preparing for when someone gets sick. Presuming a

community is not sheltering-in-place, cross-cutting strategies under each rubric are outlined below and should be implemented to the extent possible, and in accordance with the amount of ongoing community transmission. Refer to Table 11-1.

10. Community mitigation strategies should be layered upon one another and used at the same time—with several layers of safeguards to reduce the spread of disease and lower the risk of another spike in cases and deaths. No one strategy is sufficient.
11. There are range of implementation choices when setting or adjusting community mitigation plans. These choices offer different levels of protection from the risk of community transmission.
12. Communities need to decide the level of risk that is acceptable and make informed choices about implementing mitigation plans accordingly.
13. Individuals make choices about following the behavioral practices that are recommended. Compliance to community mitigation decisions will also impact the spread of COVID-19.
14. CDC offers setting-specific strategies for a variety of sectors that include businesses, schools, institutes of higher education, parks and recreational facilities, and other places.
15. Travel patterns within and between jurisdictions will impact efforts to reduce community transmission. Coordination across state and local jurisdictions is critical – especially between jurisdictions with different levels of community transmission.

Table 11.1: Level of Mitigation Needed by Community Transmission and Community Characteristics

Level of Community Transmission	Community Characteristics and Description	Level of Mitigation
Substantial, uncontrolled transmission	Large scale, uncontrolled community transmission, including communal settings (e.g., schools, workplaces)	Shelter in place
Substantial, controlled transmission	Large scale, controlled community transmission, including communal settings (e.g., schools, workplaces)	Significant mitigation
Minimal to moderate community transmission	Sustained transmission with high likelihood or confirmed exposure within communal settings and potential for rapid increase in cases	Moderate mitigation
No to minimal community transmission	Evidence of isolated cases or limited community transmission, case investigations underway; no evidence of exposure in large communal setting	Low mitigation

Source: https://www.cdc.gov/coronavirus/2019-ncov/community/community-mitigation.html

The following table includes mitigation strategies that Wicomico County could adopt in the future if they are not already in place. These strategies are divided into four (4) groups that: (1) promote behaviors that prevent spread, (2) maintain healthy environments, (3) maintain healthy operations, and (4) preparation for when someone gets sick. Not all strategies will be relevant for every community or setting within Wicomico County, but an important component of

mitigation is preparedness via foreknowledge of multiple strategies in the face of an uncertain future.

Table 11.2: Overview of Possible Mitigation Strategies to Consider in Communities with Local COVID-19 Transmission Across Settings and Sectors

Guiding Principle	Community Mitigation Strategies
Promote Behaviors that Prevent Spread	• Educate people to stay home when sick or when they have been in close contact with someone with COVID-19 • Teach and reinforce practicing hand hygiene and respiratory etiquette • Teach and reinforce the use of cloth face coverings to protect others (if appropriate) • Ensure you have accessible sinks and enough supplies that are easily available for people to clean their hands (e.g., soap, hand sanitizer with at least 60% alcohol, and a way to dry hands, such as paper towels or a hand dryer). • Post signs or posters and promote messaging about behaviors that prevent spread
Maintain Healthy Environments	• Intensify cleaning and disinfection of frequently touched surfaces • Ensure ventilation systems operate properly and increase circulation of outdoor air • Ensure all water systems are safe to use • Modify layouts to promote social distance of at least 6 feet between people – especially for persons who do not live together • Install physical barriers and guides to support social distancing if appropriate • Close communal spaces, or stagger use and clean and disinfect between use • Limit sharing of objects, or clean and disinfect between use
Maintain Healthy Operations	• Protect people at higher risk for severe illness from COVID-19 • To cope with stress, encourage people to take breaks from the news, take care of their bodies, take time to unwind and connect with others, particularly when they have concerns • Maintain awareness of local or state regulations • Stagger or rotate scheduling • Create static groups or "cohorts" of individuals and avoid mixing between groups • Pursue virtual events. Maintain social distancing at any in-person events, and limit group size as much as possible • Limit non-essential visitors, volunteers, and activities involving external groups or organizations, especially with those who are not from the local area • Encourage telework and virtual meetings if possible • Consider options for non-essential travel in accordance with state and local regulations • Designate a COVID-19 point of contact • Implement flexible and non-punitive leave policies • Monitor absenteeism and create a back-up staffing plan • Train staff on all safety protocols

	• Consider conducting daily health checks such as temperature screening or symptom checking • Encourage those who share the facilities to also adhere to mitigation strategies • Put in place communication systems for: • Individuals to self-report COVID-19 symptoms, a positive test for COVID-19, or exposure to someone with COVID-19 • Notifying local health authorities of COVID-19 cases • Notifying individuals (employees, customers, students, etc.) of any COVID-19 exposures while maintaining confidentiality in accordance with privacy laws • Notifying individuals (e.g., employees, customers, students) of any facility closures
Prepare for When Someone Gets Sick	• Prepare to isolate and safely transport those who are sick to their home or to a healthcare facility • Encourage individuals who are sick to follow CDC guidance for caring for oneself and others who are sick • Notify local health officials of any case of COVID-19 while maintaining confidentiality in accordance with the Americans with Disabilities Act (ADA)external icon. • Notify those who have had close contact with a person diagnosed with COVID-19 and advise them to stay home and self-monitor for symptoms, and follow CDC guidance if symptoms develop • Advise individuals who are sick when it would be safe for them to return based on CDC's criteria to discontinue home isolation • Close off areas used by someone who is sick. Wait >24 hours before cleaning and disinfecting. Ensure safe and correct use and storage of EPA-approved List N disinfectants, including storing products securely away from children.

11.7 CONCLUSION

On May 3, 2021, a meeting was held with the Public Health Group to review the new working draft Pandemic and Emerging Infectious Disease chapter content. During this meeting, the Public Health Group developed new goals, objectives, and mitigation actions for pandemic and emerging infectious disease hazard. As a result, these new goals, objectives, and mitigation actions have been incorporated into Chapter 14: Mitigation Strategies. The Public Health Group will meet periodically during the next five (5) year planning cycle to review the status of these mitigation action items.

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CHAPTER 12 – MAN-MADE HAZARDS

Updates to the Wicomico County Chapter 12 – Man-Made Hazards included the following:

- Added dam rating classifications information
- Updated Wicomico County Dam Condition Information table
- Added images to the chapter
- Added most recent EPA Toxics Release Inventory for Wicomico County – Quick Facts
- New vulnerability analysis for community lifelines and public facilities within 1,000 feet of the centerline on major transportation corridors
- Updated Delmarva Water Transport Committee INC. river conditions data tables
- Updated Federal Railroad Administration Office Safety Analysis data table

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

CHAPTER 12 – MAN-MADE HAZARDS

12.1 INTRODUCTION

Man-made hazards for the purposes of this plan and as described herein include dam failure, transportation and fixed-site hazardous materials events, airplane accidents, and railway accidents. The effects of man-made hazards include power outages, communication failures, road closures, loss of infrastructure, evacuation, and loss of life. The location of their occurrence and effects may be predicted to some degree by past incidents.

12.2 DAM CHARACTERIZATION

Dam failure refers to a collapse, overtopping, breaching or any related condition that causes downstream flooding. Dam failure examples in the United States include the Johnstown Flood in 1889 resulting in 2,209 deaths, the Saugus, California dam collapse in the Los Angeles Aqueduct system in 1928 resulting in 450 deaths, and the Teton Dam breach on the Snake River in Idaho during a flash flood in 1976 resulting in 11 deaths. During Hurricane Agnes in 1972, concern about the Conowingo Dam on the Susquehanna River led to the opening of all flood gates to release pressure when the water level was three feet higher than the dam's rated capacity.

Approximately one-third of all dam failures are caused by overtopping due to inadequate spillway capacity; one-third are caused by seepage through or under the structure; and the remainder from improper design or construction or because of earthquake or landslide events which trigger the dam failure.

12.3 DAM HAZARD RISK, HISTORY & VULNERABILITY

According to the Maryland Department of the Environment (MDE) and the U.S. Army Corps of Engineers (USACE), Wicomico County currently has seventeen (17) dams within its jurisdiction.

Photo 1: Photo of Morris Mill Dam at South Division Street near Fruitland prior to rehabilitation. Photo by Liz Holland.

MDE provides dam ratings based on an analysis of potential impacts in the event of a dam failure. The Dam Ratings are defined by MDE as follows:

High Hazard: Failure would likely result in loss of human life, extensive property damage to homes and other structures, or cause flooding of major highways such as State roads or interstates. There are 85 high hazard dams in Maryland.

Significant Hazard: Failure could possibly result in loss of life or increase flood risks to roads and buildings, with no more than 2 houses impacted and less than six lives in jeopardy. There are 125 significant hazard dams in Maryland.

Low Hazard Dam: Failure is unlikely to result in loss of life and only minor increases to existing flood levels at roads and buildings is expected. There are more than 240 low hazard dams in Maryland

Within Wicomico County, three (3) dams are rated as a high hazard for the County: Beaglin Park Dam, Coulbourn Mill Dam, and Morris Mill Pond. Johnsons Pond and Mitchell Pond #1 are currently rated as significant hazards. Johnsons Pond may be upgraded to high hazard due to the population at risk. When looking at the combined risk for dam failure in the County, the probability of dam failure is low, however depending on location, the resulting impact is extremely high.

Photo 2. The dam and road at Barren Creek Pond failed during a severe July 2016 storm. The County rebuilt the roadway but did not restore the dam. Photo by Liz Holland.

According to the MDE Dam Safety Division, the City of Salisbury is downstream of four dams that could pose a high or significant threat to the city in the event of a breach or failure. Emergency Action Plans (EAP) are maintained for the Beaglin Park Dam, Coulbourne Mill Dam, Johnsons Pond, Mitchell Pond #1, and Morris Mill Pond in the County. The only other municipality downstream from a dam is Mardela Springs. Wicomico County dam inventory, conditions, and areas of impact are listed on Table 12.1. There are three (3) dams rated as "High Hazards" and two (2) rated as "Significant Hazards".

In June 2016, heavy rains caused the state-owned Riawalkin Pond dam to fail and washed out a section of the Nanticoke Road. Following that event, in July, another severe storm caused the privately owned Barren Creek Dam to fail, removing a portion of Barren Creek Road (pictured above). That same year in September, due to unprecedented rainfall, officials ordered an evacuation of the entire Canal Woods condominium complex due to the concern that the nearby county-owned Morris Mill dam would breach.

The State Highway Administration repaired the Riawalkin Pond dam and Nanticoke Road. Wicomico County purchased the land surrounding the Barren Creek dam and rebuilt the roadway with culverts; removing the dam completely. In June 2020, the rehabilitation to the Morris Mill dam was completed. Improvements entailed brand new steel sheet piles, all new concrete outfall structure (not brick like the old one), all new concrete outfall pipes, steel sheet pile wing walls on the downstream outfall location, anti-seep collars, and new compliant guardrails.

The President signed the **Water Infrastructure Improvements for the Nation Act** or the "WIIN Act," on December 16, 2016, which adds a new grant program under FEMA's National Dam Safety Program (33 U.S.C. 467f). Section 5006 of the Act, Rehabilitation of High Hazard Potential Dams, provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams.

High Hazard Potential is a classification standard for any dam whose failure or mis-operation will cause loss of human life and significant property destruction.

Table 12.1: Wicomico County Dam Condition Information

Dam Name	Hazard/Condition	Areas of Impact
Allen Town Pond	Low Hazard/Good Condition	Dam failure will not flood downstream structures but road on top could washout.
Anderson Mill Pond	Low Hazard/Poor Condition	If the dam fails, Pemberton Drive will be impassable, and detours will have to be established. No downstream flood issues. Note: If Riawakin Pond upstream fails, it would overtop Pemberton Drive & possibly breach Anderson Pond. However, the increased flood depth with upstream pond failing is less than one foot (B. Harrington).
Beaglin Park Dam	High Hazard/Good Condition	Downstream flooding during failure would involve several hundred business & residential buildings, and many roads all the way to Riverside Drive.
Camden Avenue Dam	Low Hazard/Poor Condition	Failure of dam would washout Camden Avenue, but no downstream structures should be impacted.
Coulbourn Mill Dam	High Hazard /Fairly Good Condition	Canal Woods and other nearby residential developments would flood if the dam failed.
Johnsons Pond	Significant Hazard/Fair Condition	There are several commercial buildings, residential structures, and roads in jeopardy of flooding. Flood increases with failure are less than 4 feet compared to non-failure conditions. Possible loss of life in the populated area downstream to Brew River Restaurant. Isabell Street would most likely fail, and Route 50 & Main Street would be overtopped by 5 feet or more. This will cause a definite traffic and possible public safety issue. May also take out US RT 50 and Main Street.
Leonard Pond	Low Hazard/Fair Condition	Tourism Building may be affected.
Mitchell Pond #1	Significant Hazard/Fair Condition	Failure of the dam would most likely fail Mitchell Pond 2 & 3 at Mitchell Road and Fitzwater Street. The flood wave would travel downstream to Fitzwater Street and cause some flooding to the Chesapeake Ship Buildings. Traffic would need to be detoured.
Mitchell Pond #2	Low Hazard/Fair Condition	If the dam fails, Mitchell Road would washout and result in some flooding of the Chesapeake Ship Buildings below Fitzwater Street building.
Mitchell Pond #3	Low Hazard/Fair Condition	Failure of the dam would wash out Fitzwater Street and cause some flooding of the Chesapeake Ship Buildings downstream.
Morris Mill Pond	High Hazard/Good Condition	Canal Woods and other nearby residential developments would flood if the dam failed.
Parker Pond	Low Hazard/Good Condition	Roadway will not flood during a 100-yr storm.
Powellville Dam	Low Hazard/Good Condition	Large sheet pile spillway capable of passing 100-yr storm.
Rewastico Pond	Low Hazard/Good Condition	Its outfall directly to tidal waters with no downstream structures. If dam overtops, could lose Athol Road on top of dam.
Riawakin Pond	Low Hazard/Good Condition	Access on MD RT 349 would be lost if the dam is breached. A breach would also overtop Anderson Mill Pond downstream and possibly cause Pemberton Drive to washout.
Shad Point Bridge Dam	Low Hazard/Good Condition	If the dam fails and road fails, lake sediments would be carried into the Wicomico River but no downstream structures in harm's way.
Note: Morris Mill Dam was previously listed as in "poor condition" in 2017. The Morris Mill Pond Dam Rehabilitation Project was completed in 2020.		

Source: Wicomico DPW & Emergency Services, 2020 & MD Dam Safety, 2020

As part of the National Dam Inspection Act requirement, the U.S. Army Corps of Engineers (USACE) maintains an inventory of dams within the United States. The National Inventory of Dams (NID) consists of dams meeting at least one of the following criteria:

1) High hazard potential classification - loss of human life is likely if the dam fails,

2) Significant hazard potential classification - no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns,
3) Equal or exceed 25 feet in height and exceed 15 acre-feet in storage,
4) Equal or exceed 50 acre-feet storage and exceed 6 feet in height.

The USACE National Inventory of Dams provided additional information for fourteen (14) of the dams located in Wicomico County that met the NID criteria.

Table 12.2: USACE National Inventory of Dams – Wicomico County, MD

Name	Owner Type	River	Emergency Action Plan (EAP)	Last Inspection Date	Hazard Potential
Allen Town Pond	Local Government	Passerdyke Creek	Not Required	N/A	Low
Anderson Mill Pond	Local Government	Rockawalking Creek	Not Required	12/9/2020	Low
Beaglin Park Dam	Local Government	Beaver Dam Creek	Yes	12/09/2020	High
Camden Avenue Dam	Local Government	Tonytank Creek	Not Required	6/14/2017	Low
Columbia Creek Dam	Private	Rewastico Creek	Not Required	8/4/2016	Low
Coulbourn Mill Dam	Local Government	Tonytank Creek	Yes	4/13/2018	High
Johnsons Pond	Local Government	North Prong, Wicomico River	Yes	8/29/2019	Significant
Leonard Pond	Local Government	Leonard Pond Run	Not Required	6/14/2017	Low
Mitchell Pond #1	State	Owens Branch & Unknown Tributary	Yes	12/11/2019	Significant
Morris Mill Pond	Local Government	Slab Bridge Creek	Yes	4/13/2018	High
Parker Pond	Local Government	Beaver Dam Creek	Not Required	6/14/2017	Low
Powellville Dam	State	Adkins Race	Not Required	12/12/2018	Low
Rewastico Pond	Local Government	Rewastico Creek	Not Required	6/14/2017	Low
Riawakin Pond	State	Rockawalking Creek	Not Required	8/29/2019	Low
Note: Mitchell Pond #2 and #3 Dams and Shad Point Bridge Dam are not included in the USACE National Inventory of Dams.					

Source: USACE National Inventory of Dams - https://nid.usace.army.mil/ords/f?p=105:113:8099183458183::NO:::

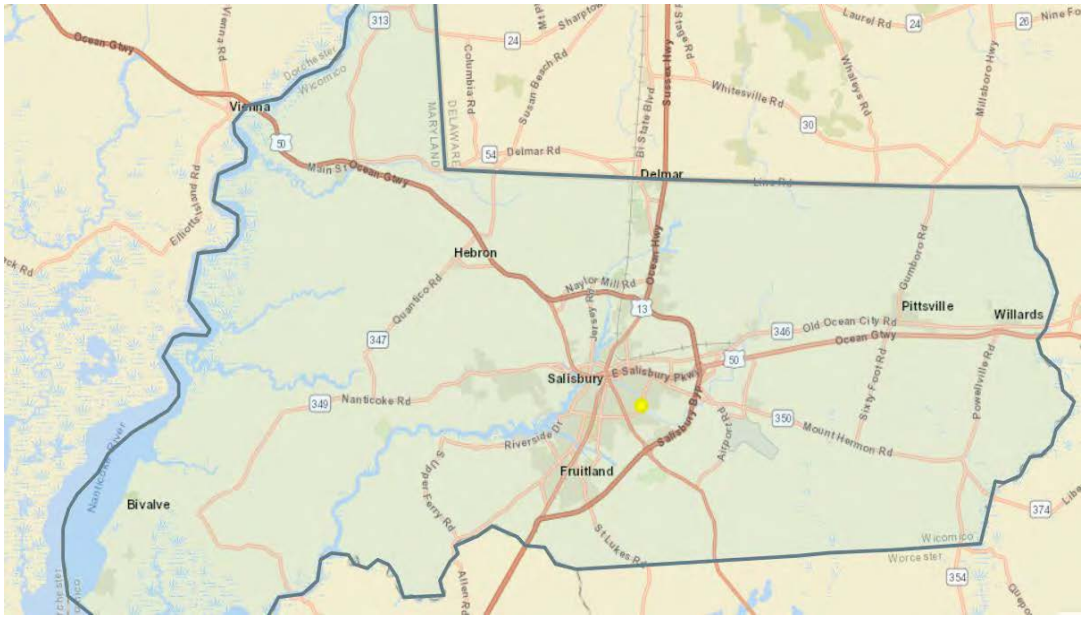


Figure 12.1: USACE National Inventory of Dams – Wicomico County, MD – High Hazard Dam: Beaglin Park Dam

Source: https://nid.usace.army.mil/#/

Dams classified as high hazard potential are those where failure or mis-operation could cause loss of lives. While significant hazard potential dams are classified as dams that will not cause loss of life if dam failure or mis-operation occurs, however could result in significant economic losses, including damages to downstream properties, critical infrastructure, environmental damage, or disruption of community lifeline facilities.

High and significant hazard potential dams should be reviewed each time the project is scheduled for inspection, or at least once each 5 years. This allows for periodic changes in the assigned hazard potential category based on changed reservoir or downstream development. The Mitchell Pond #1 is close to 5 years since previous inspection, should be inspection to ensure there is no potential for dam failure.

According to the Maryland Department of Environment Maryland Dam Safety Update, over the past 20 years there have been over 40 incidents at dams in Maryland that could have resulted in failure, with seven incidents in 2018 alone. For Maryland, this indicates a probability of at least two (2) dam incidents occurring per year.

According to FEMA Be Aware of Potential Risk of Dam Failure in Your Community, dams can fail for several reasons, including overtopping caused by floods, acts of sabotage, upstream dam failure (i.e., the failure of another nearby dam), structural failure of materials used in dam construction, or earthquakes. FEMA acknowledges three primary types of risk associated with high hazard potential dams, which include the following:

Incremental Risk: The risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or mis-operation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but loss of the pool can result in significant consequences in the pool area upstream of the dam.

Non-Breach Risk: The risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios.

Residual Risk: The risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2015, p A-2). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue.

According to FEMA Emergency Operations Planning: Dam Incident Planning Guide, dam incidents can occur for several reasons, including as a result of natural hazards, such as floods, earthquakes, excessive rainfall, or man-made hazards such as deliberate or negligent human actions. The Planning Guide explains that dams can fail for one, or a combination of, the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam;
- Structural failure of a dam or of materials used in dam construction;
- Spillway deficiency;
- Movement and/or failure of the foundation supporting the dam;
- Settlement and cracking of concrete or embankment dams;
- Piping and internal erosion of soil in embankment dams;

Flood/Excessive Rainfall

The occurrence of a Probable Maximum Flood (PMF), which is the most severe storm that can theoretically occur, is one scenario that could cause dam failure. This failure would result in a peak dam breach flow. In certain instances, a condition of uplift could occur at the heel of a dam which would not necessarily create a situation where overturning would occur. Failure of the Johnsons Pond, significant hazard dam, would impact several commercial buildings, residential structures, and roads. A failure would cause the possible loss of life in the populated area downstream. Isabell Street would most likely fail, and Route 50 and Main Street would be overtopped by 5 feet or more. Dam failure at this stie would cause a definite traffic and possible public safety issue. The incremental risk also applies to Beaglin Park Dam, a high hazard dam. Downstream flooding during failure at this would involve several hundred business & residential buildings, and roadways that extend to Riverside Drive.

Upstream Dam Failure

The failure of an upstream dam can, in some cases, put downstream dams at risk for failure depending on the amount of flood wave from the upstream dam and the downstream reservoir's capacity to store that wave. The incremental risk of the Mitchell Pond #1, a significant hazard dam, would be to failure of the dam which would most likely cause Mitchell Pond 2 & 3 at Mitchell Road and Fitzwater Street to fail. The flood wave would travel downstream to Fitzwater Street and cause some flooding to the Chesapeake Ship Buildings.

At this time, insufficient information is available to conduct a substantive analysis of incremental, non-breach and residual risk relative to Wicomico County's significant and high hazard potential dams. However, it is acknowledged that incremental risk is "the risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or mis-operation, where the consequences considered are over and above those that would occur without dam breach;" non-breach risk is "the risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios;" and residual risk is "the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue" (FEMA, 2020 Rehabilitation of High Hazard Potential Dams Grant Program Guidance).

12.4 TRANSPORTATION & FIXED-SITE HAZMAT CHARACTERIZATION

A hazardous material (hazmat) may be defined as a substance or material, which, because of 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.

According to the Maryland Hazard Analysis, 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, the rail system and on shipping lanes in the Chesapeake Bay and its tributaries. Fixed-site use of hazmat is particularly evident in the Baltimore area near rail, truck, and shipping terminals.

According to the Delmarva Freight Plan (2015), and its addendum (2017), there are three main hazardous material concerns:

- **Site-Specific Hazardous Materials Issues**: Where freight activities involve hazardous materials, planning efforts should continue to monitor and enhance emergency response efforts.
- **Hazardous Materials Tracking**: A partnership with security authorities for tracking of hazardous materials needs to be established considering social and environmental exposure, natural and man-made disasters, anticipated disruptions of traffic and business, and related economic impacts.
- **Security Screening**: Exploration of public-private partnership opportunities may help to identify tradeoffs, cost benefits, or other interests relative to increasing route or mode options and security screening for the transportation of hazardous materials.

12.5 TRANSPORTATION & FIXED-SITE HAZMAT RISK, HISTORY & VULNERABILITY

Historically, most hazardous materials moving through Wicomico County have been on U.S. Routes 50 and 13, the Norfolk Southern rail line, and by barge on the Wicomico River. In recent years, there have been several fixed-site hazmat incidents, including an ammonia leak at a Perdue Chicken Processing Plant in September 2002, a hypochlorite spill at Filtronic Comtek in August 2004. More recently, a hazmat spill at Salisbury Bypass near Northbound exit of Snow Hill Road and Colbourn Mill Road near Nutters Cross Road, February 2015, and a hazmat recycled oil spill during pick-up at the City Yard, August 2015.

According to the most recent 2019 Toxics Release Inventory (TRI) factsheet available for Wicomico County, there are four (4) TRI facilities located within the County. The TRI tracks the management of certain toxic chemicals that may pose a threat to human health and the environment. Certain industrial facilities in the U.S. must report annually how much of each chemical is recycled, combusted for energy recovery, treated for destruction, and disposed of or otherwise released on-and off-site. This information is collectively referred to as production-related waste managed. In Table 12.3 listed below are quick facts for 2019.

Table 12.3: Quick Facts for 2019

Types	Wicomico County, MD	United States
Number of TRI Facilities	4	21,458
Total Production Related Waste Managed:	793,632 lbs.	30.62 Billion lbs.
Total On-site and Off-site Disposal or Other Releases:	368,070 lbs.	3.42 Billion lbs.
Total On-Site	367,912 lbs.	2.96 Billion lbs.
- Air	367,912 lbs.	600.2 Million lbs.
- Water	0 Lbs.	201.2 Million lbs.
- Land	0 Lbs.	2.16 Billion lbs.
Total Off-Site:	158 Lbs.	458.3 Million lbs.

Source: EPA - 2019 Toxics Release Inventory for Wicomico County

These four (4) fixed-site TRI facilities within the county should be given priority consideration by the Local Emergency Planning Committee (LEPC) due to the threat it poses to human health and the environment.

According to the *Wicomico County U.S. Route 13 Hazardous Materials Commodity Flow Study* completed in June 2006, hazardous materials were usually transported by tanker truck along U.S. Route 13. The top three hazardous materials transported during the sample period were gasoline, butane, and liquid CO2. Additionally, peak truck movement occurred between 6:00 AM and 2:00 PM. According to the Study, 43.4 trucks per hour, with 1.6 of those total trucks per hour carrying hazardous materials during the peak truck movement hours traveled along U.S. Route 13.

No new Hazardous Materials Commodity Flow Studies have been completed since the last plan update; however, the update of these studies have been added as a new mitigation action item.

For this plan update, a vulnerability analysis was completed for community lifelines and public facilities. Tables 12.4 and 12.5 detail community lifelines and public facilities within 1,000 feet of the centerline along U.S. Route 13 and Business Route 13. These facilities may be at-risk depending upon the type and quantity of hazardous material spilled during a transportation accident.

Table 12.4: U.S. Route 13 Facilities at Risk

Facility Type	Facility Name	Location
County Owned	Tourist Information Center/Leonards Mill Park	8480 Ocean Highway
Medical	Your Doc's In	2425 N Salisbury Blvd
Police	Maryland State Police - Barrack E	2765 North Salisbury Blvd
.Above Ground Storage Tanks	David A. Bramble, Inc. (5 tanks)	28101 Old Eden Road
Above Ground Storage Tanks	Hertrich of Salisbury East (7 tanks)	2531 N Salisbury Blvd
Above Ground Storage Tanks	Wal-Mart Store #1890 (5 tanks)	2702 N Salisbury Blvd
Underground Storage Tank	Shore Stop #241	3602 Stockyard Road
Underground Storage Tank	North 13 Shell	2513 N. Salisbury Blvd
Underground Storage Tank	Thirsty's	9534 Ocean Highway
Underground Storage Tank	Salisbury - Barrack "E"	2765 N. Salisbury Blvd
Underground Storage Tank	Wawa #561	2740 N. Salisbury Blvd
Underground Storage Tank	Beer Cave Inc.	8600 Ocean Highway
Underground Storage Tank	Tiger Mart, Inc.	2403 N. Salisbury Blvd
Underground Storage Tank	Sam's Club #6383	2700 N. Salisbury Blvd
Underground Storage Tank	Delmar Food Service	9521 Ocean Highway
Underground Storage Tank	George L. Elliott & Sons, Inc.	West Zion Road

Source: Smith Planning & Design

Table 12.5: U.S. Business Route 13 Facilities at Risk

Facility Type	Facility Name	Location
Fire Department	Fruitland Volunteer Fire Company	106 E Main Street
Fire Department	Salisbury Fire Station #2	801 Brown Street
County Owned	Housing Authority (18 structures)	(9) Buena Vista Ave., (3) Dulany Ave., (2) Leslie St., (1) E Locust St., (2) E Carroll St. (1) Theodore St.
Medical	Anchorage Nursing Home	105 Times Square
Medical	Tidal Health PRMC	100 Carroll Street
Medical	Lower Shore WIC Office/ES Adkins Building	801 N Salisbury Blvd
Medical	Your Doc's In	1135 S Salisbury Blvd
Medical	Express Care Urgent Care Center	659 S Salisbury Blvd
Police	Fruitland Police Department	208 S. Division Street
School	Salisbury University - Main Campus	1101 Camden Avenue
School	Asbury Child Development Center	1401 Camden Avenue
School	Bennett Middle School	532 S Division Street
School	North Salisbury Elementary	1213 Emerson Avenue
Above Ground Storage Tanks	John F. Tilghman and Sons Inc (7 tanks)	121 Columbia Road
Above Ground Storage Tanks	Valvoline Instant Oil Change BA-0013 (8 tanks)	1001 N Salisbury Blvd
Above Ground Storage Tanks	Wal-Mart Store #02931 (4 tanks)	409 N Fruitland Blvd
Above Ground Storage Tanks	Ryder Truck Rental Inc	404H Irl Lane
Above Ground Storage Tanks	Wal-Mart Store #02931	409 N Fruitland Blvd
Above Ground Storage Tanks	Peninsula Regional Medical Center	100 E Carroll St
Underground Storage Tank	Global Beverages, Inc. T/A Cheers	1324 South Salisbury Blvd
Underground Storage Tank	201 Holly St Warehouse	201 Holly St
Municipal Owned	Museum	117 Elizabeth Street
Municipal Owned	Water Tank Lot	1509 Edgemore Avenue
Municipal Owned	Fruitland Community Center	300 Morris Street
Underground Storage Tank	Country Farm	104 E. Gordy Road
Underground Storage Tank	Cooper Insurance Agency	100 N. Fruitland Boulevard
Underground Storage Tank	Pacific Pride I	436 Eastern Shore Drive
Underground Storage Tank	Higher Hope Temple Church	800 Johnson Street
Underground Storage Tank	Church of the Redeemer	1308 Westchester Street
Underground Storage Tank	Fruitland Wine Rack	100 West Cedar Lane
Underground Storage Tank	Go Getters, Inc.	716 N. Division Street
Underground Storage Tank	Peninsula Roofing	1209 N. Salisbury Blvd.
Underground Storage Tank	Tru Arc Welding	1535 Northwood Drive

Facility Type	Facility Name	Location
Underground Storage Tank	Center City Quick Mart	500 S. Salisbury Blvd.
Underground Storage Tank	Verizon Communications - Salisbury SOC	620 Truitt Street
Underground Storage Tank	Global Beverages, Inc. T/A Cheers	1324 South Salisbury Blvd.
Underground Storage Tank	Naylor Food Mart	1111 N. Salisbury Blvd.
Underground Storage Tank	Wawa Food Market #555	668 - 682 S. Salisbury Boulevard
Underground Storage Tank	Ambaji Inc.	617 N. Salisbury Blvd.
Underground Storage Tank	Thirsty's	1053 S. Salisbury Blvd.
Underground Storage Tank	Red Fox Market	107 South Fruitland Blvd
Underground Storage Tank	Phillips Enterprises LTD Partnership	317-319 South Division Street
Underground Storage Tank	Eagle Express Mart III, Inc.	1312 N. Salisbury Blvd.
Underground Storage Tank	Barnes TV & Appliances Company	1413 Salisbury Boulevard
Underground Storage Tank	Newton Properties LTD	204 Newton Street
Underground Storage Tank	Samuel Q. Johnson	620 South Salisbury Boulevard
Underground Storage Tank	Samuel Q. Johnson	108 Washington Street
Underground Storage Tank	Samuel Q. Johnson	615 South Division Street
Underground Storage Tank	South Division Street Laundry	602 South Division Street
Underground Storage Tank	201 Holly St Warehouse	201 Holly St
Underground Storage Tank	Royal Farms #283	1033 S Salisbury Blvd
Underground Storage Tank	Royal Farms #384	101 W Cedar Lane

Source: Smith Planning & Design

According to the *Wicomico County U.S. Route 50 Hazardous Materials Commodity Flow Study* completed in July 2006, hazardous materials were usually transported by tanker truck along U.S. Route 50. The top three hazardous materials transported during the sample period were gasoline, aviation fuel, and oxygen. Additionally, peak truck movement occurred between 6:00 AM and 2:00 PM. According to the Study, 41.9 trucks per hour, with 1.5 of those total trucks per hour carrying hazardous materials during the peak truck movement hours traveled along U.S. Route 50.

Tables 12.6 and 12.7 detail community lifelines and public facilities within 1,000 feet of centerline along U.S. Route 50 and Business Route 50. These facilities may be at-risk depending upon the type and quantity of hazardous material spilled during a transportation accident.

Table 12.6: U.S. Route 50 Facilities at Risk

Facility Type	Facility Name	Location
Fire Department	Mardela Fire Department	100 Station Street
Medical	Chesapeake Manor Assisted Living	7054 Bent Pine Road
School	Salisbury Christian School	807 Parker Road
School	Wor-Wic Community College	6573 Walston Switch Road
School	Mardela Middle School	24940 Delmar Road
School	Wicomico Middle School	619 E Main Street
School	Gateway Christian Academy	31525 John Deere Drive
Above Ground Storage Tanks	Tri-County Council Water & Sewer Ext. (3 tanks)	31901 Tri-County Way
Above Ground Storage Tanks	Royal Farms Store #127 (4 tanks)	27992 Ocean Gateway
Underground Storage Tank	Shore Stop #229	7126 Friendship Road
Underground Storage Tank	Shore Stop #225	27430 Ocean Gateway
Underground Storage Tank	Mardela Goose Creek	24948 Ocean Gateway
Underground Storage Tank	Pittsville Food Mart	7125 Sixty Foot Road
Underground Storage Tank	1109 - Willards Shell Dash In	7201 Main Street
Underground Storage Tank	ASO Willards, LLC	36308 Old Ocean City Road
Underground Storage Tank	UPS-Salisbury Facility	2236 Northwood Drive
Underground Storage Tank	Walston Switch Carry Out	31997 Beaver Run Drive
Underground Storage Tank	Pacific Pride II	2229 Northwood Drive
Underground Storage Tank	Shore Transit Maintenance Facility	31855 Tri-County Way

Facility Type	Facility Name	Location
Underground Storage Tank	Royal Farms #167	31954 Summer Drive
Municipal Owned	Mardela Springs Town Hall	201 Station Street

Source: Smith Planning & Design

Table 12.7: U.S. Business Route 50 Facilities at Risk

Facility Type	Facility Name	Location
County Owned	Government Office Building	125 N Division Street
County Owned	Office of State's Attorney	309 E MAIN ST
County Owned	Housing Authority	(1) Linwood Ave., (1) Grace St., (1) Davis St., (1) Booth St
County Owned	Office Building	113 N Division Street
County Owned	Clerk of Court	102 Court Street
County Owned	Housing Authority	147 Davis Street
County Owned	Library	122 S Division Street
County Owned	PW General Services Complex	28562 Owens Branch Road
Fire Department	Salisbury Fire Station #16	325 Cypress Street
Police	Salisbury Police Department	221 Delaware Avenue
Police	Salisbury Police Substation	501 E Church Street
Medical	Salisbury Rehabilitation & Nursing Center	200 Civic Avenue
Medical	Hurdle Health Center/Health Department	108 E Main Street
Medical	John B Parsons Assisted Living Community	300 Lemmon Hill Lane
Medical	Encompass Health Rehabilitation	220 Tilghman Road
Medical	Chesapeake Health Care	1665 Woodbrooke Drive
Medical	Atria Senior Living	1110 Healthway Drive
Medical	Chesapeake Health Care	223 Phillip Morris Drive
Medical	Blood Bank of Delaware	1309 Mount Hermon Road
Medical	Quest Diagnostics	712 E Main Street
Medical	MHC Healthcare - Med Clinic	310 Civic Avenue
School	WCBOE Office - Long Ave	101 Long Avenue
School	Wicomico Middle School	619 E Main Street
Above Ground Storage Tanks	Perdue Inc (3 tanks)	521 Willow Street
Underground Storage Tank	Springhill Manor	28721 Ocean Gateway, Suite 202
Underground Storage Tank	American Legion Post #64	1109 American Legion Road
Municipal Owned	Housing Authority	300 Delaware Avenue
Municipal Owned	Parking Garage	115 E Market Street
Municipal Owned	Pump Station M Park	N Park Drive
Municipal Owned	Parking Garage	101 E Market Street
Municipal Owned	Housing Authority	610 Pearl Street
Municipal Owned	Port Of Salisbury Marina	506 W Main Street
Municipal Owned	Office Building	501 E Church Street

Source: Smith Planning & Design

Hazardous material commodities shipped by rail through Wicomico County by the Norfolk Southern Corporation were also listed in the *Wicomico County U.S. Route 50 Hazardous Materials Commodity Flow Study.* These commodities included the following: petroleum gases, flammable liquids, ammonium nitrate, propanol and ethanol.

In terms of commodities that are transported along shipping lanes in Wicomico County, Table 12.8 details the flow of the Wicomico River, Nanticoke River, Pocomoke, Onancock, Cape Charles, and Tred Avon River Commodities.

Table 12.8: River Commodities

Products Shipped	2014 Incoming (Tons)	2014 Outgoing (Tons)	2014 Total Barge Trips	2014 Total Tonnage	Tonnage Forecast (2015)
Wicomico River Commodities					
Petroleum	488,166		151	488,166	424,704
Grain	97,650		60	97,650	116,560
Aggregates	231,665		59	231,665	232,850
Ships	6,221	8,558	12	14,779	15,000
Totals	**823,702**	**8,558**	**282**	**832,260**	**789,114**
Nanticoke River Commodities					
Grain	113,577	278,496	134	392,073	390,000
Liquid Fertilizer	-	-	-	-	-
Aggregates	118,942	80,725	55	199,667	225,463
Totals	**232,519**	**359,221**	**189**	**591,740**	**615,463**
Pocomoke River Commodities					
Aggregates	109,753	421,803	177	531,566	499,676
Totals	**109,753**	**421,803**	**177**	**531,556**	**499,676**
Onancoke River Commodities					
Aggregates	**36,110**	**0**	**13**	**36,110**	**40,000**
Cape Charles River Commodities					
Aggregates	**67,131**	**0**	**21**	**37,131**	**76,513**
Tred Avon River Commodities					
Aggregates	**74,180**	**0**	**33**	**74,180**	**93,295**

Source: Delmarva Water Transport Committee INC.

12.6 MAJOR TRANSPORTATION CHARACTERIZATION

In the context of this document, major transportation refers to modes of mass transportation including airplanes and railways. Major causes of airplane crashes are pilot error, mechanical failure and severe weather. The leading cause of rail accidents in Maryland is by far derailment, followed by rail-highway crossing incidents. Maryland has a relatively low rate of major accidents, with an average of 30 air accident/incidents per year as reported by the *National Transportation Safety Board*, and an average of 41 rail accidents per year, and 29 highway-rail incidents per year according to *Federal Railroad Administration Office of Safety Analysis*.

Source: SBY Airport Website - https://www.flysbyairport.com/sby-airport

12.7 MAJOR TRANSPORTATION RISK, HISTORY & VULNERABILITY

According to Wicomico County Emergency Management, there have been numerous accidents over the past decade, but no transportation accidents would be considered major. However, accidents and incidents do occur due to the fact that the Salisbury Wicomico Airport and the Norfolk Southern Railroad are located in the County. Tables 12.9 and 12.10 feature major transportation accidents that have occurred in Wicomico County.

Table 12.9: Airplane Accidents/Incidents

Date	Make / Model	Event Severity
February 12, 1978	Grumman AA1-B	Nonfatal
March 31, 1978	Aero Comdr 500B	Fatal – 5
December 24, 1982	Grumman AA1-B	Fatal - 2
October 24, 1984	Piper PA-32R301	Fatal – 4
April 20, 1987	Piper PA-24-250	Fatal – 1
June 26, 1988	Boeing 737	Nonfatal
July 01, 1989	Bell 47J	Nonfatal
July 11, 1996	Piper PA-38-112	Nonfatal
October 30, 1997	Cessna 172M	Nonfatal
September 28, 1999	Cessna 310Q	Nonfatal
December 11, 1997	Piper PA-32-260	Fatal - 3
June 30, 2001	Chek Avid Mark IV	Nonfatal
August 20, 2008	Ferree Prostar B	Nonfatal
July 19, 2005	Ratliff Hummel Bird	Fatal - 1
June 25, 2010	Cessna 172S	Nonfatal
September 21, 2013	Lennox Kenneth J Zodiac 601HDS	Nonfatal
June 24, 2015	Diamond Aircraft IND INC DA 20 C1	Nonfatal
August 4, 2016	N90HF: Beech / F33	Nonfatal

Source: National Transportation Safety Board

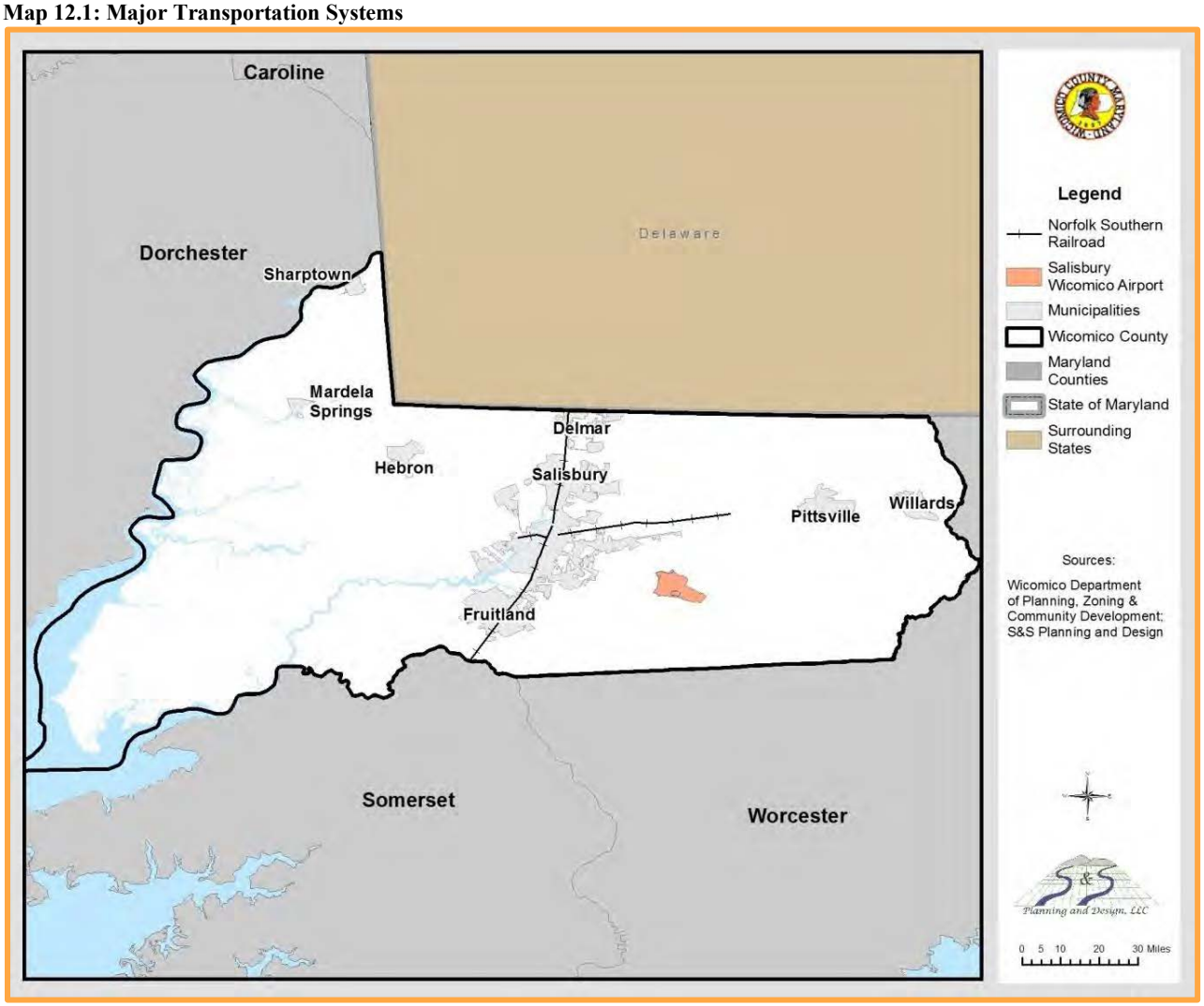
Table 12.10: Railroad Accidents/Incidents

Year(s)	Incidents at Public Crossings	Incident Injuries	Incident Fatalities
1975-1979	6	0	0
1980-1984	11	0	0
1985-1989	8	0	0
1990-1994	4	0	0
1995-1999	5	0	0
2000-2004	1	0	0
2005-2010	3	1	0
2011-2015	6	4	0
2016-2021	2	0	0
Total	**46**	**5**	**0**

Source: Federal Railroad Administration Office Safety Analysis

Both the Salisbury Wicomico Airport and the Norfolk Southern Railroad meet current safety standards set respectively by the FAA and the Railroad Safety Board. The map below depicts Wicomico County's major transportation systems.

Map 12.1: Major Transportation Systems



Reference documents utilized with the chapter include the 2006 Hazard Materials Commodity Flow Studies for U.S Routes 13 and 50. These studies should be updated every five years as recommended by the U.S. Department of Transportation, which updates national studies on a five-year cycle. In addition, hazardous materials transported by rail on the Norfolk Southern Line should be reviewed and discussed by the Local Emergency Planning Committee (LEPC).

CHAPTER 13 – COMMUNITY CAPABILITIES & PLAN INTEGRATION

Updates to the Wicomico County Chapter 13 – Plan Integration included the following:

- New Capability Assessment completed for Wicomico County and Municipalities including: 1) Planning and Regulatory, (2) Administrative and Technical, (3) Financial, and (4) Education and Outreach;
- Community Capability Overview including
  - Emergency Services
  - Citizen Hazard Warning & Notification
  - Weather Related Hazards
  - Technological or Other Events
  - Community Resilience

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

CHAPTER 13 – COMMUNITY CAPABILITIES & PLAN INTEGRATION

13.1 INTRODUCTION

Plan integration is the collection of plans, policies, codes, and programs that guides development. Consideration and management of hazard risks into the community's existing planning framework including the effective integration of hazard mitigation resulting in development patterns that do not increase risks from known hazards and/or leads to redevelopment that reduces risk from known hazards.

The purpose of conducting a capability assessment is to determine the ability of a jurisdiction, in this case Wicomico County, to implement a comprehensive hazard mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects. The capability assessment provides an opportunity to highlight the positive hazard mitigation measures already in place or being implemented throughout the county and which should continue to be supported and enhanced via future mitigation efforts.

13.2 CAPABILITY ASSESSMENT

The capability assessment is comprised of four sections that detail specific capabilities that are relevant to hazard mitigation, including: (1) Planning and Regulatory, (2) Administrative and Technical, (3) Financial, and (4) Education and Outreach.

PLANNING & REGULATORY

Wicomico County and its municipalities have identified capabilities for plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards.

Table 13.1: Planning & Regulatory Capabilities

Planning & Regulatory Capabilities									
Plans	**Wicomico County**	**Willards**	**Salisbury**	**Sharptown**	**Fruitland**	**Hebron**	**Delmar**	**Pittsville**	**Mardela Springs**
Comprehensive/ MasterPlan	Yes –2017	Yes –2020	Yes –2010	Yes –2008	Yes	Yes	Yes	Yes –2019	Yes
Land Use Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nuisance Flood Plan (NFP)	Yes –2020	No	Yes –2019	No	No	No	No	No	No
# of Flood Insurance Policies (2021 NFIP Report)	721 County Total	0	242	6	12	N/A	5	N/A	N/A
Capital Improvement Plan/Municipal Budget	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Emergency Operations Plan	Yes	Yes	Yes	No	No	Yes – Wicomico County	No	Yes – Wicomico County	No
Stormwater Management	Yes – Stormwater Management Act 2007	Yes	Yes – Ch.13.28	Yes – Wicomico County	Yes – Wicomico County	Yes – Wicomico County	No	Yes	Yes
Land Preservation, Parks and Recreation Plan	Yes	No	Yes	No	No	No	Yes	No	No
Natural / Cultural Resources Inventory	Yes	No	Yes	No	Yes	Yes	No	No	No

Planning & Regulatory Capabilities cont.									
Building Code, Permitting, and Inspections	**Wicomico County**	**Willards**	**Salisbury**	**Sharptown**	**Fruitland**	**Hebron**	**Delmar**	**Pittsville**	**Mardela Springs**
Subdivision Ordinance	Yes, 1994– Subdivision Regulations	Yes	Yes – Subdivision Code (Ch. 16)	Yes – Ordinance #74	Yes	Yes	Yes	Yes	No
Zoning Ordinance	Yes, 2004 – Chapter 225 Zoning	Yes	Yes – Zoning Code (Ch. 17)	Yes – Ordinance #19	Yes	Yes	Yes	Yes	Yes
Building Code	Yes –2015	Yes –2015	Yes –2018	Yes –2015	Yes –2015	Yes –2015	Yes –2015	Yes –2015	Yes
Building Code Effectiveness Grading Schedule (BCEGS) Rating	Yes	No	Yes - 4	No	Yes	Yes – Wicomico County	No	No	Yes
Inspections	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Erosion Control	Yes	Yes – Wicomico County	Yes	Yes – Wicomico County	Yes – Wicomico County	Yes – Wicomico County	No	No	No
Sediment Control	Yes	Yes – Wicomico County	Yes	Yes – Wicomico County	Yes – Wicomico County	Yes – Wicomico County	No	Yes	No
Land Use and Ordinances	**Wicomico County**	**Willards**	**Salisbury**	**Sharptown**	**Fruitland**	**Hebron**	**Delmar**	**Pittsville**	**Mardela Springs**
Floodplain Ordinance	Yes, 2015 – Chapter 149 Floodplain Ordinance	Yes – Wicomico County	Yes, 2015 – Floodplain Management (Ch. 15.16)	Yes – Wicomico County	Yes – Town Chapter 152; Ordinance #275	Yes – Wicomico County	Yes – Town Ordinance - Delaware	Yes – Wicomico County	Yes – Wicomico County
Land Acquisition and Planning – Program Open Space	Yes	No	Yes	No	Yes	Yes		No	

How can these capabilities be expanded and improved to reduce risk? What are highlights from existing planning tools?

- Snow emergency routes are designated in Snow Emergency Plan, not in the Comprehensive Plan. On Wicomico County website under GIS Department display an interactive Hurricane Evacuation Map "Shore Transit has a plan in place for continuation of operations under disaster and relief conditions."
- The Comprehensive Plan Implementation chapter reiterates strategies designed to achieve orderly growth and development, which are designed in a manner to reduce adverse environmental impacts and effects of climate change.
- Wicomico County does contain a Paleochannel Overlay District. This overlay zoning district is to reduce the potential of contamination of the water sources resulting from spills of hazardous

materials or impacts from natural disasters on the built environment.

- Current Zoning Ordinance requires *A minimum twenty-five (25) foot setback from all non-tidal wetlands is encouraged for all development around the extent of the delineated non-tidal wetland except as permitted by the U.S. Army Corp. of Engineers and the Maryland Department of the Environment.* Development is restricted in wetlands, floodways, and floodplains in accordance with applicable State laws and sections of the County
- Restricted. SUBDIVISION OF LAND 148-2 Review of Subdivision Proposals. *Assure that:*
  - *All such proposals are consistent with the need to minimize flood damage.*
  - *All Public utilities and facilities, such as sewer, gas, electrical and water systems, are located, elevated and constructed to minimize or eliminate flood damage.*
  - *Adequate drainage is provided so as to reduce exposure to flood hazards.*

ADMINISTRATIVE AND TECHNICAL

Wicomico County has identified the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions.

Table 13.2: Administrative Capabilities

Administrative Capabilities - Government Department and Staff Resources																
Community	Land Use Authority	Land Use/ Development Planning		Public Works & Engineering		Emergency Services (Includes Police & Fire)		Floodplain Manager		Town Manager		GIS		Fiscal Staff		Planning Commission	
	Y/N	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff
Delmar	Y	Y	1	Y		Y		N	-	Y	1	N	-	Y	1	Y	4
Fruitland	Y	Y	1	Y	17	Y	22	N	-	Y	1	N	-	Y	1	Y	5
Hebron	*N	N	-	Y	2	N	-	N	-	Y	1	N	-	Y	1	N	-
Mardela Springs	N	N	-	N	-	N	-	N	-	N	-	N	-	Y	1	Y	4
Pittsville	Y	Y	1	Y	3	N	-	N	-	Y	1	N	-	Y	2	Y	5
Salisbury	Y	Y	4	Y	5	Y	197	Y	1	Y	1	Y	2	Y	11	Y	1

Sharptown	Y	N	-	Y	2	N	-	N	-	N	-	N	-	Y	1	Y	5
Willards	Y	Y	1	Y	1	N	-	N	-	N	1	N	-	Y	2	Y	5

*Hebron - *The Town issues permits for Town items such as fences and sheds. Anything greater than 20'x12' in square footage goes to the County for approval/permit issuance.*

Table 13.3: Technical Capabilities

Technical Capabilities									
Technical	**Wicomico County**	**Willards**	**Salisbury**	**Sharptown**	**Fruitland**	**Hebron**	**Delmar**	**Pittsville**	**Mardela Springs**
911 Communications Center (calling, texting)	Countywide Plan								
Emergency Alert System (EAS)	Countywide Plan								
CivicReady Alert System	Yes	Yes – Wicomico County	Yes	Yes – Wicomico County	Yes	Yes – Wicomico County	Yes	Yes – Wicomico County	Yes
Integrated Public Alert and Warning System (IPAWS)	Countywide Plan								
HAZUS Analysis	Yes, Countywide Plan including affected municipalities for coastal flood.								
Critical Facility Protection	Yes	Yes - Insurance	Yes	Yes	Yes	Yes	Yes	Yes	No
Geographic Information Systems (GIS)	Yes	Yes	Yes – Wicomico County	Yes – Wicomico County	Yes – Wicomico County	Yes – Wicomico County	Yes	Yes – Wicomico County	Yes – Wicomico County
How can these capabilities be expanded and improved to reduce risk?									
• Encourage the installation and maintenance of generators at all critical facilities. • Continue critical facility protection. • Encourage equipment and systems life cycle planning. Determine alternative options to maximize efficiency and energy consumption.									

FINANCIAL

Wicomico County identified whether it has access to or is eligible to use the following funding resources for hazard mitigation purposes.

Table 13.4: Financial Capabilities

Financial Capabilities									
Funding Resources	**Wicomico County**	**Willards**	**Salisbury**	**Sharptown**	**Fruitland**	**Hebron**	**Delmar**	**Pittsville**	**Mardela Springs**
Authority to levy taxes for specific purposes	No	No	Yes	No	No	Yes	Yes	No	No
Development Impact Fees	Yes	Yes	Yes	No	Yes	No	Yes	No	No
Community Development Block Grant	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
Building Resilient Infrastructure and Communities (BRIC)	Yes	No	Yes	No	No	No	No	No	No

How can these capabilities be expanded and improved to reduce risk?

- The FY 2020-FY 2024 CIP for Wicomico County includes capital expenditures designed to improve the infrastructure of Wicomico County, including generators several bridge and dam replacements, and drainage improvements.
- CAPITAL IMPROVEMENT PROGRAM 2020-2024 PAGES 28-38 PUBLIC WORKS – Department 24
  - Chesapeake Bay Watershed Implementation Plan (WIP)
  - Wicomico River Dredging Support
  - Hobbs Road at Beaver Dam Creek-Eliminate Flooding Issues
  - Westside Collector Phase 3
  - Coulbourn Mill Pond Dam
  - Twin Tree Road Drainage Improvements
- Consider incorporation of a hazard mitigation and resilience revolving fund. This fund could be used provide match funding for mitigation and resilience projects.

EDUCATION & OUTREACH

Wicomico County identified education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Table 13.5: Education & Outreach Capabilities

Education & Outreach Capabilities									
Funding Resources	**Wicomico County**	**Willards**	**Salisbury**	**Sharptown**	**Fruitland**	**Hebron**	**Delmar**	**Pittsville**	**Mardela Springs**
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations, etc.	Yes	No	Yes	No	No	Yes	No	No	No
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No
StormReady certification	Yes	No	No	No	No	No	No	No	No
Firewise USA certification	No	No	No	No	No	No	No	No	No
Public Information Program	Yes – Public Information Officer	No	Yes	Yes – Town Fire Dept/County	Yes – PAC 14	Yes – Wicomico County	Yes	No	Yes
How can these capabilities be expanded and improved to reduce risk?									
• Encourage Skywarn training throughout the County, specifically those hosted by municipalities, resulting in trained stormready spotters. • Review Firewise Program and determine benefits of participation.									

13.3 COMMUNITY CAPABILITY GENERAL OVERVIEW

Wicomico County Emergency Services has access to a network of trained agency and volunteer personnel through the Maryland Emergency Management Assistance Compact, 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 (MSP), Department of Natural Resources (DNR), Department of the Environment (MDE), Department of Health and Mental Hygiene, State Highway Administration (SHA) and the Maryland Department of Emergency Management (MDEM). County agencies include the Roads Department, Planning Office, General Services, Board of Education, the Community Action Agency, and the Sherriff's Office.

In addition, the County has mutual aid agreements with surrounding counties and has also developed working relationships with the Salisbury Fire Department as well as the volunteer fire and rescue units throughout the County. The County also has mutual agreements with the American Red Cross and other groups, such as the National Guard, that may be called upon under special circumstances. In addition, the County has agreements to coordinate mitigation activities with private utility companies, such as Delmarva Power and Verizon, and with private transportation companies, such as Norfolk Southern, for rail transportation Hazmat events.

13.4 EMERGENCY SERVICES

EMERGENCY MANAGEMENT DIVISION

The division is responsible for updating and maintaining emergency plans to deal with mitigation, preparedness, response, and recovery for natural and man-made disasters along with administration of the county risk management program.

Members of the division participate with several community and area committees, and organizations on a regular basis to maintain working and cooperative partnerships in the furtherance of emergency preparedness. These committees and organizations include:

- Local Emergency Planning Committee (LEPC);
- Maryland Department of Emergency Management (MDEM);
- Delmarva Emergency Task Force (DETF);
- Maryland Emergency Management Association (MEMA);
- Tidal Health Disaster Committee (formerly PRMC);
- Lower Shore Vulnerable Populations Workgroup & Vulnerable Population Task Force;
- Salisbury Mutual Assistance Group; and,
- U.S. Coast Guard Area Contingency Planning Committee.

COMMUNICATION DIVISION

The Communications Division known as "Central" is manned 24/7. Central houses, maintains, and operates the Wicomico County Public Safety Answering Point, better known as 9-1-1. All incoming 911 calls from within Wicomico County are received at this center.

The center receives calls for service for seven (7) police agencies within the county, gathers information and transfers the call to the appropriate agency for action. Along with the seven police agencies, the center also receives and dispatches all fire and medical related calls for

fourteen (14) fire companies and twelve (12) ambulance companies.

Fire & Ambulance Companies:

- Salisbury Fire Department Station 1;
- Salisbury Fire Department Station 2;
- Fruitland Fire Department and E.M.S Station 3;
- Delmar Fire Department and E.M.S Station 74 (4);
- Hebron Fire Department and E.M.S Station 5;
- Parsonsburg Fire Department and E.M.S Station 6;
- Pittsville Fire Department and E.M.S Station 7;
- Willards Fire Department and E.M.S Station 8;
- Mardela Springs Fire Department and E.M.S. Station 9;
- Powellville Fire Department and E.M.S Station 11;
- Westside Fire Department and E.M.S Station 12;
- Sharptown Fire Department and E.M.S Station 14;
- Allen Fire Department and E.M.S Station 15; and,
- Salisbury Fire Department Station 16.
- Salisbury E.M.S.

Police Agencies:

- Delmar Police Department;
- Fruitland Police Department;
- Maryland State Police;
- Salisbury Police Department;
- Wicomico County Sheriff's Department;
- Salisbury University Police Department; and,
- Pittsville Police Department.

RADIO DIVISION

The Radio Division maintains a 13 channel, 8 tower P25 Phase 2 trunking radio system in Wicomico County that supports public works, fire, EMS, and police agencies. This also includes other agencies not on the trunking system, but who share interoperability with County Public Safety agencies. There are approximately 1,700 portable and 600 mobile radios on the system. There are 14 fire and EMS departments and seven (7) police agencies on the system in the county.

The radio system has interoperability with seven counties, the State of Delaware, Maryland state agencies, the City of Salisbury, and Ocean City systems. Preventive maintenance is done in-house and by vendors on a 12-month schedule. A 60 ft. portable tower trailer for backup scenarios is also maintained by the division staff. The system provides on street coverage. Bi-Directional Amplifiers (BDAs) are used to inject signals in and out of a building to enhance in-building coverage. BDAs are typically utilized on buildings such as Tidal Health Peninsula Regional Hospital (formerly PRMC) due to the type of construction that can inhibit regular in-building coverage provided by the current system.

The Maryland Eastern Shore Interoperability Network (MESIN) provides for interoperability capability between the counties on the Eastern Shore of Maryland. The division maintains the Wicomico County Emergency Mobile Command Unit for use by all emergency response agencies in the county.

13.5 CITIZEN WARNING/ALERT NOTIFICATION PLAN

CITIZEN WARNING/ALERT NOTIFICATION PLAN

The objective of the notification plan is to provide timely information to both residents of and visitors to the county regarding impending or occurring extraordinary events that may impact the safety of individuals. The distribution of information through the components of the plan cited below will result in an informed public, which is a public armed to react in a safe and effective manner. The components implemented/utilized singularly or in combination will result in:

- Alerting citizens in geographically targeted area(s) of imminent threats/hazards to their safety.
- Providing alerts for life threatening/severe weather conditions to include National Weather Service forecasts, warnings, and watches.
- Notification of impending or occurring emergencies/hazardous conditions.
- Sharing emergency preparedness advisories dealing with current events.
- Access to emergency preparedness information dealing with both manmade and natural events adversely affecting the public.

Components include:

1) Citizen Warning/Alert Siren System. There are currently thirteen (13) outdoor sirens utilized by local fire departments throughout the County for alerting purposes and two (2) sirens maintained by the Department of Emergency Services for emergency purposes. These 15 sirens make up the Citizen Warning/Alert Siren System. Sirens are used to alert citizens of an imminent hazard and prompt them to seek shelter immediately, and to obtain additional information on the threat specifics (i.e., timing, location, and severity) from reliable sources such as those cited in items 2-5 below. Citizens should not call 911 to determine the hazard causing the activation.

2) NOAA Weather All-Hazards Radios (NWR). NWR (known as NOAA Weather Radio) broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, seven days a week providing comprehensive weather and emergency information. For Wicomico County, the Station with call sign KEC92 broadcasts on frequency 162.475 MHz.

3) Emergency Alert System Messaging System (EAS). The National Weather Service (NWS) generates verbal and text messages dealing with weather warnings and watches that are broadcast by participating radio and television broadcasters, cable, satellite, and wireline providers.

4) Wireless Emergency Alerts (WEA). Allows customers who own certain wireless phone models and other enabled mobile devices to receive geographically targeted alert text messages through cell towers in the area(s) of the emergency.

5) Local Television and Radio Media. Local television and radio media is a source of warning/emergency information reaching a large segment of the County's population.

6) "CivicReady" System. The CivicReady system is a citizen notification method used to notify the citizens of Wicomico County of important information in the event of an impending or occurring emergency via telephone communications. The system is intended to be used for emergency alerts, as well as non-emergency incidents that may have significant impacts to residents. Emergency Alerts could be related to specific hazards that require action be taken such as evacuation, shelter in place, boil water orders, etc. Non-emergency alerts could include significant transportation problems with prolonged impacts or significant ongoing police or fire activity. This list is not meant to be all inclusive and demonstrates that this system will not be used for routine information. In addition to receiving information on your wireless device, you may also receive notification on your land telephone line (if you have one) depending on the type of incident or event. In order for a cellular customer to receive an informational call they must register their cell phone through a Self-Registration Portal accessed by visiting the County Department of Emergency Services website: www.wicomicocounty.org/133/Emergency-Services.

7) Press Releases. Press releases are distributed by the Department of Emergency Services. In addition, The County website enables members of the news media, as well as individuals, to obtain the latest press releases and media advisories. News on the site is updated daily.

8) County Department of Emergency Services (DES) Website. The County DES website contains information dealing with a variety of emergency preparedness topics and current advisories: www.wicomicocounty.org/133/Emergency-Services. The County DES Facebook page is also a source for emergency preparedness information.

9) County Website Postings. The County webpage provides emergency information during declared emergencies: http://www.wicomicocounty.org.

10) Social Networking. Facebook is available on the county's website for up-to-date information on County government related and community activities.

11) Wicomico County Hazard Mitigation and Resilience Website. The website https://www.wicomicohazards.org/ provides information on the Wicomico County Hazard Mitigation & Resilience Plan, which aims to ensure the County is prepared for various hazards.

12) Community Perspective Hazard Survey. Included on https://www.wicomicohazards.org/ is a community perspective hazard survey. The Department of Emergency Services is placing special emphasis on understanding citizens' concerns regarding hazards.

13.6 WEATHER RELATED EVENTS

WINTER STORM CAPABILITY

The County Roads Department, the Board of Education and local municipalities, along with the State Highway District Office are equipped to deal with significant snowstorms. As mentioned in the hazard profile, the County also has to deal with occasional ice storms during the winter months.

In addition to the County Roads Department and State Highway Administration, the Emergency Services Office has close ties with utility companies that provide electrical and telephone service to the citizens of the County. These utility companies clear dead, overhanging, and downed trees from utility rights-of-way during summer months to mitigate ice and wind damage during winter storms. With respect to new construction, the County's Building Code has both snow loading and wind loading requirements.

Generators at community lifeline facilities were discussed by the 2021 HMPC during plan update process. Several facilities were identified as needing emergency back-up power. These facilities lacking back-up power were included in the 2021 Mitigation Action Items, Table 14.2, Chapter 14.

COASTAL & RIVERINE FLOODING – HURRICANE & TORNADO CAPABILITY

During major weather events, including thunderstorms, tornados and the passage of hurricanes, most of the agency and volunteer groups mentioned in their corresponding hazard profiles are called upon for assistance by the Emergency Services Office. Wicomico County's capabilities are similar to other coastal counties that must deal with hurricanes and storm surge flooding. Usually, local roads are blocked as shown in *Chapter 8: Flooding Profile and Vulnerability Assessment* and described in *Chapter 14: Mitigation Strategies* and when warranted, residents are asked to evacuate from the flooded area.

Emergency Services has a plan which coordinates evacuation activities with the Roads Department, State Highway Administration, local police, fire and rescue units, the Health Department, Department of Social Services, Humane Society, and the Red Cross. While Wicomico County makes a vast effort to mitigate flood events, the character of the natural environment, along with large storm surge inundation areas, lends itself to further mitigation efforts, particularly that of moving people and structures from harm's way.

The County also has the capability to mitigate future flood losses through its Subdivision Regulations, Floodplain Management Ordinance and Building Code. The new Floodplain Ordinance adopted in 2015, requires that the first floor of new structures be at least two feet above base flood level elevation in the floodplain area. The Building Code has 100 mph wind loading requirements for new structures and tie-down requirements for mobile homes. Finally, the County participates in the National Flood Insurance Program (NFIP) to allow property owners to purchase insurance through this federally sponsored program.

As of August 17, 2015, Wicomico County's Digital Flood Insurance Rate Maps (DFIRM) became effective. A low risk area may have changed to a high-risk area, or vice versa. To assist

citizens in determining flood risk, MDE created the DFIRM Outreach Website @ www.mdfloodmaps.com, Flood Risk Application. The Flood Risk Application is a step-by-step interactive tool designed to help citizens understand their flood risk and what their next steps should be based on their personalized results.

CLIMATE CHANGE CAPABILITY

Maryland's *Climate Action Plan* includes two climate change adaptation strategies that are currently being used to guide state-level adaptation planning efforts. The first strategy (Phase 1) addresses the impacts associated with sea level rise and coastal storms. The second strategy (Phase II), released as a complement to the Climate Action Plan, addresses changes in precipitation patterns and increased temperature, and the likely impacts to human health, agriculture, forest and terrestrial ecosystems, bay and aquatic environments, water resources, and population growth and infrastructure. Together, more than 100 experts from the governmental, nonprofit, and private sectors participated in a series of meetings for the purpose of interpreting the most recent climate change literature, evaluating adaptation options, and recommending strategies to reduce Maryland's overall climate change vulnerability.

The strategies provide the basis for guiding and prioritizing State-level activities with respect to both climate science and adaptation policy over the near and longer terms. A variety of projects designed to implement components of the strategies is well underway and additional efforts have been identified as high priorities for early action.

HEAT & DROUGHT CAPABILITY

As noted in the hazard profile, heat and drought are normally not a severe problem in Wicomico County. However, when dry conditions do occur, they can disrupt water service in areas of the County. In the event this occurs, the Department of Emergency Services may request the Maryland Department of Emergency Management to activate 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.

13.7 TECHNOLOGICAL OR OTHER EVENTS

EPIDEMIC CAPABILITY

As noted in the epidemic hazard profile, the Maryland Department of Health and Mental Hygiene administer the County Health Department. This administrative setup allows the full capabilities of the State to be utilized to mitigate an epidemic or other outbreak of disease in Wicomico County. Planning documents developed to mitigate and respond to epidemics include Pandemic Flu, Medical Surge, Strategic National Stockpile, Risk Communications, Continuity of Operations, Emergency Response Plan for both Anthrax Prophylaxis and Treatment Order and Smallpox Post Exposure Protocol.

FIRE OR EXPLOSION CAPABILITY

Wicomico County developed its fire and rescue capability response to fire hazard early in the 20th Century. More recently, fire prevention measures such as regulatory requirements mandated through the County's Building Code and the dissemination of public information through the State Fire Marshal's Office and all Wicomico County Volunteer Fire Departments have become the norm. Safety requirements for explosive materials in containers being shipped by rail or truck are enforced by the Department of Transportation.

WILDFIRE CAPABILITY

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

DAM FAILURE CAPABILITY

All dams in the County are subject to inspections by the State's Dam Safety Division and the Army Corps of Engineers. A potential failure at any of the dams in the County would be called in to the Emergency Management Office and relayed to citizens via local radio outlets. As shown in the mitigation projects in *Chapter 12: Man-Made Hazards* the County is continually taking measures to ensure the structural integrity by proposing to reconstruct failing dams. *Table 12.1: Dam Condition Information*, details the hazard rating and dam condition for each dam within Wicomico County.

TRANSPORTATION / HAZMAT CAPABILITY

The Salisbury Fire Department has a HazMat Team that can be called upon in the event of a HazMat incident within the County. The Maryland Department of the Environment is also on call to assist in the cleanup of hazardous materials. The Maryland Department of Transportation would be called upon to assist with a major transportation accident or transportation HazMat incident. In addition, the Coast Guard is available to assist with any water borne transportation accident or HazMat event.

13.8 COMMUNITY RESILIENCE

Presidential Policy Directive (PPD)-8 [2011] defines resilience as, "the ability to adapt to changing conditions and conditions and to withstand and rapidly recover from disruptions due to emergencies." PPD-21 [2013] expanded the definition to, "the ability to prepare for and adapt to changing conditions and to withstand and recover rapidly from disruptions." Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents. Disaster refers to, "a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses, which exceed the ability of the affected community or society to cope using its own resources‖ [National Science and Technology Council 2005]." Under these definitions, resilience includes activities already conducted by some communities as a part of disaster preparedness.

> The National Preparedness Goal, developed by the Federal Emergency Management Agency (FEMA) in response to a Presidential Policy Directive, envisions ―a secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk‖ [FEMA 2015a].

The general definition of the word resilience refers to the ability to recover quickly from a disaster event. Through continued hazard mitigation initiatives and projects Wicomico County builds upon their overarching goal of becoming a more disaster-resistant community. Coupling this idea with the continual effort to improve and expand community capabilities to prevent, mitigate, respond, and recover from a disaster event, Wicomico County evolves into a more resilient community. Improving the ability to maintain and restore vital services in a more timely and efficient manner has been added as "Goal 9" in Chapter 14 - Mitigation Strategies. Additionally, many of the goals and associated mitigation action items and projects are proactive and continuous. Furthermore, the plan integration has been added during the update process to ensure that mitigation and community resilience are included within all County-planning documents. As part of the shared community vision of resiliency, a safe, sustainable, economically vibrant, and healthy environment emerges.

13.9 FLOOD INSURANCE RATE MAP (FIRM) & OTHER RESOURCES

The Wicomico County website, under Permits, Inspections, Licenses, and Fire Protection, "Find Your Flood Zone," provides a hyperlink to "Official FEMA Map Service Center." Additional resource links provided by Wicomico County via their website include:

- Wicomico Floodplain Regulations
- Floodplain Permit Application
- NEW Flood Elevation Certificate
- Technical Bulletin: Opening in Foundations
- Technical Bulletin: Flood-Resistant Building Materials

- **Preparation Is The Key To Preventing Damage.** There are several low-cost projects that homeowners can do to make their homes less likely to suffer damage from a flooding event. The Federal Emergency Management Agency (FEMA) has prepared a new publication entitled, "Protect Your Home From Flooding" which provides useful information

on damage-preventing projects. Homeowners with questions about these suggestions can contact the building department or the floodplain manager by calling the Department of Planning & Zoning at 410-548-4810.

"Protect Your Home From Flooding - Low-cost Projects You Can Do Yourself"

- **Create Your Family Emergency Communication Plan.** Is your family prepared for an emergency? Does everyone in your household know what to do should an emergency occur? Here is a practical guide to improving family communication during a disaster.

"Be Smart. Take Part. Create Your Family Emergency Communication Plan."

- **Don't Forget Your Pets.** Preparation for a flooding event or disaster also includes ensuring that family pets are kept safe and have the supplies they need. FEMA offers some practical suggestions for providing for furry family members during a flood.

"Pet Preparedness"

- **Is Your Disaster Kit Stocked?** Don't wait until a disaster is here to get together the things you and your family will need to sustain your household during a severe weather event. Prior preparation will ensure a much more comfortable experience. This publication provides a helpful checklist of supplies to set aside now.

"Is Your Disaster Kit Stocked?"

- **More Helpful Hints.** Here are some more helpful hints on how you can protect your home from flood damage.

"Protect Against A Flood"

Municipalities refer citizens to the County website for helpful and links and the FEMA Map Service Center, however the City of Salisbury's website also provides a direct link to the FEMA Map Service Center.

13.10 CONCLUSION

Integrating hazard planning and resiliency into the County's planning framework will lead to development patterns and redevelopment that decreases hazard risk and vulnerability. In order to achieve and facilitate integration, Wicomico County should review the recommendations and mitigation actions in Chapter 14. This review will enable the County to implement opportunities for plan integration, resulting in effective ways to reduce hazard vulnerability and build a resilient Wicomico County. During the biannual plan review meetings, discussed in Chapter 1 on page 1-13, Chapter 14 mitigation action items along with opportunities for plan integration will be reviewed and updated, as appropriate.

CHAPTER 14 – MITIGATION STRATEGIES

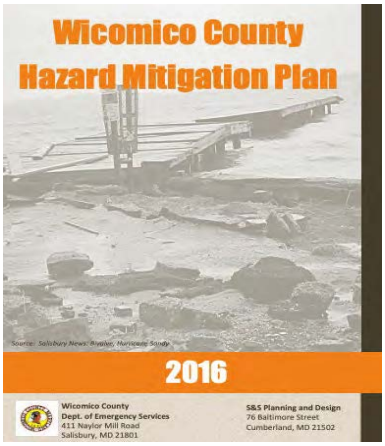
Updates to the Wicomico County Chapter 14 - Mitigation Strategies included the following:

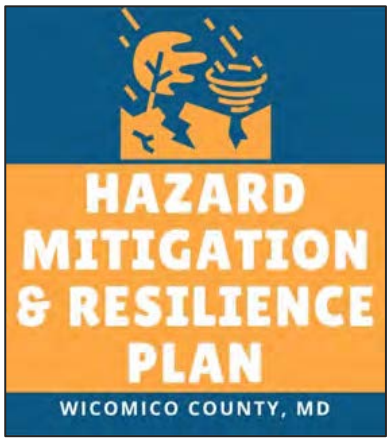
- Developed the 2017-2021 Mitigation Action Status Report
- Updated 2017-2021 Project Status Table 14.1
- Updated Goals and Objectives Table 14.2
- New On-Going Mitigation Action Item Table 14.3
- Included new 2021 Mitigation Action Items & Priority Rankings - Table 14.4

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLAN

CHAPTER 14 – MITIGATION STRATEGIES

14.1 MITIGATION STRATGIES UPDATE PROCESS





This chapter includes both mitigation actions and projects from the ***2017 Wicomico County Hazard Mitigation Plan*** and the **2021 Hazard Mitigation & Resilience Plan.** As part of the plan update process, a fillable form was developed and distributed to members of the Hazard Mitigation Planning Committee (HMPC). The purpose of the form was to collect information on the status of mitigation action items and projects identified in the ***2017 Wicomico County Hazard Mitigation Plan***. Results of this data collection effort have been included in this chapter as well as Appendix B: 2021 Mitigation Action Project Status Report.

Obtaining the most recent status of previously identified mitigation actions and projects assisted in the identification of those actions and projects that should be carried over for this planning effort. HMPC members reviewed the 2017-2021 Mitigation Status Report and provided feedback on the carry-over and modifications of specific mitigation actions and projects.

In addition, goals and objectives were reviewed by the HMPC. Modifications were made and a new goal and associated objectives were added. This new goal reflects the inclusion of the "Active Assailant" threat, which was a new threat added during this plan development process.

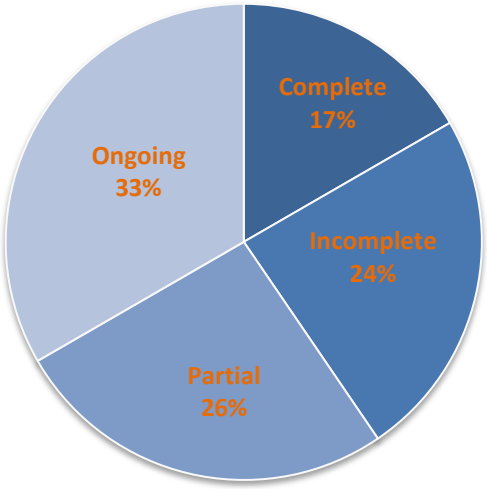
Finally, mitigation actions and projects carried over from the previous plan were added for the 2021-2022 planning cycle. New county-wide and municipal specific actions were identified during the plan update process and have been included in this chapter.

14.2 2017-2021 MITIGATION ACTION STATUS REPORT

There were forty-two (42) mitigation action items identified in the *2017 Wicomico County Hazard Mitigation Plan*. The Local Emergency Planning Council (LEPC) reviewed the 2017 mitigation action items annually. In addition, the Department of Emergency Services (DES) requested updates from municipal representatives periodically. The information collected during the previous planning cycle was incorporated with the mitigation status updates collected from the members of the 2021 Hazard Mitigation Planning Committee (HMPC).

Information collected was compiled and results indicate that seventeen percent (17%) of the 2017 mitigation action items are completed. Incomplete and partially complete mitigation action items were reviewed by the 2021 HMPC to determine which, if any, should be carried over into the 2021 Plan. The full Mitigation Action Status Report is included in Appendix B.

2017-2021 MITIGATION ACTION ITEM STATUS SNAPSHOT



Projects were developed from mitigation action items that were identified as a high priority by the previous HMPC. The table below lists the fourteen (14) projects and their associated status.

Table 14.1: 2017 vs. 2021 Mitigation Project Status

2017 MITIGATION PROJECT	2021 STATUS
Barren Creek Dam Mitigation	Ongoing
Coast Smart for Plan Integration Study	Incomplete
Hazard Mitigation & Comp. Plan – Whitehaven Community	Incomplete
Peninsula Regional Medical Center Mitigation	Incomplete
City of Salisbury – Flood Issue Upgrades	Ongoing
City of Fruitland – Flood Issue Upgrades	Ongoing
Wicomico County – Flood Issue Upgrades	Partial
State of Maryland – Flood Issue Upgrades	Ongoing
Shelter Facilities & Generators	Ongoing
Tri-County Council Building Generator	Incomplete
Tow of Willards – Storage Lift Stations (2) Generator	Incomplete
NFIP – CRS: Flood Mitigation – Repetitive Loss Properties and Repetitive Loss Areas	Incomplete
Flood Mitigation & Prevention – Public Information Campaign	Ongoing
Wicomico County Backup EOC Flood Mitigation	Complete

Note: Several projects that have been completed have multiple components, many of which are still in progress.

14.3 GOALS, OBJECTIVES & MITIGATION ACTIONS

The 2021 Hazard Mitigation Planning Committee (HMPC) reviewed and updated goals and objectives as part of the planning process. Goals and objectives serve as the basis for implementing mitigation action items which aid in mitigating the hazards described in Chapters 4-12 of the Plan.

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

Table 14.2: Mitigation Goals and Objectives

GOALS	OBJECTIVES
Goal 1: Maintain and enhance the Department of Emergency Services coordination with municipalities and other departments and organizations to increase hazard preparedness and mitigation.	Institutionalize hazard mitigation and streamline policies to eliminate conflicts and duplication of effort.
	Improve organizational efficiency.
	Maximize utilization of best technology.
	Incorporate hazard mitigation into activities of other organizations.
Goal 2: Build and support municipal capacity and commitment to become continuously less vulnerable to hazards.	Increase awareness and knowledge of hazard mitigation principles and practice among local and municipal public officials.
	Provide assistance to municipal officials and help municipalities obtain funding for mitigation planning and project activities.
Goal 3: Increase public understanding, support, and demand for hazard mitigation.	Publicize and encourage the adoption of appropriate hazard mitigation actions.
	Increase the number of businesses that have developed a business risk reduction plan.
	Increase the proportion of businesses and residences that have flood insurance
Goal 4: Protect existing and future properties (residential, commercial, public, and critical facilities).	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
	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.
	Reduce the number of houses in the floodplain that are subject to flooding through acquisition and elevations.
	Increase the number of critical facilities that have carried out mitigation measures to ensure their functionality during all hazard events.

GOALS	OBJECTIVES
Goal 5: Ensure that public funds are used in the most efficient manner.	Prioritize new mitigation projects, starting with sites facing the greatest threat to life, health, and property.
	Use public funding to protect public services, and critical and public facilities.
	Use public funding on private property where benefits exceed costs.
	Maximize the use of outside funding sources. Encourage property-owner self-protection measures.
	Prioritize signage in and around high hazard dams denoting dam inundation area.
Goal 6: Promote sustainable development to improve the quality of life.	Establish open space parks and recreational areas in flood hazard areas.
	Provide for the conservation and preservation of natural resources.
	Limit additional housing (especially elderly and high density) in areas of high hazard risk.
Goal 7: Prevent destruction of forests and structures in the Urban Wildland Interface.	Improve communications capability between municipal and County emergency management and law enforcement personnel.
	Identify specific high hazard areas in the Urban Wildland Interface and notify residents of means to protect their property from wildfire damage.
	Develop evacuation procedures to enable residents near forested areas to evacuate safely.
Goal 8: Protect public infrastructure, especially evacuation routes.	Upgrade or replace public roads and storm water management features to include mitigation into the project design and construction.
	Improve evacuation routes utilized in flood hazard events to mitigate life-threatening road conditions and road closures.
	Mitigate problem road sections within the County and municipalities.
	Consider evacuation routes in relation to dam inundation areas.
Goal 9: Improve the ability to maintain and restore vital services following a disaster event in a timely and efficient manner.	Ensure emergency back-up power is available at all critical facilities.
	Evaluate and improve the resiliency of infrastructure lifelines.
	Design new systems or upgrade existing systems to withstand evolving and future hazards.
Goal 10: Expand the existing natural hazard risk assessment within the Hazard Mitigation Plan to include threats-human caused incidents that result from intentional acts. This could include chemical, biological, or cyber-attacks and other act of terrorism.	Include Active Assailant as an identified threat in the Hazard Mitigation Plan.
	Assess Active Assailant preparedness and mitigation capabilities and provide new recommendations for mitigation actions to fill gaps identified.
Goal 11: Promote hazard mitigation as the cornerstone of emergency management in Wicomico County.	Educate the public about natural hazards risks, preparedness, and mitigation.
	Continued education for emergency responders and medical personnel.

GOALS	OBJECTIVES
Goal 12: Eliminate or reduce human, environmental, social, and economic loss from natural and technological hazards.	Maintain healthy environments at county-owned and operated locations, beyond the global pandemic.
	Identify vulnerable populations and provide resources to these groups based on their unique needs.
Goal 13: Provide outreach to agencies and organizations within Wicomico County regarding hazard mitigation.	Maintain awareness of local or state regulations in relation to pandemic and emerging infectious diseases planning and best practices.

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

14.4 MITIGATION ACTIONS

Mitigation actions address the goals and objectives developed by the Hazard Mitigation Planning Committee (HMPC). These actions form the core of the Wicomico County Hazard Mitigation Plan. The 2021-2026 mitigations actions were 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 and public facilities, buildings, structures, and public infrastructure to protect them from hazards. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and infrastructure modification.

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

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

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

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

14.5 2021 MITIGATION ACTION ITEMS & RATINGS

Actions that considered "on-going" were not included on the table for priority ranking purposes include:

Table 14.3: On-Going Mitigation Action Items

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD
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.					
1	Identify and obtain funding opportunities to prepare a sea-level rise and climate change study.	Planning and Zoning, City of Salisbury	1 2 3	Long-term	All Hazards
2	Pursue Community Rating System eligibility.	Planning and Zoning		Short-term	Flood
3	Update GIS Program to include floodplain structure information including elevation certificate database.	Planning and Zoning	1 2 3	Short-term	Flood
4	Continue to ensure goals, objectives, and strategies contained in the County's Hazard Mitigation Plan, Water and Sewerage Plan, and Comprehensive Plan are consistent.	Planning and Zoning	1 2 3	Short-term	Flood
PUBLIC EDUCATION AND AWARENESS - Actions to inform and educate citizens, elected officials, and property owners about potential ways to mitigate for hazards that can occur in the County.					
5	Distribute FEMA materials on flood insurance at various public places, as well as being available on the County's website.	Planning and Zoning, Emergency Services	4 5 6	Short-term	Flood
6	Continue outreach efforts to provide education about the associated risks of flooding and climate change.	Planning and Zoning, City of Salisbury		Short-term	Flood
7	Consideration should be given for the County, along with State and Federal partners, to develop and implement a repetitive flood loss outreach project(s).	Planning and Zoning, Emergency Services	4 5 6	Short-term	Flood
8	Continue efforts to conduct public information and awareness campaigns throughout the summer months. As heat risks increase, it is important to educate and inform the public about the dangers of heat and how to avoid them.	Emergency Services, Municipalities	2 3	Short-term	Extreme Heat, Drought & Wildfires
NATURAL RESOURCE PROTECTION - Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural protection systems.					
9	Continue implementing regulations and administering programs designed to enhance coastal resiliency, invasive species management, and vegetation selection for future conditions.	Planning and Zoning	3 7	Long-term	Shoreline Erosion Climate Change
10	Maintain and expand green infrastructure hubs and corridors, which are promoted as mechanism to protect against forest fragmentation and facilitate habitat migration.	Planning and Zoning	3 7	Long-term	Shoreline Erosion Climate Change
11	Educate property owners about the benefits of placing environmentally sensitive lands under public and private conservation easements.	Planning and Zoning		Long-term	Flood Shoreline Erosion Climate Change

2021 MITIGATION ACTIONS ITEMS & PRIORITY RANKINGS

During the planning process, mitigation action items from the previous plan were reviewed, updated, and new action items were developed for inclusion in the 2021 Plan Update. Mitigation action items are ranked as "High", "Medium" or "Low".
Note - Timeframe Definitions: Short-term is less than 0-2 years and long-term is 2-5 years.

Table 14.4: 2021 Mitigation Action Items & Ratings

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
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.							
1	Update 2006 Hazardous Materials Commodity Flow Studies for both US Route 13 and 50.	Emergency Services	1 2 3	Short-term	Man-Made Hazards	Incomplete	**High**
2	Conduct a Stormwater Management Assessment to evaluate: o Roadside drainage ditch assessment for conveyance and adequacy, including maintenance. o Regional Stormwater Detention Basin to attenuate stormwater runoff prior to discharge to Pocomoke River.	Towns of Pittsville & Willards	1 2 4 5 8	Short-term	Flood	**New**	Low
3	Request FEMA to develop and provide Flood Risk Products for sections of the County at risk to riverine flooding.	Emergency Services	1 4 6	Short-term	Flood	**New**	**High**
4	Review high and significant hazard potential dams each time the project is scheduled for inspection, or at least once each 5 years. This allows for periodic changes in the assigned hazard potential category based on changed reservoir or downstream development. The Mitchell Pond #1 is close to 5 years since previous inspection, and therefore should be inspected to ensure there is no potential for dam failure.	MD-DOT District 1, Public Works, City of Salisbury	4 5 8 10	Short-term	Man-Made Hazards	**New**	Medium

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
PROPERTY PROTECTION - Actions that involve the modification of existing critical and public facilities, buildings, structures, and public infrastructure to protect them from hazards.							
5	Acquire flood properties in order to develop the North Prong Park. o Industrial Area Project – Located at Lake Street – Route 50 North between Lake Street and where Prong River ends at Rose Street • Purchase parcels that are brown fields • Relocate city parcels first • Convert area into a park According to the City of Salisbury's Nuisance Flood Plan, the project would serve several purposes. It would remove vulnerable properties from the floodplain, provide open space, and provide some mitigation benefit by allowing the area to be inundated during flood events. The area consists mostly of under-utilized industrial properties; some of which are already owned by the City. Efforts are underway to obtain grant funding to aid in the purchase of the remaining parcels.	City of Salisbury	2 4 5 6	Short-term	Flood	**New**	Low
6	Install impact glass, hurricane shutters and retrofit roofs as needed at critical facilities to ensure protection from severe weather, such as hurricanes.	TidalHealth Peninsula Regional	3 5	Long-term	High Wind Hurricane	Partial	Low
7	Take measures to prevent flooding of the TidalHealth Peninsula Regional by installing a levee, back flow prevention valves, and stormwater pumping stations.	TidalHealth Peninsula Regional	3 5 6	Long-term	Flood	Partial	Low
8	Install generators at designated shelter facilities that currently lack a back-up emergency power source.	Salisbury Middle, Parkside High School, Board of Education, Emergency Services	5 6 9	Short-term	All Hazards	Incomplete	**High**

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
9	Implement flood mitigation for critical facilities, specifically: o Salisbury Fire Department – Station 16 which is at risk to the 1% annual chance flood hazard, hurricane storm surge inundation area, coastal flooding, and the Climate Ready Action Boundary inundation areas; and, o Salisbury Fire Training Building which is at risk to the 1% annual chance flood hazard, hurricane storm surge inundation area, coastal flooding, Climate Ready Action Boundary inundation areas and the 100-foot shoreline erosion risk zone.	City of Salisbury	2 4 5	Short-term	Flood, Coastal, Shoreline Erosion, Sea Level Rise	**New**	Low
10	Include green infrastructure design into mitigation efforts to improve drainage and water retention. Also, incorporate green infrastructure such as open space and tree plantings in community designs to improve public health and expand recreational space.	Countywide, Municipalities	3 6	Long-term	Flood, Coastal, Climate Change	**New**	Medium
11	Due to increased storm severity and projected sea level rise, implement mitigation measures for the following sanitary facilities: o Salisbury Pumping Station – 611 Ridge Road o Salisbury Pumping Station M Park – North Park Drive o Salisbury Sewage Pumping Plant – 100 Delaware Avenue o Sharptown Sewer Plant – Little Water Street	City of Salisbury, Town of Sharptown	4 5 9	Short-term	Flood, Coastal, Sea Level Rise	**New**	Low
12	Install landfill generators – Wicomico County Solid Waste Complex.	Public Works, Emergency Services	5 6 9	Short-term	All Hazards	Partial	Medium

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
13	Install a generator at the Tri-County Council Building, which serves as a back-up facility the court system as designated in County Continuity of Operation Plan. An agreement is in place to provide space at the facility to both FEMA, MDEM and the Department of Agriculture during incident response/recovery.	Public Works, Emergency Services	1 5 6 9	Short-term	All Hazards	Incomplete	Medium
14	Complete flood mitigation study in the Pine Bluff (Camden/RT 12) area.	Maryland State Highway Administration	5 6	Long-term	Flood	Incomplete	**High**
15	Install generators for two storage lift stations. Currently each lift station can hold 1-1 ½ days storage capacity before overflow occurs.	Town of Willards	2 5 6 9	Short-term	All Hazards	Incomplete	Low
16	Encourage back flow prevention on municipal water service to homes. Provide one page information sheet with utility bill.	Town of Willards	2 5 6 9	Short-term	Flood	Incomplete	Low
17	Assess and mitigate flood risks to the eight (8) repetitive loss properties located within the City of Salisbury, see detailed list in Appendix G: NFIP & CRS (Official Use Only). Please note, flood mitigation is voluntary, and this action item is specific to those property owners who are willing to engage in hazard mitigation.	City of Salisbury	2 5 6 9	Long-term	Flood	**New**	Low
18	Assess and mitigate flood risks to repetitive loss properties located within the unincorporated areas of the County including Bivalve, Nanticoke, Parsonburg, Whitehaven, Tyaskin, see detailed list in Appendix G: NFIP & CRS (Official Use Only). Please note, flood mitigation is voluntary, and this action item is specific to those property owners who are willing to engage in hazard mitigation.	Planning & Zoning	2 5 6 9	Long-term	Flood	**New**	Medium

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
19	Mitigate and upgrade flooded roads when funding is available, specifically evacuation routes, based on areas that the HMPC identified as "high" in Table 14.6 to 14.8. Continue to identify and assess areas within the County with stormwater run-off issues resulting in damage to structures and County infrastructure	Countywide, Municipalities	9	Long-term	Flood	Partial	**High**
PUBLIC EDUCATION AND AWARENESS - Actions to inform and educate citizens, elected officials, and property owners about potential ways to mitigate for hazards that can occur in the County.							
20	Target residents and businesses for outreach campaign preparedness in high hazard areas such as the 1 percent annual chance flood hazard area. Note: This action item is specific to SFHA and structures.	Countywide, City of Salisbury, Town of Sharptown	4 6	Long-term	Flood	**New**	Medium
21	Complete CRS Activity 332.b Flood Response Preparations (FRP). Develop a pre-flood plan for public information projects. Materials may include templates of handouts, mailers, press releases, webpage and social media that cover key messages to be disseminated before, during and after flood. Include materials and the procedures for how FRP will be used.	Planning and Zoning, Emergency Services	4 5 6	Short-term	Flood	Partial	Medium
22	Review and update extreme cold weather press release templates from December 2016.	Emergency Services, Health Department	1 2 3	Short-term	Winter Weather	**New**	**High**
23	Develop a "community preparedness toolkit" that provides step-by-step directions along with useful resources for making the community safer, more resilient, and better prepared in the event of a public health crisis where social distancing and quarantining are necessary, while continuing to provide information on the County's web site about pandemic and emerging infectious diseases risk and vulnerability.	Health Department	11	Short-term	Pandemic and Emerging Infectious Disease	**New**	**High**

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
24	Utilize results of the Social Vulnerability Index (SVI) mapping to identify potentially under-served and/or under-represented communities. Including pandemic and emerging infectious diseases, these areas are likely to be impacted by multiple hazards. Targeted outreach efforts should be attempted to "bridge the gap" in access to information and services as it relates to natural hazards.	Health Department	12	Short-term	Pandemic and Emerging Infectious Disease	**New**	Medium
25	Ensure that all health-related announcements, information, and materials are accessible to all socially vulnerable groups, including but not limited to those: over the age of 65, under the age of 5, with limited English-speaking proficiency, with disability, and those at or below the poverty line. Coordinate with municipalities on distribution.	Health Department, Municipalities	12	Short-term	Pandemic and Emerging Infectious Disease	**New**	Medium
26	Coordinate with Salisbury-Wicomico Economic Development (SWED) and the Chamber of Commerce to distribute information to local businesses.	Health Department	13	Short-term	Pandemic and Emerging Infectious Disease	**New**	**High**
NATURAL RESOURCE PROTECTION - Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural protection systems.							
27	Maintain, identify, and protect new marsh migration corridors.	Planning and Zoning	3 7	Long-term	Shoreline Erosion Climate Change	Incomplete	Medium
28	Create habitat mosaics that are more resilient to climate change impacts, such as sea level rise.	Planning and Zoning	3 7	Long-term	Sea Level Rise Climate Change	Incomplete	**High**
29	Create new and restore existing wetlands as a best management practice to increase resiliency by providing storm buffers, drought buffers and sea level rise buffers. Consider projects to create wetlands to increase floodplain holding capacity.	Planning and Zoning, Public Works	3 7	Long-term	Drought Sea Level Rise Flood	Partial	Medium
30	Create an "ideal" living shoreline by installing riparian buffers about the tide line using native trees and shrubs; tidal wetlands using grasses, rushes, and sedges at mid-tide elevation and marsh grasses and common three-square at low tide; and underwater grasses in shallow water.	Planning and Zoning	3 7	Long-term	Drought Sea Level Rise Flood Climate Change	Partial	Medium

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
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.							
31	Conduct countywide dry hydrant assessment to ascertain the need for additional dry hydrants.	Public Works, Emergency Services, Municipalities	1 4 8 9	Long-term	Wildfire	Incomplete	Low
32	Host and promote training courses such as DHS and FEMA certified courses, specifically related to pandemic/emerging infectious disease.	Emergency Services, Health Depart., Planning and Zoning	11	Short-term	Pandemic and Emerging Infectious Disease	**New**	Medium
33	Develop a training course that introduces the concept of vulnerable populations, how disasters impact these groups, and ways these populations can be assisted in before, during, and after a hazard event. Emergency and medical first responders should be educated on the unique needs of socially vulnerable populations.	Emergency Services	11	Short-term	Pandemic and Emerging Infectious Disease	**New**	Medium
34	Develop an After-Action Report and Improvement Plan for the COVID-19 pandemic. These documents are intended to capture observations of an exercise or event and make recommendations for post-exercise/event improvements.	Health Department	13	Short-term	Pandemic and Emerging Infectious Disease	**New**	Low
35	Update EOP – Mass Care/Sheltering to include non-congregate sheltering. How is the current framework of response geared towards infectious diseases?	Emergency Services	13	Short-term	Pandemic and Emerging Infectious Disease	**New**	Medium
36	Improve emergency notification and evacuation information by using technology, such as a smartphone App.	Public Works, Emergency Services	1 4 9	Short-term	All Hazards	Incomplete	**High**
37	Ensure that warming centers are located within or near those areas shown as having the highest SVI scores. Review 2016 Warming Center Information. Review Social Vulnerability Index- Figure 9.1 for areas shown as having the highest Social Vulnerability Index (SVI) score which include the Towns of Hebron, Willards, Pittsville, and the City of Salisbury.	Emergency Services	1 2 3 5 9	Short-term	Winter Weather	**New**	**High**

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
38	Provide cooling centers during extreme heat and drought events. A cooling center is a location, typically an air-conditioned or cooled building that has been designated as a site to provide respite and safety during extreme heat. This may be a government-owned building such as a library or school, an existing community center, religious center, recreation center, or a private business such as a coffee shop, shopping mall, or movie theatre. Some counties have set up cooling sites outdoors in spray parks, community pools, and public parks.	Emergency Services	1 2 3 5 9	Short-term	Extreme Heat, Drought & Wildfires	**New**	**High**
39	Procure chippers needed for tree removal from storms.	Town of Fruitland	1 2	Short-term	High Wind Hurricane	Incomplete	**High**
40	Procure snow removal equipment (currently using contractors - Snow evacuation route goes thru center of town).	Town of Delmar	4 9	Long-term	Winter Storm	Incomplete	Low
41	Procure storm damage removal equipment	Town of Delmar	1 2	Long-term	All Hazards	Incomplete	Low
42	Establish a debris storage area at city yard for use during clean up after flooding events and weather emergencies.	City of Salisbury	1 4	Short-term	All Hazards	Partial	**High**
43	Update 2019 Partner Notifications List-Attachment C within the *Wicomico County Preparedness and Response Plan for Extreme Temperatures*.	Emergency Services	1 2 3	Short-term	Winter Weather	**New**	**High**
STRUCTURAL PROJECTS - Actions that involve the construction of structures to reduce the impact of a hazard event.							
44	Prioritize flood risk reduction solutions for Upper Ferry Road. According to the 2020 Wicomico County Nuisance Flood Plan, these roadways lead to vehicular ferries providing transportation across the Wicomico River. These routes are used daily by commuters from the west side of Wicomico County who work in Somerset County. The ferries are vulnerable to high tides and often must cease operation during peak hours of a higher-than-normal tide.	Public Works	4 5 8	Short-term	Coastal	**New**	**High**
45	Discuss flood risk protection and grant opportunities with property owners in vulnerable locations within the County identified in the Nuisance Flood Plan, such as Riverton Road, Clara Road, Nanticoke Drive, etc.	Public Works, Planning and Zoning	4 5 8	Short-term	Coastal	**New**	Medium

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
46	Install backflow prevention/tide gates along Market Street and Fitzwater Street/West Main Street.	Public Works	2 5 6	Long-term	Flood	Partial	**High**
47	Install lightning rod(s) at the following tower locations: o Civil Defense Siren – Pemberton Drive o Co. Communication Tower - 6095 Sixty Foot Road o Co. Communication Tower - 24090 Nanticoke Road o Salisbury Communication Tower - Marine Road o State of MD/Wicomico County Tower - 9975 Sharptown Road o Wicomico County Tower - 5635 Plantation Lane o Tower next to West Salisbury Elementary - 28929 Adventist Drive A lightning rod is a metal rod mounted on a structure and intended to protect the structure from a lightning strike. If lightning hits the structure, it will preferentially strike the rod and be conducted to ground through a wire, instead of passing through the structure, where it could start a fire or cause electrocution.	Wicomico County, City of Salisbury	4 5 8	Short-term	Severe Weather	**New**	Medium
48	Increase building energy efficiency through weatherization and the use of "cool" surfaces can reduce waste heat generated by indoor cooling and mechanical systems. Decreasing vehicle use through the planning of transit and active transportation modes is another waste heat reduction strategy. These strategies also have the co-benefit of reducing greenhouse gas emissions and local contributions to climate change.	Public Works, General Services	4 5 6	Long-term	Extreme Heat, Drought & Wildfire	**New**	Medium
49	Evaluate locations for potential tide gates.	City of Salisbury	1 2 4 5	Short-term	Flood	**New**	Medium

ID #	ACTION	RESPONSIBLE ENTITY	GOALS	TIME-FRAME	HAZARD	STATUS	RANKING
50	Consider hazard vulnerability within all services areas and consider flood mitigation in new design and/or upgrades. • Install backflow prevention devices on sewers, drains and other buildings. • Generator. fuel storage tank, and chemical placement outside of flood risk area. • Re-grade land surrounding well field so that it slopes away to prevent flood water from flowing toward the wells. Ensure that the casing terminates at least twelve inches above grade. Also, extend well casings above the flood zone. Relocate or elevate well field pump houses that are in the flood zone. • Install submersible pumps or waterproof pump motors and other equipment. Install permanent physical barriers (e.g., flood walls, levees, sealed doors). • Replace pumps with diesel driven or dual-option counterparts. • Install nonelectrical backup controls where possible (e.g., float switches for pumps). • Upgrade mechanical screens to prevent debris blockages and hydraulic restrictions in anticipation of higher than normal sand, grit, trash and debris loading during and immediately after a flood event. • Waterproof or elevate motor control units, instrumentation and controls, electrical panels, variable frequency drives and other systems. • Replace dry well pumps with submersible pumps; consider increased capacity needed during storm/flood events. • Elevate, relocate or cap individual assets (e.g., blowers, chemical/fuel/air tanks, instrumentation/controls) to prevent damage from flood waters; vertically extend the walls of a treatment structure (e.g., clarifier, basin, tank) above flood stage and/or flood-proof/seal structures to prevent seepage of flood water into the treatment train. The County Council legislatively amended County Code Chapter 97 Urban Service Districts and alternatively created a Water Division within the Department of Public Works to provide water related utility services inclusive of full operations, maintenance, and ownership based upon recommendation within the Wicomico County Water and Sewer Master Plan (WC-WSMP). This includes extensions of urban water and sewer utility services in the unincorporated and incorporated areas of the County.	Public Works	2 4 5 9	Long-term	Coastal Flood	**New**	83 Medium

The Hazard Mitigation & Resilience Planning Committee and municipalities prioritized the 2021 mitigation action items provided in Table 14.4. A survey was developed for each of the six broad categories: Prevention, Property Protection, Public Education & Awareness, Natural Resources Protection, Emergency Services, and Structural Projects. Surveys were developed for each municipality with mitigation actions items pertinent to their jurisdiction.

In order to prioritize each mitigation action item, the following six (6) questions were asked:

1. Do you think there would be community acceptance/general support for this mitigation action?
2. Do you think implementation of this mitigation action will enhance the health and safety of the community?
3. Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?
4. Do you think the benefits of this mitigation action will exceed the likely costs?
5. Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?
6. Is this project consistent with environment goals?

Planning committee members were asked to answer these survey questions to the best of their ability and were only asked to provide feedback on action items for which they had expertise or confidence in answering. As a result in the prioritization process, a total of seventeen (17) mitigation action items were ranked as "High," while twenty (20) mitigation action items were ranked as "Medium," and the remaining thirteen (13) action items were ranked "Low."

2021 MITIGATION ACTION ITEM PRIORITIZATION

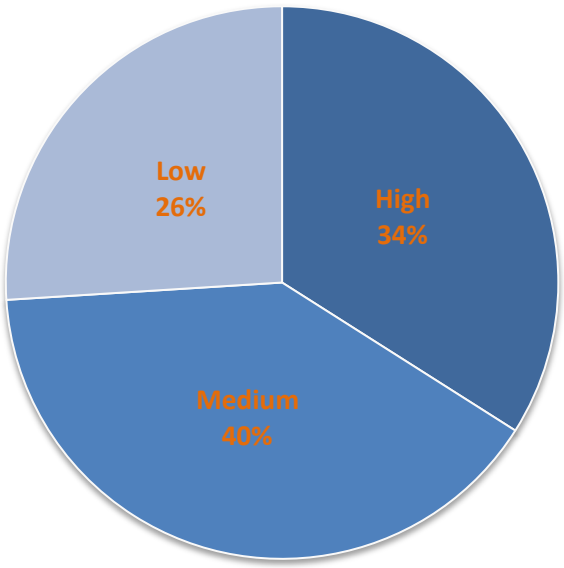


Table 14.5: County Roads Experiencing Nuisance Tidal Flooding

Road Name/Flood Source	Location Of Flooding	Comments
Clara Road, Tyaskin Wicomico River and tidal ditches	Worse flooding occurs south of Mezick Road; however, occasionalminor tidal flooding can occur along the length of Clara Road due to tidal ditches.	Minor collector road. Mitigation efforts are planned. See additional comments in the Mitigation Efforts section of the Nuisance Flood Plan.
Cove Road, Tyaskin Nanticoke River	Final approximately 1,000 feet of the road as it reaches the Nanticoke River.	Minor collector road. Moderate tomajor flooding can occur during extreme tidal events.
Deep Branch Road, Quantico Tyaskin Creek	At the bridge	Minor collector road. Moderate flooding can occur during extreme tidal events. The road would have to be raised significantly in order to mitigate the flooding.
Harbor Road, Nanticoke Nanticoke River	Parking lot and road near boat ramp	Local road. Minor flooding occurs in this area from an unprotected beach area and a boat ramp.
Muddy Hole Road, Tyaskin Broad Creek, Muddy Hole Creek, and various tidal tributaries of the Wicomico River	Entire length	Minor collector. This is primarily an unimproved road running through tidal marshlands. A new bridge was built over Broad Creek several years ago, and continued maintenance has only kept the road passable in some areas. No significant improvements are planned due to the lack of residences along this unimproved road.
Nanticoke Drive, Nanticoke Nanticoke River and tidal ditches	Near community park and at the end of the cul-de-sac	Local road. Mitigation efforts have occurred with more planned. See additional comments in the Mitigation Efforts section of the Nuisance Flood Plan.
Nanticoke Road, Waterview Nanticoke River, tidal ditches andmarshes	Several locations near Waterview	This is a State Road, and it is unlikely that mitigation efforts will occur since this road serves only a small number of residences in this section.
Riverside Drive, Salisbury Stock Creek	Where tidal creek crosses Riverside Drive	Major collector. Only minor occasional nuisance flooding.
Riverton Road, Riverton Nanticoke River and tidal ditches	Near Old School House Road	Minor collector. This area has minor flooding on high and lunar tides and can experience moderate to major flooding during extreme tidal events. There is no bulkhead or rip rap along the Nanticoke River in the area; there is a tidal ditch which runs along theroad; and ground elevations are only approximately two to four feet.
Town of Whitehaven – Church Street, River Street and Whitehaven Road Wicomico River and tidal ditchesand marshes	All three roads in the town flood repeatedly on high and lunar tides,with the worst flooding occurring on River Street and Whitehaven Road.	Whitehaven Rd. is major collector.Other roads are local roads. Mitigation efforts have occurred with more planned. See additional comments in the Mitigation Efforts section of the Nuisance Flood Plan.
Trinity Church Road, Tyaskin Muddy Hole Creek and tidal ditches	Various places along the road	Minor collector. Raising the road may help. This is a rural road serving only a couple residences.
Tyaskin Road, Tyaskin Nanticoke River	Park and Parking Lot at the end of the road	Minor road. Nuisance flooding occurs occasionally in the park area.
Upper Ferry Road, Eden Wicomico River and tidal ditches	Near the ferry and for about 200 feet	Major collector. The elevation of the road is only about 1.5’ to 2.5’ above sea level and there is a tidal ditch running along the road. With the ferry, elevating the road would be difficult.
Wetipquin Road, Tyaskin Wetipquin Creek	At the bridge	Minor collector. There is minor to moderate flooding occurring on both sides of the bridge from high and lunar tides. The road would have to be raised.

Table 14.6: Municipal Roadways Flood Related Issues

Flood Related Issue	Evacuation Issue (Y/N)	SWM or ElevationProblem	2016 Ranking (High, Medium, Low)
Municipal Roads			
City of Salisbury Coty Cox Flood Relief.	Yes	SWM	**High**
Status Update: Completed			
City of Salisbury East Main Street Storm Drain	No	SWM	Medium
Status Update: Remove. Design was completed. Stormwater project upstream was completed and flooding has ceased.			
City of Salisbury Vine Street Flood Relief	N/A	SWM	Medium
Status Update: Completed			
City of Salisbury Germania Circle Regional SWM System & Property Acquisition	Yes	Elevation	**High**
Status Update: Most properties are rentals and no interest in acquisition, however public outreach on flooding will continue in this area.			
City of Salisbury Market Street and Baptist Street	No	Storm Drains & Flood Mitigation	**High**
Status Update: After completion of the Main Street projects and developing bioretention areas on Green Street, these areas only flood during major events.			
City of Salisbury Fitzwater Street and Lake Street	Yes	Storm Drains & Flood Mitigation	**High**
Status Update: Repaving of the roadway has elevated the road's crown causing flooding issues.			
City of Salisbury Johnson Pond Dam	No	Sluice Gates & Access	Medium
Status Update: Gate improvements have been designed. Alternative improvements are being considered.			
City of Salisbury Beaglin Park Dr. Dam	No	Sluice Gates & Access	Low
Status Update: Access to the dam gates is still an issue. A platform is needed for boat access.			
City of Fruitland Intersection of Poplar and Anderson St.	No	SWM	Medium
City of Fruitland Morris Ave. at Moore Ave.	Yes	SWM	**High**
City of Fruitland North Division at Morris Mill Dam	Yes	SWM	**High**
City of Fruitland North and South Brown St. from St. Luke's to Crown Rd.	Yes	SWM & Elevation	**High**
Town of Hebron Culver St.	No	Elevation – Low Spot	Medium
Town of Hebron Downing St.	No	Elevation – Low Spot/Drainage	Low
Town of Hebron Corner of Howard St. and East Walnut St.	No	Elevation – Low Spot	Low
Town of Hebron Corner of Chestnut Tree Rd. and East Walnut St.	No	Elevation – Low Spot/Drainage	Medium
Town of Hebron Corner of Northeast Railroad Ave and North Main St.	No	Elevation – Low Spot	Medium
NEW Town of Hebron Corner of Main St & Maryland Ave	No	Elevation – Low Spot	N/A
Town of Mardela Springs Main St. and Main St. Extended to Route 50.	Yes	SWM	Low
Town of Mardela Springs Bridge St. to Main St. and Athol Rd.	Yes	SWM	Low
Town of Mardela Springs Station St. to Route 50	Yes	SWM	Low
Town of Mardela Springs Spring Grove Rd. to Route 50	Yes	SWM	Low
Town of Mardela Springs Bratton St. to Route 50	Yes	SWM	Low

Table 14.7: Countywide Roadways Flood Related Issues

Flood Related Issue	Evacuation Issue(Y/N)	SWM or ElevationProblem	2016 Ranking (High, Medium, Low)
Wicomico County Roads			
Morris Mill Dr	No	Elevation: Low Spot/Drainage	Low
Texas Road; segment between Old School St and Oak Grove/ Church Rd	Yes	Private Ditches	Low
Civic Avenue at Nursing Home - SHA issue on County Road	Yes	Elevation – Low Spot / Drainage	**High**
Morris Leonard Rd. east of Zion Church Rd.	No	Elevation – Low Spot	Low
Log Cabin Rd. between Naylor Mill and West Rd.	No	Elevation – Low Spot/Drainage	**RESOLVED**
Little Lane at S turns	No	Elevation – Low Spot/Drainage	Low
Hickory Mill Rd. at Little Lane intersection	No	Elevation – Low Spot	**RESOLVED**
Norris Twilley Rd. at Cross Rd.	No	Elevation – Low Spot/Drainage	Low
Purnell Crossing Rd. at bridge and Mt. Pleasant intersection	No	Elevation – River Flooding	Medium
Quinton Rd. at Norris Twilley Rd.	No	Elevation – LowSpot/Drainage	Low
Bear Swamp Rd.	No	Elevation – Low Spot	Low
Mt. Olive Rd.	No	Elevation – Low Spot	Low
Wango Rd.	No	Elevation – Low Spot/Drainage	Low
Melson Church Rd. at Rt. 54 (County replaced this pipe, any backup due to Delaware)	No	Elevation – Low Spot/Drainage	Low
Athol Rd. off Rt. 50	No	Elevation – Low Spot	Low
Sharps Point Road at Fruitland line	No	Elevation – Low Spot	Low
Levin Dashiell Rd.	No	Elevation – Low Spot	**RESOLVED**
Pemberton Dr. past Crooked Oak Rd.	No	Elevation – Low Spot	Low

Table 14.8: State Roadways Flood Related Issues

Flood Related Issue	Evacuation Issue(Y/N)	SWM or ElevationProblem	2016 Ranking (High, Medium, Low)
State Routes			
US Business Route 13 floods during heavy rain events and the right lane becomes impassable.	Yes	SWM	**High**
Pine Bluff Rd @ Route 13	No	Elevation: Low Spot/ Drainage	Low
US 50 at US Route 13 Business Route	Yes	SWM	**High**

Appendix A
Natural Hazard Identification and Risk Assessment Ranking Results

As part of the plan update process, a Hazard Identification Risk Assessment (HIRA) has been completed for Wicomico County, Maryland. Results from the Hazard Risk Survey completed by Stakeholders have been integrated into the updated HIRA.

A **risk** is the chance, high or low, that any hazard will occur and the severity or impact from that hazard.

Twelve (12) natural hazards have been identified and a hazard risk has been assigned to each. Only natural hazards are included in this assessment as they lend themselves better to data collection related to geographic extent than technological and man-made hazards. A separate risk assessment will be conducted for the technological and man-made hazards (i.e., transportation accident, hazardous material incident, dam failure, fire and explosion, mass power outage) identified in the previous plan version.

Natural Hazard Identification and Risk Assessment Ranking Results			
Hazards	**2016 Hazard Ranking**	**2021 Hazard Ranking**	**2021 Composite Score**
***Flood (Flash/Heavy Rain)**	Medium	Medium-High	20.5
Drought	Medium	Medium	17
Tornado	Medium	Medium-Low	13
Thunderstorm	Medium	High	26
High Wind	Medium-High	Medium	19
Wildfire	Medium	Medium	18
Earthquake	Low	Medium-Low	9
Extreme Cold – Cold/Wind Chill	Medium	Medium-Low	14.5
Winter Storm	Medium-High	Medium-Low	14.5
Extreme Heat	Medium	Medium	15.5
Coastal Storm and Flooding	Medium-High	Medium-High	22
Pandemic and Emerging Infectious Diseases	No 2016 Ranking	High	28
**This hazard was identified as "Flood (Riverine & Flash)" in the 2016 Plan Update.*			

The methodology and data used to complete this HIRA has been included on the following pages, which will comprise Appendix A of the Plan Update.

Hazard Identification and Assessment (HIRA) Methodology

To assess the hazard risk for the twelve (12) natural hazards identified in this Plan Update a composite score method was undertaken. The composite score method was based on a blend of quantitative and qualitative factors extracted from the National Centers for Environmental Information (NCEI), Maryland Department of Health - Maryland's NEDSS And PRISM Databases, stakeholder survey, and other available data sources. These included:

- Historical impacts, in terms of human lives and property;
- Geographic extent;
- Historical occurrence;
- Future probability, and;
- Community perspective.

The following eight (8) ranking parameters were used to develop the composite risk score, which provide the hazard ranking results for the twelve (12) identified natural hazards. Each parameter was rated on a scale of one (1) to four (4).

Injuries and Death Ranking	
Death	4
N/A	3
Injury	2
None	1

Source: National Centers for Environmental Information

Annualized Events Ranking	
2.51	4
1.01	3
0.11	2
0	1

Source: National Centers for Environmental Information, Maryland Dept. of Health – Maryland's NEDSS and PRISM Databases

Community Perspective Ranking	
Very Concerned	4
Concerned	3
Somewhat Concerned	2
Not Concerned	1

Source: Wicomico County Hazard Mitigation Plan Update: Public Survey

Property and Crop Damage Ranking	
> 2M	4
501K	3
50k	2
0	1

Source: National Centers for Environmental Information

Probability and Future Ranking	
Highly Likely	4
Likely	3
Occasional	2
Unlikely	1

Source: National Centers for Environmental Information, based upon annualized events

Max Geographical Extent (Hazard Dependent) Ranking								
Ranking	**Coastal & Climate Change**	**Drought**	**Flood**	**Thunderstorm**	**Tornado & Earthquake**	**Wildfire**	**Wind**	**Winter Storm**
1	0.00	0	0.00	0-2 events	0-10 events	0	0.00	10”-19”
2	25.00	0.18	10.00	3-5 events	11-17 events	0.4674	60.00	20”-29”
3	50.00	0.3421	20.00	6-8 events	18-22 events	2.1545	74.00	30”-39”
4	75.00	0.49	30.00	>9 events	>23 event	3.9041	95.00	>40”
Source:	*COASTAL: Risk Area*	*DROUGHT: CDL MD*	*FLOOD: DFIRMS*	*THUNDERSTORM: NCDC*	*TORNADO: NCDC EARTHQUAKE: Maryland Geological Survey*	*WILDFIRE: MD DNR Forest Service*	*WIND: ASCE*	*WINTER STORM: National Weather Service*
Calculated Using:	% of Coastal Land Area	% Crop Area	% Area in 100-yr Floodplain	Average number based on: Number of events, 2"> hail and lightning events with Injuries/Deaths	Sum of all tornados weighted by F-scale (F1*1.5, F2*2, F3*3, F4*4); Number of Earthquake Events	Average annual acres burned (%)	ASCE Design Wind Speeds	Average Snowfall
Source: 2016 State of Maryland Hazard Mitigation Plan								

The following weighted risk factors were used in the equation below to determine the composite risk score for each identified hazard.

Weighted Risk Factors		
Injuries	IN	1
Deaths	DT	1
Property Damage	PD	1
Crop Damage	CD	1
Geographic Extent (Hazard Dependent)	GE	1.5
Events (Annualized)	EV	1
Future Probability	FP	1
Community Perspective	CP	1.5

Equation: Composite Score = IN + DT + PD + CD + (GE*1.5) + EV + FP + (CP*1.5)

Hazard Ranking Results: Using the data tables above to populate the parameters, the composite score was determined for each identified hazard. Hazard Rankings were assigned accordingly using the adjacent Composite Score chart.

Composite Score	
Score (>=)	**Hazard Ranking**
0	**Medium-Low**
15	**Medium**
20	**Medium-High**
25	**High**

The following table provides the hazard risk ranking update results. Thunderstorm and Pandemic and Emerging Infectious Diseases were ranked as "High" risk hazards. Flood and Coastal Storm and Flooding were ranked as "Medium-High" risk hazards. Drought, High Winds, Wildfire, and Extreme Heat were ranked as "Medium" risk hazards. Finally, Tornado, Earthquake, Winter Storm, and Extreme Cold were ranked as "Medium-Low" risk hazards.

Composite Scores										
Hazard	**Injuries & Deaths**		**Property & Crop Damage**		**Geographic Extent**	**Total Events Annualized**	**Future Probability**	**Community Perspective**	**Composite Score**	**HAZARD RANKING**
	IN	DT	PD	CD	GE	EV	FP	CP	CS	
Flood (Flash Flood, Heavy Rain)	0 = 1	0 = 1	$70k = 2	0 = 1	18.23% = 3	0.93 = 2	Likely = 3	Very Concerned = 4	20.5	**Medium-High**
Drought	0 = 1	0 = 1	0 = 1	4.2M = 4	37% = 3	1.3 = 2	Occasional = 2	Not Concerned = 1	17	**Medium**
Tornado	2 = 2	0 = 1	$1.163 M = 3	0 = 1	8 = 1	0.14 = 2	Unlikely = 1	Not Concerned = 1	13	**Medium-Low**
Thunderstorm (Thunderstorm Wind, Lightning, Hail)	1 = 2	1 = 4	$473k = 2	0 = 1	122 = 4	0.71 = 2	Likely = 3	Very Concerned = 4	26	**High**
High Winds	0 = 1	0 = 1	$1.049 M = 3	0 = 1	120 = 4	0.41 = 2	Occasional = 2	Somewhat Concerned = 2	19	**Medium**
Wildfire	1 = 2	1 = 4	0 = 1	0 = 1	0.012% = 1	29.13 = 4	Likely = 3	Not Concerned = 1	18	**Medium**
Earthquake	0 = 1	0 = 1	0 = 1	0 = 1	1 = 1	0.01 = 1	Unlikely = 1	Not Concerned = 1	9	**Medium-Low**
Extreme Heat	0 = 1	0 = 1	0 = 1	0 = 1	4	0.30 = 2	Occasional = 2	Not Concerned = 1	15.5	**Medium**
Winter Storm (Winter Weather)	0 = 1	0 = 1	0 = 1	0 = 1	7”= 1	1.48 = 3	Likely = 3	Somewhat Concerned = 2	14.5	**Medium-Low**

Composite Scores										
Hazard	**Injuries & Deaths**		**Property & Crop Damage**		**Geographic Extent**	**Total Events Annualized**	**Future Probability**	**Community Perspective**	**Composite Score**	**HAZARD RANKING**
Extreme Cold – Cold/Wind Chill	0 = 1	0 = 1	0 = 1	0 = 1	4	1	Unlikely = 1	Not Concerned = 1	13.5	**Medium-Low**
Coastal Storm and Flooding (Tropical storm, Hurricane, Coastal Flooding)	0 = 1	0 = 1	$4.828 M = 4	$1.06 M = 3	49% = 3	0.27 = 2	Occasional = 2	Somewhat Concerned = 3	22	**Medium-High**
Pandemic and Emerging Infectious Diseases	*6,543 = 2	*135 = 4	0 = 1	0 = 1	**100% = 4	***1,348.4 annual cases = 4	Highly Likely = 4	Very Concerned = 4	28	**High**

*Injuries & Deaths were based on Coronavirus Disease 2019 (COVID-19) Outbreak data provided by Maryland Department of Health as of February 9, 2021.
**Pandemic & Emerging Infectious Diseases' geographic extent is countywide (100%).
*** Total Events/Annualized based on Cases of Selected Notifiable Conditions Reported Wicomico County, Maryland 2014-2018. *Source: Maryland Department of Health - Maryland's NEDSS And PRISM Databases*

DATA TABLES

The following data tables were developed and used to populate five (5) of the eight (8) parameters: Injuries, Death, Property Damage, Crop Damage, and Annualized Events.

FLOOD (TIDAL/COASTAL)

Flood Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent % in 100-yr Flood Zone (A, AE, AO &VE)**	**Days with Events (1996-2020)**
0	0	$20k	$0	18.23%	Total = 8 Annual Avg = 0.32
**Note: Data collected for 1950-present, no data available for this event type prior to 1996*					

Flash Flood Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent % in 100-yr Flood Zone (A, AE, AO &VE)**	**Days with Events (2000-2020)**
0	0	$50k	$0	18.23%	Total = 9 Annual Avg = 0.43
Note: Data collected for 1950-present, no data available for this event type prior to 2000					

Heavy Rain Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1998-2020)**
0	0	$0	$0	18.23%	Total = 47 Annual Avg = 2.04
Note: Data collected for 1950-present, no data available for this event type prior to 1998					

DROUGHT

Drought Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1998-2020)**
0	0	$0	$2.0M	% Crop land cover from 2019 USDA Crop Land Data = 37%	Total = 30* Annual Avg = 1.30
**Note: One event recorded in 1998 that spanned 30 days. 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.*					

TORNADO

Tornado Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1962-2020)**
2	0	$1.163M	$0	Sum of Events = 8	Total = 8 Annual Avg = 0.14
Note: Data collected for 1950-present, no data available for this event type prior to 1962					

HIGH WINDS

High Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1999-2020)**
0	0	$1.049M	$0	ASCE Wind Design Speed = 120	Total = 9 Annual Avg = 0.41
Note: Data collected for 1950-present, no data available for this event type prior to 1999					

WILDFIRE

High Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Events (2000-2020)**
1	1	$0	$0	Avg Annual Acres Burned = 0.012%	Total = 418 Annual Avg = 29.13
Note: Data obtained from MD-DNR Forest Service for 2000-2020.					

EARTHQUAKE

No NCEI data available for this hazard; however, one (1) earthquake with a magnitude of 3.3 was recorded in Ocean City, Maryland on 10/14/1928.

WINTER STORM

Winter Storm Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2020)**
0	0	$0	$0	Average snowfall total: 7" (1996-present NOAA/NWS)	Total = 35 Annual Avg = 1.40
Note: Data collected for 1950-present, no data available for this event type prior to 1996					

Winter Weather Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1999-2020)**
0	0	$0	$0	Average snowfall total: 7" (1996-present NOAA/NWS)	Total = 34 Annual Avg = 1.55
Note: Data collected for 1950-present, no data available for this event type prior to 1999					

EXTREME COLD – COLD/WIND CHILL

**Note: An arctic air mass settled over the mid-Atlantic states resulting in record breaking cold across the lower Maryland Eastern Shore. The temperature dropped to 1 below zero at the Salisbury Airport on the morning of the 5th, and 2 below zero on the 6th.*

COASTAL STORM AND FLOODING

Coastal Flood Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent % in 100-yr Flood Zone (A, AE, AO &VE)**	**Days with Events (2012-2020)**
0	0	$250k	$0k	% of County in Coastal Land Area = 49%	Total = 4 Annual Avg = 0.44
Note: Data collected for 1950-present, no data available for this event type prior to 2012					

Tropical Storm Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2020)
0	0	$795K	$1M	% of County in Coastal Land Area = 49%	Total = 6 Annual Avg = 0.24
Note: Data collected for 1950-present, no data available for this event type prior to 1996					

Hurricane Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2020)
0	0	$10k	$60k	% of County in Coastal Land Area = 49%	Total = 3 Annual Avg = 0.12
Note: Data collected for 1950-present, no data available for this event type prior to 1996					

STORM SURGE

No NCEI data available for this hazard

THUNDERSTORM

Thunderstorm Wind Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1958-2020)
0	0	$363k	$0	Sum of Events = 96	Total = 96 Annual Avg = 1.52
Note: Data collected for 1950-present, no data available for this event type prior to 1958					

Lightning Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1998-2020)
1	1	$110K	$0	Sum of Events = 5	Total = 5 Annual Avg = 0.22
Note: Data collected for 1950-present, no data available for this event type prior to 1998					

Hail Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1967-2020)
0	0	$0	$0	Sum of Events = 21	Total = 21 Annual Avg = 0.39
Note: Data collected for 1950-present, no data available for this event type prior to 1967					

EXTREME HEAT

Extreme Heat Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2011-2020)
0	0	$0	$0	Countywide	Total = 3 Annual Avg = 0.30
Note: One event recorded that spanned 3 days. 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 70's to mid 80's.					

PANDEMIC AND EMERGING INFECTIOUS DISEASES

Cases of Selected Notifiable Conditions Reported Wicomico County, Maryland					
Condition	2014	2015	2016	2017	2018
Anaplasmosis	0	0	1	0	1
Animal Bites	293	271	251	195	299
Babesiosis	0	2	0	0	0
Campylobacteriosis	21	34	23	23	35
Chlamydia	575	499	667	646	835
Coccidioidomycosis	0	1	0	0	0
Cryptosporidiosis	0	2	0	0	1
Dengue Fever	1	0	1	0	0
Ehrlichiosis	6	4	4	4	3
Encephalitis – non-Arboviral	0	0	0	4	3
Giardiasis	4	2	2	2	3
Gonorrhea	188	168	232	300	388
H. influenzae – invasive disease	1	1	3	2	1
Hemolytic Uremic Syndrome post-diarrhea	0	0	0	0	1
Hepatitis B (acute symptomatic)	3	2	0	0	1
Hepatitis C (acute symptomatic)	1	2	1	3	3
Kawasaki Syndrome	1	0	0	1	0

Cases of Selected Notifiable Conditions Reported Wicomico County, Maryland					
Condition	**2014**	**2015**	**2016**	**2017**	**2018**
Legionellosis	0	1	0	1	5
Listeriosis	0	0	0	1	1
Lyme Disease	20	14	10	29	11
Meningitis, aseptic	21	18	16	12	22
Meningitis, fungal	2	1	2	0	0
Microsporidiosis	0	0	0	1	0
Mycobacteriosis, Other than TB & Leprosy	11	19	20	15	15
Pertussis	1	0	1	3	1
Rabies - Animal	12	11	8	5	6
Salmonellosis – other than typhoid fever	28	29	34	41	42
Shiga toxin producing E. coli (STEC)	4	0	1	2	3
Shigellosis	0	1	8	4	4
Spotted Fever Rickettsiosis	0	0	1	3	4
Strep Group A – Invasive Disease	4	4	3	8	4
Strep Group B – Invasive Disease	10	11	17	19	17
Strep pneumoniae - Invasive Disease	10	9	8	10	9
Syphilis – primary and secondary	3	7	1	2	5
Tuberculosis	3	4	3	1	2
Typhoid Fever - acute	0	1	0	1	2
Vibriosis (non-cholera)	2	0	1	1	1
Yersiniosis	0	0	0	0	1
Zika virus disease, non-congenital	**	**	4	0	0
Zika virus infection, congenital	**	**	1	0	0
Zika virus infection, non-congenital	**	**	2	5	0
TOTALS:	1,225	1,118	1,326	1,344	1,729

** Data sources: Maryland's NEDSS and PRISM databases. Data is current as of 1/15/2021. 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.dhmh.maryland.gov/OIDEOR/CHSE/SitePages/statistics.aspx.*

*** Ziza virus infections not reported for the years 2014 and 2015 in the database.*

Appendix B
Mitigation Action Items Status Report Update

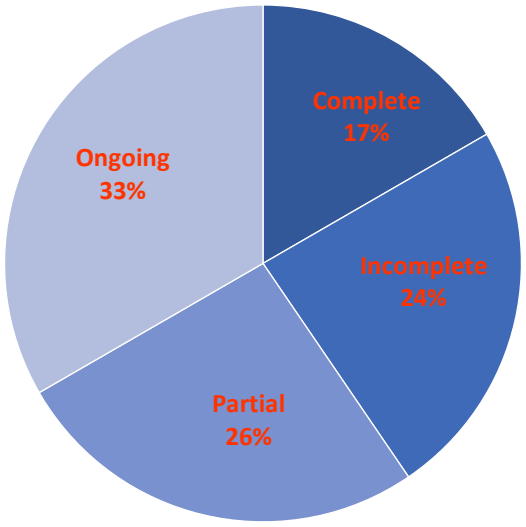
The purpose of hazard mitigation action items is to reduce or eliminate long-term risk to people and property from hazards and their effects. During the 2021 Plan Update process, hazard-specific action items and projects were developed. As part of this Plan Update, a mitigation status report was created to determine the present status of past projects.

A total of forty-two (42) action items were evaluated as part of the plan update process. Members of the Hazard Mitigation Planning Committee (HMPC) provided important feedback regarding the progress of these action items and projects.

Based on the feedback received, the following was determined: seven (7) items are complete, ten (10) items are incomplete and have no work completed, eleven (11) items are partially complete and have some work completed, and fourteen (14) items are ongoing.

More than half of the previous action items (59%), not including those designated as complete, were identified as having received some amount of progress towards completion. The HMPC may determine that these projects are to be carried forward into the current Plan Update, in addition to any projects that were identified as being "incomplete (no work completed)". Furthermore, new mitigation action items as identified by the HMPC will be included in the Plan Update.

2017-2021 MITIGATION ACTION ITEM STATUS SNAPSHOT



Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
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.					
High - Apply for a Coast Smart grant to conduct a Plan Integration study that incorporates hazard mitigation strategies into Comprehensive Plan and/or Critical Areas Plan.	Planning and Zoning				●
2021 Status Update: The 2017 Comp Plan has implementation strategies and references to the County's Hazard Mitigation Plan. Important to incorporate the 2017 Comp Plan strategies into Hazard Mitigation Update and identify potential improvements based on emerging data. The need for a Coast Smart grant to conduct a Plan Integration may be outdated. Plan integration should occur during updates and build upon previous work.					
Update GIS Program to include floodplain structure information including elevation certificate database.	Planning and Zoning				●
2021 Status Update: This will be a requirement of a CRS program and an ongoing activity for the GIS services unit to continue developing and maintaining planimetric data to use as foundation for adding floodplain information as an attribute to a feature.					
High - Designate Whitehaven within the Comprehensive Plan update as a vulnerable area.	Planning and Zoning				●
2021 Status Update: The adopted 2017 Comprehensive Plan contains information about vulnerable low-lying areas and concerns/threats associated with sea-level rise. The area of interest for flooding and sea-level rise extends to more than Whitehaven. Moreover, the Plan includes a recommendation to seek State funding to assist with a sea-level rise study.					
Update 2006 Hazardous Materials Commodity Flow Studies for both US Route 13 and 50.	Emergency Services			●	
2021 Status Update: The LEPC has requested updated hazardous materials data for inclusion in their planning process.					
PROPERTY PROTECTION - Actions that involve the modification of existing critical and public facilities, buildings, structures, and public infrastructure to protect them from hazards.					
High - Install impact glass, hurricane shutters and retrofit roofs as needed at critical facilities to ensure protection from severe weather, such as hurricanes.	Peninsula Regional Medical Center			●	
2021 Status Update: Project is at approximately 50% completion.					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
Take measures to prevent flooding of the Peninsula Regional Medical Center by installing a levee, back flow prevention valves, and stormwater pumping stations.	Peninsula Regional Medical Center			●	
2021 Status Update: Project is at approximately 50% completion.					
High - Install generators at designated shelter facilities that currently lack a back-up emergency power source.	Salisbury Middle and Parkside High School				●
2021 Status Update: Parkside High School generator project ongoing; plan to apply through FEMA in August, 2021.					
High - Upgrade or install additional generators at shelter facilities that currently have undersized generators.	James M. Bennett High School & Wicomico Youth Civic Center	●			
2021 Status Update: James M. Bennett H.S. has one generator listed but no secondary generator. Project is complete per Chuck Rousseau.					
Install landfill generators – Wicomico County Solid Waste Complex.	Public Works Emergency Services			●	
2021 Status Update: Received pricing for design and install of generators.					
High - Install a generator at the Tri-County Council Building, which serves as a back-up facility the court system as designated in County Continuity of Operation Plan. An agreement is in place to provide space at the facility to both FEMA, MDEM and the Department of Agriculture during incident response/recovery.	Public Works Emergency Services		●		
2021 Status Update: FEMA grant denied for this project.					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
Install stationary generators at the following high priority pumping station locations in Salisbury: Wavely Drive, College Avenue, and Cherokee Lanes.	Salisbury Public Works Dept.	●			
2021 Status Update: Not all PS will have stationary generators. Waverly and Cherokee are equipped to have mobile ones when needed.					
Complete flood mitigation study in the Pine Bluff (Camden/RT 12) area.	Public Works Emergency Services		●		
2021 Status Update:					
High - Install generators for two storage lift stations. Currently each lift station can hold 1-1 ½ days storage capacity before overflow occurs.	Willards		●		
2021 Status Update:					
Encourage back flow prevention on municipal water service to homes.	Willards				●
2021 Status Update:					
High - Assess and mitigate flood risks to the seven (7) repetitive loss properties located within the City of Salisbury specifically, Baptist Street, West Market Street, Delaware Avenue, Greentree Drive, Middle Neck Lane, and (2) properties on East Main Street.	Salisbury				●
2021 Status Update:					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
*Mitigate and upgrade flooded roads when funding is available, specifically, evacuation routes, based on areas that the HMPC identified as "high" in the following table.	Countywide			●	
2021 Status Update: Roads elevated in Whitehaven; and Levin Dashiell Road at Nanticoke. Roadway flooding status update included in this appendix.					
Mitigate flooding at the Salisbury Fire Station 16 located in the 100-year floodplain – Zone AE.	Public Works Emergency Services		●		
2021 Status Update:					
PUBLIC EDUCATION AND AWARENESS - Actions to inform and educate citizens, elected officials, and property owners about potential ways to mitigate for hazards that can occur in the County.					
High - Develop and disseminate public information materials encouraging flood mitigation and prevention. Specifically, the use of sandbags and hydrosacks.	Salisbury				●
2021 Status Update:					
Target residents for public outreach campaign preparedness in high hazard areas such as the 100-year floodplain.	Countywide				●
2021 Status Update: Ongoing as part of planning activities/studies conducted by various agencies and coordinating with real estate and development professionals. This activity will be a requirement of CRS.					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
*Complete CRS Activity 332.b Flood Response Preparations (FRP). Develop a pre-flood plan for public information projects. Materials may include templates of handouts, mailers, press releases, webpage and social media that cover key messages to be disseminated before, during and after flood. Include materials and the procedures for how FRP will be used.	Planning and Zoning Emergency Services			●	
2021 Status Update: Staff is in the beginning stages of preparing the CRS application.					
*Provide brochure on flood insurance produced by FEMA at various public places. Include locations such as insurance and real estate agencies.	Planning and Zoning Emergency Services				●
2021 Status Update: These brochures are produced by FEMA and distributed throughout the community.					
Conduct repetitive flood loss outreach project such as annual mailings or neighborhood meetings.	Planning and Zoning Emergency Services				●
2021 Status Update: Have requested updated repetitive loss property list. This activity could be incorporated into items above.					
NATURAL RESOURCE PROTECTION - Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural protection systems.					
Build coastal resiliency through living shoreline implementation, invasive species management, or vegetation selection for future climate conditions.	Planning and Zoning Parks & Rec.				●
2021 Status Update: Parks and Rec has conducted invasive species removal projects at Pemberton Park and Leonard's Mill Park.					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
Maintain green corridors, protect against fragmentation, and facilitate habitat migration.	Planning and Zoning Parks & Rec.				●
2021 Status Update:					
Maintain, identify, and protect new marsh migration corridors.	Parks & Recreation		●		
2021 Status Update:					
Create habitat mosaics that may be more resilient to climate change impacts, such as sea level rise.	Park & Recreation		●		
2021 Status Update:					
Create new and restore existing wetlands as a best management practice to increase resiliency by providing storm buffers, drought buffers and sea level rise buffers.	Park & Recreation			●	
2021 Status Update:					
Create an "ideal" living shoreline by installing riparian buffers about the tide line using native trees and shrubs; tidal wetlands using grasses, rushes, and sedges at mid-tide elevation and marsh grasses and common three-square at low tide; and underwater grasses in shallow water.	Planning and Zoning Parks & Rec.			●	
2021 Status Update: Shoreline projects at Cove Road and Roaring Point are currently in the process of development through Parks and Recreation. Nothing has been completed.					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
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.					
Conduct county wide dry hydrant assessment to ascertain the need for additional dry hydrants.	Public Works Emergency Services		●		
2021 Status Update: Direct to Fire Services.					
Improve emergency notification and evacuation information by using technology, such as a smartphone App.	Public Works Emergency Services				●
2021 Status Update:					
Install dry storage building (salt) to mitigate problems related to winter storms.	Public Works Emergency Services	●			
2021 Status Update:					
Obtain and strategically place mobile sign boards at fire and law enforcement locations.	Public Works Emergency Services	●			
2021 Status Update: Both DES and Public Works have (2) mobile sign boards each.					
Procure chippers needed for tree removal from storms.	Fruitland		●		
2021 Status Update:					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
Procure snow removal equipment (currently using contractors - Snow evacuation route goes thru center of town).	Delmar		●		
2021 Status Update:					
Procure storm damage removal equipment	Delmar		●		
2021 Status Update:					
Establish a debris storage area at city yard for use during clean up after flooding events and weather emergencies.	Salisbury			●	
2021 Status Update:					
STRUCTURAL PROJECTS - Actions that involve the construction of structures to reduce the impact of a hazard event.					
High - Replace Barren Creek Dam to prevent road washouts and to reduce the economic impact of the failure of this dam.	Public Works				●
2021 Status Update: Road washed out. Ongoing plans to rebuild.					
Mitigate flooding at county Sheriff's Office (Naylor Mill) through acquisition/relocation.	Public Works Emergency Services			●	
2021 Status Update: Planning for this project is complete; the Sheriff's Office is slated to be relocated in 3-4 years.					

Mitigation Action	Location/ Responsible Entity	Complete	Incomplete (No Work Completed)	Partial (Some Work Completed)	Ongoing
High - Mitigate flooding issues at the Health Department basement – used as Emergency Operations Center (EOC).	Public Works Emergency Services	●			
2021 Status Update: The Health Department basement is no longer utilized as a backup EOC. The current backup EOC is the Civic Center.					
Install and improve drainage/stormwater mitigation on South Brown Street.	Fruitland	●			
2021 Status Update:					
Install backflow prevention/tide gates along Market Street and Fitzwater Street/West Main Street.	Salisbury			●	
2021 Status Update: Undergoing assessment to see if this is the appropriate technology.					
High - Repair/rebuild the Morris Mill Dam to prevent flooding in the Canal Woods subdivision.	Public Works	●			
2021 Status Update:					

Appendix C
Risk & Vulnerability Assessment Methodology

Community Lifelines & Public Facilities

According to the Federal Emergency Management Agency (FEMA), a Community Lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.
- The integrated network of assets, services, and capabilities that provide lifeline services are used day-to-day to support the recurring needs of the community and enable all other aspects of society to function.
- When disrupted, decisive intervention (e.g., rapid re-establishment or employment of contingency response solutions) is required to stabilize the incident.

Public facilities can be any facility, including, but not limited to, buildings, property, recreation areas, and roads, which are owned, leased, or otherwise operated, or funded by a governmental body or public entity.

In order to update the 2017 Critical and Public Facilities listing, Smith Planning and Design obtained GIS data from Frank McKenzie, GIS Coordinator, Technical Services Division within the Department of Planning, Zoning & Community Development to review and compare facilities to ensure an accurate listing. Data was provided March 2021

Community Lifelines

Safety and Security - Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety

Food, Water, Shelter - Food, Water, Shelter, Agriculture

Health and Medical - Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management

Energy - Power Grid, Fuel

Communications - Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch

Transportation - Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime

Hazardous Material - Facilities, HAZMAT, Pollutants, Contaminants

Community Lifelines

Community lifelines are structures that have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Various critical facilities are essential to the health and welfare of the whole population. Critical facilities include reviewed for the vulnerability assessment include:

- Emergency Operations Center;
- Fire Departments;
- Police Stations;
- Hospitals, Medical Clinics, Nursing Homes/Assisted Living;
- Schools (K-12 & Colleges);
- Communication Towers;
- Shelters;
- Sanity Facilities (WTP, WTTP); and,
- Public Work Facilities.

Public Facility

Public facility can be any facility, including, but not limited to, buildings, property, recreation areas, and roads, which are owned, leased, or otherwise operated, or funded by a governmental body or public entity. Public facilities include reviewed for the vulnerability assessment include:

- County owned facilities;
- Marina;
- Municipal Owned Facilities; and,
- Above & Below Ground Storage Tanks.

Methodology

Step 1: The most recent county facilities geodatabase was acquired from the Technical Services Division. The geodatabase contained specific shapefiles facility type; point and polygon data layers.

Step 2: The critical and public facilities listed in the 2017 hazard mitigation geodatabase were cross referenced with the facilities provided by the GIS Department.

Step 3: The attribute tables for each hazard mitigation community lifeline and public facility shapefiles were updated to include additional data. This additional data was captured from the parcel shapefile maintained by Technical Services Division. The data extracted from the parcel layer included:

- Account ID;
- Structure value;
- Square footage;
- Building stories; and,
- Year built.

Step 4: Once the final Community Lifeline & Public Facilities database was refined, the database was used for vulnerability analysis is Chapter 4 Coastal Storms, Chapter 6 Shoreline Erosion & Sea Level Rise, Chapter 8 Flooding, Chapter 10 Extreme Heat, Drought & Wildfires, and Chapter 12 Man-Made Hazards.

Results from the 2021 Hazard Mitigation facility database are provided in the table below.

Community Lifeline Type	Total # of Facilities
Emergency Operations Center	1
Fire Departments	13
Police Stations	8
Hospitals, Medical Clinics, Nursing Homes, Assisted Living	27
Schools (K-12 & Colleges)	45
Communication Towers (Public Safety, Commercial)	75
Shelters	2
Sanitary Facilities (WTP, WTTP, Pump Stations, Water Towers)	21
Substations	3

Public Facility Type	Total # of Facilities
County Owned (Airport, Community Center, Detention Center, Parks and Recreation, Office Buildings, Museum, Soil Conservation, Public Works, Transit Library, Housing Authority, Public Work Facilities)	182
Municipally Owned (Public Works, Museum, Housing Authority, Community Center, Office Building, Parks and Recreation)	11
Storage Tank (Above Ground, Underground)	130 Above Ground 120 Underground

The table below details modifications made to the facility listing during the planning process.

Critical Facility Data Changes Since 2017 Plan		
Facility Type	**Facilities Added**	**Facilities Eliminated**
Police	Salisbury Police Substation to County Data	
	Maryland Natural Resources Police to County Data	
	Trooper 4 to Essential Facilities	
Fire Department		Delmar Fire Department – not within Study Area
Schools		Delmar Middle School – not within Study Area
		Delmar High School – not within Study Area
	Northwestern Elementary to Essential Facilities	
	Salisbury Mennonite School to Essential Facilities	
	AGAPE Christian Academy to County Data	
Schools cont.	Asbury Child Development Center to County Data	
	Gateway Christian Academy to County Data	
	CHOICES Academy to Essential Facilities	
	CTE to Essential Facilities	
	Instructional Resource Center to Essential Facilities	
	Pittsville Middle School to Essential Facilities	
		Day Cares (2) from Essential Facilities
		Mental Health Clinics (2) from Essential Facilities
Medical		Private Medical Offices (68) from Essential Facilities
	Nursing Homes/Assisted Living (5) to Essential Facilities	
	Your Doc’s In (2) to Essential Facilities	
Communication Towers	Nextel to County Data	
	Clearview Tower Company to County Data	
Marina/Dock	Cedar Hill Park & Marina to Public Facilities	
	Nanticoke Harbor to Public Facilities	
		Wicomico Yacht Club & Marina from Public Facilities (Not County Owned)
		Whitehaven Marina from Public Facilities (Not County Owned)
		Wikander"s Boat Yard & Marina from Public Facilities (Not County Owned)
	Whitpquin Boat Launch to Public Facilities	

Appendix D
Community Lifelines & Public Facilities

COMMUNITY LIFELINE & PUBLIC FACILITIES

Results from the 2021 Hazard Mitigation facility database are provided in the table below.

Community Lifeline Type	Total # of Facilities
Emergency Operations Center	1
Fire Departments	13
Police Stations	8
Hospitals, Medical Clinics, Nursing Homes, Assisted Living	27
Schools (K-12 & Colleges)	45
Communication Towers (Public Safety, Commercial)	75
Shelters (Schools)	2
Sanitary Facilities (WTP, WTTP, Pump Stations, Water Towers)	21
Substations	3

Public Facility Type	Total # of Facilities
County Owned (Airport, Community Center, Detention Center, Parks and Recreation, Office Buildings, Museum, Soil Conservation, Public Works, Transit, Library, Housing Authority, Public Work Facilities)	182
Municipally Owned (Public Works, Museum, Housing Authority, Community Center, Office Building, Parks and Recreation)	11
Storage Tank (Above Ground, Underground)	130 Above Ground 120 Underground

Community Lifeline Type	Name	Address	City
EOC	Wicomico County Public Safety Complex	405 Naylor Mill Road	Salisbury
Fire Department	Westside Fire Department	21045 Nanticoke Road	Bivalve
Fire Department	Allen Fire Department	3676 S Upper Ferry Road	Eden
Fire Department	Fruitland Fire Department	106 E Main St	Fruitland
Fire Department	Salisbury Fire Department - Station 16	325 Cypress St	Salisbury
Fire Department	Salisbury Fire Department - Station 2	801 Brown St	Salisbury
Fire Department	Hebron Fire Department	200 N Main St	Hebron
Fire Department	Mardela Fire Department	101 Station St	Mardela Springs
Fire Department	Salisbury Fire Department - Station 1	1100 S Schumaker Dr	Salisbury
Fire Department	Parsonsburg Fire Department	33030 Old Ocean City Road	Parsonsburg
Fire Department	Pittsville Fire Department	7442 Gumboro Road	Pittsville
Fire Department	Powellville Fire Department	5105 Powellville Road	Pittsville
Fire Department	Willards Fire Department	7384 Main St	Willards
Fire Department	Sharptown Fire Department	317 Main St	Mardela Springs
Medical	Lower Shore WIC Office/Es Adkins Building	801 N Salisbury Blvd	Salisbury
Medical	Hurdle Health Center/Health Department	108 E Main St	Salisbury
Medical	Your Doc's In	2425 N Salisbury Blvd	Salisbury
Medical	Your Doc's In	1135 S Salisbury Blvd	Salisbury
Medical	William C Fritz Health Center	300 W Carroll St	Salisbury
Medical	Chesapeake Health Care	1665 Woodbrooke Dr	Salisbury
Medical	Holly Center/Alzheimer's Association	926 Snow Hill Road	Salisbury
Medical	Golden Gardens Assisted Living	7888 Parsonsburg Road	Parsonsburg
Medical	Salisbury Rehabilitation & Nursing Center	200 Civic Ave	Salisbury
Medical	Commonwealth Senior Living at Salisbury	611 Tressler Dr	Salisbury
Medical	John B Parsons Assisted Living Community	300 Lemmon Hill Lane	Salisbury
Medical	Wicomico Nursing Home	900 Booth St	Salisbury
Medical	Baycare Assisted Living	9288 Hickory Mill Road	Salisbury
Medical	Chesapeake Manor Assisted Living	7054 Bent Pine Road	Willards
Medical	Atria Senior Living	1110 Healthway Dr	Salisbury
Medical	Chesapeake Health Care	223 Phillip Morris Dr	Salisbury
Medical	Blood Bank of Delaware	1309 Mount Hermon Road	Salisbury
Medical	Quest Diagnostics	712 E Main St	Salisbury
Medical	MHC Healthcare - Med Clinic	310 Civic Ave	Salisbury
Medical	Encompass Health Rehabilitation Hospital of Salisbury.	220 Tilghman Road	Salisbury
Medical	Power Street Medical Center	100 Power St	Salisbury
Medical	Tidal Health - Peninsula Surgery Center	804 Snow Hill Road	Salisbury
Medical	Deers Head State Hospital	351 Deers Head Hospital Road	Salisbury
Medical	Express Care Urgent Care Center	659 S Salisbury Blvd	Salisbury
Medical	Fresenius Kidney Care	1340 S Division St	Salisbury
Medical	Peninsula Regional Medical Center	100 E Carroll St	Salisbury
School	St Francis De Sales	514 Camden Ave	Salisbury
School	Salisbury University - Main Campus	1101 Camden Ave	Salisbury

School	Asbury Child Development Center	1401 Camden Ave	Salisbury
School	Wicomico High School	350 Civic Ave	Salisbury
School	James M Bennett High	300 E College Ave	Salisbury
School	Faith Baptist Church	30505 Dagsboro Road	Salisbury
School	Mardela High School	24940 Delmar Road	Mardela Springs
School	Fruitland Primary School	301 N Division St	Fruitland
School	North Salisbury Elementary	1213 Emerson Ave	Salisbury
School	Glen Avenue Elementary	1615 Glen Avenue Ext	Salisbury
School	Salisbury Baptist Academy	6413 Hobbs Road	Salisbury
School	Gateway Christian Academy	31525 John Deere Dr	Salisbury
School	Chipman Elementary School	711 Lake St	Salisbury
School	Wcboe Office - Long Ave	101 Long Ave	Salisbury
School	Pittsville Elementary School	34331 Main St	Pittsville
School	Wicomico Middle School	619 E Main St	Salisbury
School	Fruitland Intermediate School	208 W Main St	Fruitland
School	Stepping Stones Learning Ac	402 W Main St	Fruitland
School	Agape Christian Academy	2818 Merritt Mill Road	Salisbury
School	Salisbury Middle School	607 Morris St	Salisbury
School	East Salisbury Elementary	1201 Old Ocean City Road	Salisbury
School	Wicomico Day School	1315 Old Ocean City Road	Salisbury
School	Beaver Run Elementary School	31481 Old Ocean City Road	Salisbury
School	Salisbury Christian School	807 Parker Road	Salisbury
School	Pemberton Elementary School	1300 Pemberton Dr	Salisbury
School	Pinehurst Elementary School	508 S Pinehurst Ave	Salisbury
School	Prince Street Elementary	408 Prince St	Salisbury
School	Westside Primary School	6046 Quantico Road	Quantico
School	Westside Intermediate School	8000 Quantico Road	Hebron
School	Willards Elementary School	36161 Richland Road	Willards
School	Wicomico Early Learning Center	1101 Robert St	Salisbury
School	Parkside High School	1015 S Schumaker Dr	Salisbury
School	Wor-Wic Community College	6573 Walston Switch Road	Salisbury
School	West Salisbury Elementary School	1321 West Road	Salisbury
School	Salisbury University - East Campus	1301 Wayne St	Salisbury
School	Northwestern Elementary School	9975 Sharptown Rd	Mardela Springs
School	Mardela Middle School	24940 Delmar	Mardela Springs
School	Bennett Middle School	532 S Division St	Fruitland
School	CTE School	1015 S Schumaker Dr	Salisbury
School	Instructional Resource Center	910 S Schumaker Dr	Salisbury
School	Choices Academy	502 Calloway St	Salisbury
School	Pittsville Middle School	34331 Main St	Pittsville
School	WCBOE Office - Northgate Dr	2424 Northgate Dr	Salisbury
School	Salisbury Mennonite School	31608 Dagsboro Road	Delmar
Tower	American Tower Hebron1	Brick Kiln Rd	Salisbury
Tower	American Tower Hebron2	Brick Kiln Rd	Salisbury

Tower	American Tower Salisbury	Marine Road	Salisbury
Tower	AT&T	613 Calloway St.	Salisbury
Tower	Civil Defense Siren	Pemberton Drive	Salisbury
Tower	Clear Channel	Tighlman Rd.	Salisbury
Tower	Clear Channel	Old Eden Rd.	Eden
Tower	Co. Commun. Tower	6095 Sixty Foot Road	Parsonsburg
Tower	Co. Commun. Tower	24090 Nanticoke Rd	Quantico
Tower	Comcast Cablevision	Hobbs Rd.	Salisbury
Tower	Comcast Cablevision	28560 Milford Twilley Rd.	Salisbury
Tower	Conectiv Tower	Naylor Mill Rd.	Salisbury
Tower	Crown Castle Intl.	34751 Poplar Neck Road	Pittsville
Tower	DBC Communications	Marine Road	Salisbury
Tower	Delmarva Broadcast Wmdt.	11121 Snethan Church Rd	Mardela Springs
Tower	Delmarva Power & Light	Layfield Rd.	Salisbury
Tower	GBH Radio Inc. 4ta3	West Rd & Log Cabin Rd	Salisbury
Tower	GBH Radio Inc. 4ta4	West Rd & Log Cabin Rd	Salisbury
Tower	GBH Radio, Inc 4ta1	West Rd & Log Cabin Rd	Salisbury
Tower	GBH Radio, Inc 4ta2	West Rd & Log Cabin Rd	Salisbury
Tower	Md Public Television	310 Deers Head Blvd.	Salisbury
Tower	Mesa Comm. Tower	Northwood Drive	Salisbury
Tower	MSP Comm. Tower	2765 N. Salisbury Blvd	Salisbury
Tower	Natural Resources Police	Mt. Olive Rd	Salisbury
Tower	Naylor Mill Tower Site	409 Naylor Mill Rd	Salisbury
Tower	Nextel Comm. Inc.	Green Branch Rd	Willards
Tower	Pinnacle Tower Inc	Riggin Rd Mardela	Mardela Springs
Tower	Salisbury Comm. Tower	Marine Road	Salisbury
Tower	Salisbury Mobil Telephone	Jersey Rd & Salisbury Bypass	Salisbury
Tower	SBA Towers Inc.	4400 Powellville Rd	Pittsville
Tower	SBA Towers Inc.	Roy West Rd	Delmar
Tower	Spectrasite Comm. Inc.	Monroe St.	Fruitland
Tower	Sprint Pcs	Wildlife Lane	Salisbury
Tower	Sprint Pcs	Hobbs Rd & Old Hobbs Rd	Salisbury
Tower	State Of Md/Wico. Co.	9975 Sharptown Rd.	Mardela Springs
Tower	Verizon	34417 Old Ocean City Rd	Pittsville
Tower	Verizon	21092 Nanticoke Rd	Bivalve
Tower	Verizon	128 East Church St.	Salisbury
Tower	Verizon	36655 Mt. Hermon Road	Pittsville
Tower	Verizon	101 E. Main St.	Salisbury
Tower	Verizon Wireless	1120 American Legion Rd	Salisbury
Tower	Verizon Wireless	25050 Nanticoke Rd	Salisbury
Tower	WBOC Television	1729 North Salisbury Blvd.	Salisbury
Tower	WDIH 90.3 Tower	Jersey Rd & Salisbury Bypass	Salisbury
Tower	WMDT Tv 47	202 Downtown Plaza	Salisbury

Tower		3622 Union Church Rd	Salisbury
Tower		3667 St Lukes Rd	Salisbury
Tower		4696 Snow Hill Rd	Salisbury
Tower		1841 S Division St	Salisbury
Tower		202 Coulbourn Mill Rd	Salisbury
Tower		5082 Nutter Cross Road	Salisbury
Tower		27410 Riverside Dr Ext	Salisbury
Tower	Wicomico County Tower	5635 Plantation Ln	Salisbury
Tower		5279 Airport Rd	Salisbury
Tower		5279 Airport Rd	Salisbury
Tower		1101 Camden Ave	Salisbury
Tower		24462 Nanticoke Rd	Quantico
Tower		6573 Walston Switch Rd	Salisbury
Tower		31455 Winterplace Pkwy	Salisbury
Tower		108 Moss Hill Ln	Salisbury
Tower	West Salisbury Elementary Parcel	28929 Adventist Dr	Salisbury
Tower		N Salisbury Blvd	Salisbury
Tower		Northwood Dr	Salisbury
Tower		Zion Rd	Salisbury
Tower		Naylor Mill Rd	Salisbury
Tower		405 Naylor Mill Rd	Salisbury
Tower		27137 E Lillian St	Hebron
Tower		9010 Stage Rd	Delmar
Tower	Delmarva Energy Properties LLC	800 Fitzwater St	Salisbury
Tower	State Highway Administration	4085 Disharoon Road	Eden
Tower	State Highway Administration	660 West Rd	Salisbury
Tower		409 N Park Dr	Salisbury
Tower	Nextel	7036 Morris Road	Pittsville
Tower	Clearview Tower Company LLC	Zion Church Rd	Parsonsburg
Sanitary	Wicomico County	6948 Brick Kiln Road	Salisbury
Sanitary	Wicomico County	7161 Brick Kiln Road	Salisbury
Sanitary	Salisbury	1142 Marine Road	Salisbury
Sanitary	Salisbury	100 Delaware Ave	Salisbury
Sanitary	Sharptown,	Little Water St	Sharptown
Sanitary	Sharptown,	104 State St	Mardela Springs
Sanitary	Salisbury	611 Ridge Road	Salisbury
Sanitary	Salisbury	N Park Dr	Salisbury
Sanitary	Salisbury	1509 Edgemore Ave	Salisbury
Sanitary	Delmar Water Commission	Foskey Ln	Delmar
Sanitary	Wor-Wic Community College	6573 Walston Switch Road	Salisbury
Sanitary	The Town of Willards	7344 Main St	Willards
Sanitary	Fruitland	1841 S Division St	Salisbury
Sanitary	Willards	36172 Poplar Neck Road	Willards
Sanitary	Willards	36172 Poplar Neck Road	Willards

Sanitary	Pittsville	34751 Poplar Neck Road	Pittsville
Sanitary	Pittsville	7505 Gumboro Road	Pittsville
Sanitary	Hebron	26126 Rewastico Road	Hebron
Sanitary	Fruitland	200 Shady Lane	Fruitland
Sanitary	Fruitland	200 Shady Lane	Fruitland
Sanitary	Fruitland	Clyde Ave	Fruitland
Substation	Delmarva Power & Light Wi-030 01	28104 Pemberton Dr	Salisbury
Substation	Delmarva Power & Light Wi-015 02	709 Substation Road	Salisbury
Substation	Delmarva Power & Light Wi-027 01	3768 Layfield Rd	Salisbury

Public Facility Type	Name	Address	City
County Owned	Tyaskin Park	4778 Tyaskin Road	Tyaskin
County Owned	Westside Solid Waste	20906 Nanticoke Road	Bivalve
County Owned	Whitehaven Ferry	23865 River St	Quantico
County Owned	Cedar Hill Marina & Park	20945 Harbor View Road	Bivalve
County Owned	Education Association	1302 Old Ocean City Road	Salisbury
County Owned	East Wicomico Little League Park	31620 Winterplace Pkwy	Salisbury
County Owned	Vacant House	107 Coulbourn Mill Road	Salisbury
County Owned	Airport	5130 Citation Dr	Salisbury
County Owned	Housing Authority	627 Jefferson St	Salisbury
County Owned	Housing Authority	1016 Queen Anne St	Salisbury
County Owned	Housing Authority	615 Jefferson St	Salisbury
County Owned	Office Of Stat's Attorney	309 E Main St	Salisbury
County Owned	Housing Authority	1014 Queen Anne St	Salisbury
County Owned	Housing Authority	500 Truitt St	Salisbury
County Owned	Housing Authority	700 Jefferson St	Salisbury
County Owned	Housing Authority	200 Linwood Ave	Salisbury
County Owned	Arthur W. Perdue Stadium	6396 Hobbs Road	Salisbury
County Owned	Housing Authority	511 Decatur Ave	Salisbury
County Owned	Housing Authority	509 Decatur Ave	Salisbury
County Owned	Airport	31493 Mount Hermon Road	Salisbury
County Owned	Housing Authority	709 Grace St	Salisbury
County Owned	Housing Authority	624 Hammond St	Salisbury
County Owned	Housing Authority	145 Davis St	Salisbury
County Owned	Parks And Recreation	Naylor Mill Rd	Salisbury
County Owned	Kilbirnie Playground	Dundee Dr	Salisbury
County Owned	Public Safety Complex	405 Naylor Mill Road	Salisbury
County Owned	Housing Authority	410 Overbrook Dr	Salisbury
County Owned	Office Building	113 N Division St	Salisbury
County Owned	Clerk Of Court	102 Court St	Salisbury
County Owned	Adkins Mill Park	5168 Powellville Road	Pittsville
County Owned	Schumaker Park	1019 S Schumaker Dr	Salisbury
County Owned	Pemberton Historical Park	5565 Plantation Lane	Salisbury

County Owned	Housing Authority	147 Davis St	Salisbury
County Owned	Housing Authority	744 S Division St	Salisbury
County Owned	Housing Authority	410 Poplar St	Salisbury
County Owned	Housing Authority	303 Buena Vista Ave	Salisbury
County Owned	Housing Authority	613 Jefferson St	Salisbury
County Owned	Housing Authority	305 Buena Vista Ave	Salisbury
County Owned	Housing Authority	301 Buena Vista Ave	Salisbury
County Owned	Housing Authority	304 Buena Vista Ave	Salisbury
County Owned	Housing Authority	313 E Locust St	Salisbury
County Owned	Riverside Boat Ramp	Riverside Dr	Salisbury
County Owned	Housing Authority	519 Alabama Ave	Salisbury
County Owned	Housing Authority	405 Bueclar Dr	Salisbury
County Owned	Housing Authority	1003 West Road	Salisbury
County Owned	Housing Authority	1001 West Road	Salisbury
County Owned	Housing Authority	1007 West Road	Salisbury
County Owned	Housing Authority	1013 West Road	Salisbury
County Owned	Housing Authority	1011 West Road	Salisbury
County Owned	Housing Authority	1101 West Road	Salisbury
County Owned	Hebron Convenience Center	8301 Old Railroad Road	Hebron
County Owned	Quantico Convenience Center	25202 Nanticoke Road	Quantico
County Owned	Housing Authority	526 Washington St	Salisbury
County Owned	Edgewood Park	8497 Memory Gardens Lane	Salisbury
County Owned	Crooked Oak Playground	Quercus Dr	Hebron
County Owned	Housing Authority	607 Lake St	Salisbury
County Owned	Library	122 S Division St	Salisbury
County Owned	Pemberton Historical Park	5635 Plantation Lane	Salisbury
County Owned	Housing Authority	609 Lake St	Salisbury
County Owned	Parks Maintenance/Roads Division	28440 Owens Branch Road	Salisbury
County Owned	Housing Authority	613 Lake St	Salisbury
County Owned	Harmon Field	409 Church Hill Ave	Salisbury
County Owned	Housing Authority	1111 West Road	Salisbury
County Owned	Board Of Elections	345 Snow Hill Road	Salisbury
County Owned	Housing Authority	1119 West Road	Salisbury
County Owned	Housing Authority	729 S Division St	Salisbury
County Owned	Housing Authority	310 E Carroll St	Salisbury
County Owned	Housing Authority	300 Buena Vista Ave	Salisbury
County Owned	Housing Authority	613 Delaware Ave	Salisbury
County Owned	Pemberton Historical Park	5561 Plantation Lane	Salisbury
County Owned	Billy Gene Jackson Sr. Park	429 N Lake Park Dr	Salisbury
County Owned	Centennial Village Playground	6373 Freedom Way	Salisbury
County Owned	Housing Authority	425 Ogle Ave	Fruitland
County Owned	Housing Authority	417 Ogle Ave	Fruitland
County Owned	Housing Authority	302 N Dulany Ave	Fruitland
County Owned	Housing Authority	431 Ogle Ave	Fruitland

County Owned	Office Building	28647 Old Quantico Road	Salisbury
County Owned	Housing Authority	420 Cartwright Ave	Fruitland
County Owned	Housing Authority	423 Ogle Ave	Fruitland
County Owned	Housing Authority	415 Ogle Ave	Fruitland
County Owned	Housing Authority	315 N Dulany Ave	Fruitland
County Owned	Parks Maintenance/Roads Division	28593 Ocean Gateway	Salisbury
County Owned	Housing Authority	201 N Dulany Ave	Fruitland
County Owned	Housing Authority	205 N Dulany Ave	Fruitland
County Owned	Housing Authority	304 N Dulany Ave	Fruitland
County Owned	Housing Authority	203 N Dulany Ave	Fruitland
County Owned	Housing Authority	311 N Dulany Ave	Fruitland
County Owned	Housing Authority	Dulany Ave	Fruitland
County Owned	Housing Authority	407 Cartwright Ave	Fruitland
County Owned	Housing Authority	422 Cartwright Ave	Fruitland
County Owned	Housing Authority	507 Mulberry St	Salisbury
County Owned	Parks Maintenance/Roads Division	28302 Owens Branch Road	Salisbury
County Owned	Housing Authority	427 Ogle Ave	Fruitland
County Owned	Housing Authority	428 Cartwright Ave	Fruitland
County Owned	Housing Authority	416 Saint Lukes Road	Fruitland
County Owned	Housing Authority	204 Leslie St	Fruitland
County Owned	Housing Authority	112 N Brown St	Fruitland
County Owned	Housing Authority	313 N Dulany Ave	Fruitland
County Owned	Housing Authority	205 Leslie St	Fruitland
County Owned	Housing Authority	429 Ogle Ave	Fruitland
County Owned	Housing Authority	103 Leslie St	Fruitland
County Owned	Housing Authority	7983 Farm House Dr	Hebron
County Owned	Housing Authority	101 Leslie St	Fruitland
County Owned	Housing Authority	208 Leslie St	Fruitland
County Owned	Housing Authority	1103 West Road	Salisbury
County Owned	Housing Authority	206 Leslie St	Fruitland
County Owned	Indian Village Playground	903 Manoa Blvd	Salisbury
County Owned	Tourist Information Center/Leonards Mill Park	8480 Ocean Hwy	Salisbury
County Owned	Eastside Sports Complex/Willards Park	7391 E Adkins Ave	Willards
County Owned	Housing Authority	202 Leslie St	Fruitland
County Owned	Housing Authority	317 N Dulany Ave	Fruitland
County Owned	Housing Authority	313 Buena Vista Ave	Salisbury
County Owned	Housing Authority	309 Buena Vista Ave	Salisbury
County Owned	San Domingo Park	25554 Elzey Brown Loop	Mardela Springs
County Owned	Cope Bennett Park	100 Railway St	Sharptown
County Owned	Gene Lowe Park	714 State Street	Sharptown
County Owned	Roaring Point Park	Red Hill Ln	Nanticoke
County Owned	Bivalve Wharf	Bivalve Wharf Rd	Bivalve
County Owned	Nanticoke Harbor	Nanticoke Harbor Rd	Nanticoke

County Owned	Housing Authority	520 Priscilla St	Salisbury
County Owned	Housing Authority	419 Ogle Ave	Fruitland
County Owned	Housing Authority	203 Theodore St	Fruitland
County Owned	Housing Authority	207 Theodore St	Fruitland
County Owned	Housing Authority	418 Cartwright Ave	Fruitland
County Owned	Housing Authority	204 Theodore St	Fruitland
County Owned	Housing Authority	309 N Dulany Ave	Fruitland
County Owned	Housing Authority	202 Theodore St	Fruitland
County Owned	Housing Authority	301 N Dulany Ave	Fruitland
County Owned	Housing Authority	303 N Dulany Ave	Fruitland
County Owned	Housing Authority	203 Leslie St	Fruitland
County Owned	Housing Authority	625 Jefferson St	Salisbury
County Owned	Upper Ferry Harbor	5420 N Upper Ferry Road	Salisbury
County Owned	Adkins Mill Park	5168 Powellville Road	Pittsville
County Owned	Housing Authority	311 Buena Vista Ave	Salisbury
County Owned	Housing Authority	544 Snow Hill Cir	Salisbury
County Owned	Housing Authority	542 Snow Hill Cir	Salisbury
County Owned	Housing Authority	7980 Farm House Dr	Hebron
County Owned	Airport	5485 Airport Terminal Road	Salisbury
County Owned	Emerson C. Holloway Park	916 Mineola Ave	Salisbury
County Owned	Housing Authority	206 Theodore St	Fruitland
County Owned	Nanticoke Harbor	20411 Harbor Road	Nanticoke
County Owned	Winterplace Park & Equestrian Center	6737 Blue Ribbon Rd	Salisbury
County Owned	115 Military Police Battalion	5000 Goldman Lane	Salisbury
County Owned	Housing Authority	312 E Carroll St	Salisbury
County Owned	Parks And Recreation	Foskey Ln	Delmar
County Owned	Housing Authority	611 Lake St	Salisbury
County Owned	Housing Authority	1009 West Road	Salisbury
County Owned	Housing Authority	805 Price Road	Salisbury
County Owned	Delmar Convenience Center	27774 Waller Road	Salisbury
County Owned	Housing Authority	611 Delaware Ave	Salisbury
County Owned	Housing Authority	609 Delaware Ave	Salisbury
County Owned	Housing Authority	421 Ogle Ave	Fruitland
County Owned	Fruitland Convenience Center	27778 Walnut Tree Road	Salisbury
County Owned	Housing Authority	1100 West Road	Salisbury
County Owned	Housing Authority	1005 West Road	Salisbury
County Owned	Housing Authority	426 Cartwright Ave	Fruitland
County Owned	Housing Authority	424 Cartwright Ave	Fruitland
County Owned	Housing Authority	205 Theodore St	Fruitland
County Owned	Housing Authority	307 Buena Vista Ave	Salisbury
County Owned	Airport	5475 Airport Terminal Road	Salisbury
County Owned	Airport	5475 Airport Road	Salisbury
County Owned	Airport	5475 Airport Road	Salisbury
County Owned	Airport	5475 Airport Terminal Road	Salisbury

County Owned	Airport	5417 Airport Road	Salisbury
County Owned	Airport	5280 Lear Jet Way	Salisbury
County Owned	Airport	5361 Airport Road	Salisbury
County Owned	Airport	5385 Airport Road	Salisbury
County Owned	Pw General Services Complex	28562 Owens Branch Road	Salisbury
County Owned	Youth & Civic Center/Rec, Park & Tourism Offices	500 Glen Ave	Salisbury
County Owned	Fairfield Park	201 Chapel St	Salisbury
County Owned	Westside Community Center	21109 Bivalve Lodge Road	Bivalve
County Owned	Pirates Wharf	4701 Whitehaven Road	Quantico
County Owned	Housing Authority Office	911 Booth St	Salisbury
County Owned	Youth & Civic Center/Rec, Park & Tourism Offices	500 Glen Ave	Salisbury
County Owned	Youth & Civic Center/Rec, Park & Tourism Offices	500 Glen Ave	Salisbury
County Owned	Airport	5447 Airport Terminal Road	Salisbury
County Owned	Airport	5279 Airport Road	Salisbury
County Owned	Airport	5255 Falcon Dr	Salisbury
County Owned	Airport	5333 Airport Road	Salisbury
County Owned	Airport	5381 Airport Road	Salisbury
County Owned	Airport	5395 Airport Road	Salisbury
County Owned	Wetipquin Boat Launch	21664 Wetipquin Rd	Tyaskin
County Owned	Adkins Mill Park	5168 Powellville Road	Pittsville
County Owned	Adkins Mill Park	5168 Powellville Road	Pittsville
Municipally Owned	Mardela Springs Town Hall	201 Station St	Mardela Springs
Municipally Owned	Pittsville Town Hall	7505 Gumboro Road	Pittsville
Municipally Owned	Delmar Public Works	400 S Pennsylvania Ave	Delmar
Municipally Owned	Sharptown Carnival Grounds	801 Main St	Mardela Springs
Municipally Owned	Sharptown Town Hall	401 Main St	Mardela Springs
Municipally Owned	Sharptown Public Works	102 State St	Mardela Springs
Municipally Owned	Willards Town Hall	7360 Main St	Willards
Municipally Owned	Hebron Town Hall	100 Main St	Hebron
Municipally Owned	Hebron Museum	413 W Main St	Hebron
Municipally Owned	Fruitland Community Center	300 Morris St	Fruitland
Municipally Owned	Fruitland City Hall	401 E Main St	Fruitland
Municipally Owned	Housing Authority	300 Delaware Ave	Salisbury
Municipally Owned	Museum	117 Elizabeth St	Salisbury
Municipally Owned	Parks & Recreation	1100 S Schumaker Dr	Salisbury
Municipally Owned		506 Lake St	Salisbury

Municipally Owned		306 Newton St	Salisbury
Municipally Owned	Parks & Recreation	924 Johnson St	Salisbury
Municipally Owned	Parks & Recreation	135 Mitchell Road	Salisbury
Municipally Owned	Parking Garage	115 E Market St	Salisbury
Municipally Owned		Scenic Dr	Salisbury
Municipally Owned		Naylor & Brown St	Salisbury
Municipally Owned	Fire Training	325 Lake St	Salisbury
Municipally Owned	Municipal Park	500 E Main St	Salisbury
Municipally Owned	Pumping Station	611 Ridge Road	Salisbury
Municipally Owned	Parks & Recreation	650 Fitzwater St	Salisbury
Municipally Owned	Fire Training Bldg.	311 W Isabella St	Salisbury
Municipally Owned	Salisbury Police Dept	221 Delaware Ave	Salisbury
Municipally Owned	Sewerage Disposal Plant	1142 Marine Road	Salisbury
Municipally Owned	Sewage Pumping Plant	100 Delaware Ave	Salisbury
Municipally Owned	Pump Station M Park	Park Dr	Salisbury
Municipally Owned	City Barn	Lake St	Salisbury
Municipally Owned	Parking Garage	101 E Market St	Salisbury
Municipally Owned	Public Works	104 Power St	Salisbury
Municipally Owned	Public Works	400 W Isabella St	Salisbury
Municipally Owned	Parks & Recreation	501 S Park Dr	Salisbury
Municipally Owned	Playground	704 Lake St	Salisbury
Municipally Owned		325 Cypress St	Salisbury
Municipally Owned	Palo Channel	Naylor Mill Rd	Salisbury
Municipally Owned	Truitt Community Center	319 Truitt St	Salisbury
Municipally Owned		621 Delaware Ave	Salisbury
Municipally Owned		610 Pearl St	Salisbury
Municipally Owned	Parks & Recreation	506 W Main St	Salisbury
Municipally Owned	Office Building	501 E Church St	Salisbury
Municipally Owned	Fire Training	317 Lake St	Salisbury
Municipally Owned	Water Tank Lot	1509 Edgemore Ave	Salisbury
Above Ground Storage Tanks	Wicomico Youth And Civic Center	500 Glen Ave	Salisbury

Above Ground Storage Tanks	Perdue Inc	521 Willow St	Salisbury
Above Ground Storage Tanks	Perdue Inc	521 Willow St	Salisbury
Above Ground Storage Tanks	Perdue Inc	521 Willow St	Salisbury
Above Ground Storage Tanks	Wicomico Youth And Civic Center	500 Glen Ave	Salisbury
Above Ground Storage Tanks	Wicomico Youth And Civic Center	500 Glen Ave	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
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Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Perdue Corporate Airplane Hangar	5280 Lear Jet Way	Salisbury
Above Ground Storage Tanks	Wicomico County Roads Division Office/Shop	28440 Owens Branch Rd	Salisbury
Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
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Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Valvoline Instant Oil Change Ba-0013	1001 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Tri-County Council Water And Sewer Extension	31901 Tri-County Way	Salisbury
Above Ground Storage Tanks	Tri-County Council Water And Sewer Extension	31901 Tri-County Way	Salisbury
Above Ground Storage Tanks	Tri-County Council Water And Sewer Extension	31901 Tri-County Way	Salisbury
Above Ground Storage Tanks	Samuel Coraluzzo Co Inc.	700 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Samuel Coraluzzo Co Inc.	700 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Samuel Coraluzzo Co Inc.	700 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Samuel Coraluzzo Co Inc.	700 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury

Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
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Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Blackwater Maryland Llc	1132-34 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	Cato Inc.- Marine Road Terminal	1030 Marine Rd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury

Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury
Above Ground Storage Tanks	John F. Tilghman And Sons Inc	121 Columbia Rd	Salisbury
Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Hertrich Of Salisbury East	2531 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Pep-Up, Inc. - #9 West Plant	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Pep-Up, Inc. - #9 West Plant	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Pep-Up, Inc. - #9 West Plant	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Pep-Up, Inc. - #9 West Plant	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Pep-Up, Inc. - #9 West Plant	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	Pep-Up, Inc. - #9 West Plant	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
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Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury

Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	David A. Bramble, Inc. - Eden	28101 Old Eden Rd	Eden
Above Ground Storage Tanks	David A. Bramble, Inc. - Eden	28101 Old Eden Rd	Eden
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	West Properties	702 Naylor Mill Rd	Salisbury
Above Ground Storage Tanks	David A. Bramble, Inc. - Eden	28101 Old Eden Rd	Eden
Above Ground Storage Tanks	David A. Bramble, Inc. - Eden	28101 Old Eden Rd	Eden
Above Ground Storage Tanks	David A. Bramble, Inc. - Eden	28101 Old Eden Rd	Eden
Above Ground Storage Tanks	Wal-Mart Store #1890	2702 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Wal-Mart Store #1890	2702 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Royal Farms Store #127	27992 Ocean Gateway	Salisbury
Above Ground Storage Tanks	Royal Farms Store #127	27992 Ocean Gateway	Salisbury
Above Ground Storage Tanks	Royal Farms Store #127	27992 Ocean Gateway	Salisbury
Above Ground Storage Tanks	Royal Farms Store #127	27992 Ocean Gateway	Salisbury
Above Ground Storage Tanks	Wal-Mart Store #1890	2702 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Wal-Mart Store #1890	2702 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Wal-Mart Store #1890	2702 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Wal-Mart Store #02931	409 N Fruitland Blvd	Fruitland
Above Ground Storage Tanks	Wal-Mart Store #02931	409 N Fruitland Blvd	Fruitland
Above Ground Storage Tanks	Wal-Mart Store #02931	409 N Fruitland Blvd	Fruitland
Above Ground Storage Tanks	Taylor Oil Company, Inc.- Bivalve Plant	3840 Texas Rd	Bivalve
Above Ground Storage Tanks	Wal-Mart Store #02931	409 N Fruitland Blvd	Fruitland
Above Ground Storage Tanks	Ryder Truck Rental Inc	404h Irl Lane	Fruitland
Above Ground Storage Tanks	Poplar Hill Pre-Release Unit	24090 Nanticoke Rd	Quantico
Above Ground Storage Tanks	Bennett Processing Facility	515 S Camden Ave	Fruitland
Above Ground Storage Tanks	Taylor Oil Co., Inc. - Lake Street	333-335 Lake St	Salisbury
Above Ground Storage Tanks	Wal-Mart Store #02931	409 N Fruitland Blvd	Fruitland
Above Ground Storage Tanks	Eagle Transport Corporation-Fletcher Diesel	8580 Memory Gardens Lane	Salisbury
Above Ground Storage Tanks	Taylor Oil Co., Inc. - Lake Street	333-335 Lake St	Salisbury
Above Ground Storage Tanks	Ingenco Wicomico Plant	6967 Brick Kiln Rd	Salisbury

Above Ground Storage Tanks	Delmarva Power And Light Company	2530 N Salisbury Blvd	Salisbury
Above Ground Storage Tanks	Maryland State Highway Administration - Salisbury Shop	660 West Rd	Salisbury
Above Ground Storage Tanks	Chesapeake Environmental Services Dba 3d Environmental, Llc	29631 Foskey Lane	Delmar
Above Ground Storage Tanks	Perdue Agribusiness Llc	6906 Zion Church Rd	Salisbury
Above Ground Storage Tanks	Peninsula Regional Medical Center	100 E Carroll St	Salisbury
Underground Storage Tank	Edward F. Baker	6705 Levin Dashiell Road	Salisbury
Underground Storage Tank	Shore Stop #229	7126 Friendship Road	Pittsville
Underground Storage Tank	Country Farm	104 E. Gordy Road	Salisbury
Underground Storage Tank	Shore Stop #225	27430 Ocean Gateway	Hebron
Underground Storage Tank	Shore Stop #211	1215 Mt. Hermon Road	Salisbury
Underground Storage Tank	Stop & Shop	403 Bi-State Boulevard	Delmar
Underground Storage Tank	Shore Stop #207	1020 Eastern Shore Drive	Salisbury
Underground Storage Tank	Shore Stop #210	1140 Parsons Road	Salisbury
Underground Storage Tank	Lomond, Inc Dba Chickenman	824 Snow Hill Road	Salisbury
Underground Storage Tank	American Legion Post #64	1109 American Legion Road	Salisbury
Underground Storage Tank	Cooper Insurance Agency	100 N. Fruitland Boulevard	Fruitland
Underground Storage Tank	St. Paul A.M.E. Zion Church	410 Delaware Avenue	Salisbury
Underground Storage Tank	Winter Place Market	6731 Hobbs Road	Salisbury
Underground Storage Tank	Shreegee Llc D/B/A Express Lane	4912 Snow Hill Road	Salisbury
Underground Storage Tank	Salisbury University - Commons Building	1101 Camden Avenue	Salisbury
Underground Storage Tank	Shore Stop #241	3602 Stockyard Road	Eden
Underground Storage Tank	Royal Farms #73	1401 S. Division Street	Salisbury
Underground Storage Tank	Royal Farms #5	901 Snow Hill Road	Salisbury
Underground Storage Tank	Pacific Pride I	436 Eastern Shore Drive	Salisbury
Underground Storage Tank	Beverage Barn	444 Snow Hill Road	Salisbury
Underground Storage Tank	Higher Hope Temple Church	800 Johnson Street	Salisbury
Underground Storage Tank	Church Of The Redeemer	1308 Westchester Street	Salisbury
Underground Storage Tank	Robert L. Messick, Inc.	106 Morris Mill Road	Salisbury
Underground Storage Tank	Ups-Salisbury Facility	2236 Northwood Drive	Salisbury
Underground Storage Tank	Fruitland Wine Rack	100 West Cedar Lane	Fruitland
Underground Storage Tank	Walston Switch Carry Out	31997 Beaver Run Drive	Salisbury

Underground Storage Tank	College Avenue Shell	900 Snow Hill Road	Salisbury
Underground Storage Tank	Mardela Goose Creek	24948 Ocean Gateway	Mardela Springs
Underground Storage Tank	Wood Duc Enterprise Llc	409 Camden Ave.	Salisbury
Underground Storage Tank	Wicomico Teen-Adult Center	Nanticoke St.	Sharptown
Underground Storage Tank	North 13 Shell	2513 N. Salisbury Boulevard	Salisbury
Underground Storage Tank	New Hope Methodist Church	6057 New Hope Road	Willards
Underground Storage Tank	Go Getters, Inc.	716 N. Division Street	Salisbury
Underground Storage Tank	Peninsula Roofing	1209 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	R.D. Grier & Sons, Co.	317 Railroad Avenue	Salisbury
Underground Storage Tank	Royal Farms #083	101 N. Salisbury Avenue	Salisbury
Underground Storage Tank	Top Ten	825 West Isabella Street	Salisbury
Underground Storage Tank	Hobbs Road Station	31373 Old Ocean City Road	Salisbury
Underground Storage Tank	Tru Arc Welding	1535 Northwood Drive	Salisbury
Underground Storage Tank	Parsonsburg Quick Stop	7181 Parsonsburg Rd.	Parsonsburg
Underground Storage Tank	Center City Quick Mart	500 S. Salisbury Blvd.	Salisbury
Underground Storage Tank	Valet Cleaners	223 Lake St.	Salisbury
Underground Storage Tank	Om Retail - Salisbury, Llc T/A Vintage Beverage	610 Snow Hill Road	Salisbury
Underground Storage Tank	Pepsi Bottling Ventures Llc	330 Snow Hill Rd (Aka 507 Race St)	Salisbury
Underground Storage Tank	Azam Llc Dba Azam's Super Soda	28768 Ocean Gateway	Salisbury
Underground Storage Tank	Thirsty's	9534 Ocean Highway	Delmar
Underground Storage Tank	Goose Creek	111 Truitt Street	Salisbury
Underground Storage Tank	Chesapeake Hall	1101 Camden Avenue	Salisbury
Underground Storage Tank	Chester Hall	1101 Camden Avenue	Salisbury
Underground Storage Tank	Choptank Hall	1101 Camden Avenue	Salisbury
Underground Storage Tank	Maggs	1101 Camden Avenue	Salisbury
Underground Storage Tank	Devilbiss Hall	1101 Camden Avenue	Salisbury
Underground Storage Tank	Blackwell Library	1101 Camden Avenue	Salisbury
Underground Storage Tank	Former Cropper Brothers Lumber Co.	7504 Main Street	Willards
Underground Storage Tank	Hebron Vol. Fire Dept., Inc.	200 South Main Street	Hebron
Underground Storage Tank	Cross Roads Food Mart	2601 Old Ocean City Road	Salisbury
Underground Storage Tank	Salisbury - Barrack "E"	2765 N. Salisbury Boulevard	Salisbury

Underground Storage Tank	Verizon Communications - Salisbury Soc Md36462	620 Truitt Street	Salisbury
Underground Storage Tank	Pittsville Food Mart	7125 Sixty Foot Road	Pittsville
Underground Storage Tank	Wise Mart 2	806 Main Street	Sharptown
Underground Storage Tank	Boulevard Beer & Wine	1 South Bi-State Blvd	Delmar
Underground Storage Tank	Global Beverages, Inc. T/A Cheers	1324 South Salisbury Blvd.	Salisbury
Underground Storage Tank	Naylor Food Mart	1111 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	Country Side Market	27215 Nanticoke Road	Salisbury
Underground Storage Tank	Pocomoke Hall	1101 Camden Ave	Salisbury
Underground Storage Tank	Wawa Food Market #555	668 - 682 S. Salisbury Boulevard	Salisbury
Underground Storage Tank	Bay Land Aviation Inc.	5279 Airport Road - Hanger 5381	Salisbury
Underground Storage Tank	1109 - Willards Shell Dash In	7201 Main Street	Willards
Underground Storage Tank	Ambaji Inc.	617 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	Meryam Inc. Dba Beverage Barn	1120 East Church Street	Salisbury
Underground Storage Tank	Thirsty's	1053 S. Salisbury Blvd.	Salisbury
Underground Storage Tank	Red Fox Market	107 South Fruitland Blvd	Fruitland
Underground Storage Tank	Pacific Pride Ii	2229 Northwood Drive	Salisbury
Underground Storage Tank	Wawa #561	2740 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	St. James Ame Zion Church	521 Mack Ave.	Salisbury
Underground Storage Tank	Wicomico County Detention Center	411 Naylor Mill Rd.	Salisbury
Underground Storage Tank	Government Office Bdlg.	125 N. Division St.	Salisbury
Underground Storage Tank	Beer Cave Inc.	8600 Ocean Highway	Delmar
Underground Storage Tank	Tiger Mart, Inc.	2403 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	Autumn Grove Tiger Mart	1801 Autumn Grove Court	Salisbury
Underground Storage Tank	Salisbury Exxon, Inc.	501 West Salisbury Parkway	Salisbury
Underground Storage Tank	Phillips Enterprises Ltd Partnership	317-319 South Division Street	Fruitland
Underground Storage Tank	Springhill Manor	28721 Ocean Gateway Suite 202	Salisbury
Underground Storage Tank	Henson Science Hall	1101 Camden Avenue	Salisbury
Underground Storage Tank	Verizon Communications - Salisbury Dial Office Md36500	128 E. Church Street	Salisbury
Underground Storage Tank	Sam's Club #6383	2700 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	Salisbury Sunoco	1300 Old Ocean City Road	Salisbury
Underground Storage Tank	Aso Willards, Llc	36308 Old Ocean City Road	Willards

Underground Storage Tank	Eagle Express Mart I, Inc.	101 N. Camden Avenue	Fruitland
Underground Storage Tank	Eagle Express Mart Iii, Inc.	1312 N. Salisbury Blvd.	Salisbury
Underground Storage Tank	Eagle Transport Corporation	8580 Memory Garden Lane	Hebron
Underground Storage Tank	Delmar Food Service	9521 Ocean Highway	Delmar
Underground Storage Tank	Peninsula Regional Medical Center	100 East Carroll Street	Salisbury
Underground Storage Tank	Green Hill Yacht & Country Club	5471 White Haven Road	Quantico
Underground Storage Tank	B & J Market	31795 Mount Hermon Road	Salisbury
Underground Storage Tank	Qfn # 416	1702 Northwood Drive	Salisbury
Underground Storage Tank	Wesley Temple United Methodist Church	1306 West Road	Salisbury
Underground Storage Tank	Rapture Ready Ministries	368 Carey Avenue	Salisbury
Underground Storage Tank	Faith Wesleyan Church	500 East Lincoln Avenue	Salisbury
Underground Storage Tank	Bethany Lutheran Church	817 Camden Avenue	Salisbury
Underground Storage Tank	Weeping Mary Baptist Church	31537 Shavox Road	Salisbury
Underground Storage Tank	Barnes Tv & Appliances Company	1413 Salisbury Boulevard	Salisbury
Underground Storage Tank	The Pure Presbyterian Church Of American-Korean	108 Louise Avenue	Salisbury
Underground Storage Tank	Newton Properties Ltd	204 Newton Street	Salisbury
Underground Storage Tank	Samuel Q. Johnson	620 South Salisbury Boulevard	Salisbury
Underground Storage Tank	Samuel Q. Johnson	108 Washington Street	Salisbury
Underground Storage Tank	Samuel Q. Johnson	615 South Division Street	Salisbury
Underground Storage Tank	South Division Street Laundry	602 South Division Street	Salisbury
Underground Storage Tank	Walter Maycocks	600 West Main Street	Salisbury
Underground Storage Tank	Donald Shockley	30891 Dagsboro Road	Salisbury
Underground Storage Tank	George L. Elliott & Sons, Inc.	West Zion Road	Salisbury
Underground Storage Tank	Salisbury University-Teacher Education Techology Center	1101 Camden Avenue	Salisbury
Underground Storage Tank	Seagull Square At Salisbury University	1101 Camden Avenue	Salisbury
Underground Storage Tank	Shore Transit Maintenance Facility	31855 Tri-County Way	Salisbury
Underground Storage Tank	Royal Farms #137	1150 Pemberton Drive	Salisbury
Underground Storage Tank	Royal Farms #167	31954 Summer Dr	Salisbury
Underground Storage Tank	201 Holly St Warehouse	201 Holly St	Fruitland
Underground Storage Tank	Messick Funeral Home	20941 Nanticoke Rd	Bivalve
Underground Storage Tank	Royal Farms #283	1033 S Salisbury Blvd	Salisbury

Underground Storage Tank	Royal Farms #384	101 W Cedar Lane	Fruitland

Appendix E
Hazard Mitigation Public Outreach & Initiatives

HAZARD MITIGATION PUBLIC OUTREACH & INITIATIVES

Planning, training, and outreach initiatives were documented throughout the plan development process and is provided in the table below. The Hazard Mitigation & Resilience Planning Committee met a total of three times during the planning process. The committee met on the following dates: January 21, 2021; May 25, 2021; and October 28, 2021. Meeting notes are included at the end of this appendix.

Furthermore, municipal participation is detailed below.

City of Salisbury:

- HMPC Meeting #1: 1/21/2021
- HMPC Meeting #2: 3/25/2021
- Completed Questionnaire – 5/5/2021
- Webex – 5/6/2021
- HMPC Meeting #3: 10/28/2021
- Completed Mitigation Action Survey – 11/18/2021

City of Fruitland:

- Completed Questionnaire – 4/14/2021
- Targeted Email – 10/29/2021
- Completed Mitigation Action Survey – 11/8/2021

Town of Delmar:

- HMPC Meeting #1: 1/21/2021
- HMPC Meeting #3: 10/28/2021
- Targeted Email – 10/29/2021
- Completed Mitigation Action Survey – 12/2/2021

Town of Hebron:

- HMPC Meeting #2: 3/25/2021
- Completed Questionnaire – 4/20/2021
- Webex – 5/4/2021
- Completed Mitigation Action Survey – 11/9/2021

Town of Sharptown:

- Completed Questionnaire – 5/11/2021
- Webex – 5/11/2021
- Targeted Email – 10/29/2021

Town of Pittsville:

- Completed Questionnaire - 5/11/2021
- Webex – 5/11/2021
- Targeted Email – 10/29/2021

Town of Willards:

- Completed Questionnaire - 5/11/2021
- Webex – 5/11/2021
- Targeted Email – 10/29/2021

Town of Mardela Springs:

- Phone Conversation – 5/20/2021
- Targeted Email – 10/29/2021

Wicomico County Hazard Mitigation Planning, Training, and Outreach Initiatives				
Date	**Meeting, Training, or Outreach Activity**	**Target Audience**	**Materials Provided**	**Comments/Input**
16-Dec-20	Project Kick-Off Mtg.	Core Planning Team	Project SOW & Timeline	Discussed outreach strategy and development of project website. HMP stakeholder listing review and update will be completed.
7-Jan-21	Lower Eastern Shore Planner's Mtg.	Regional Planner's Group	Discussed WC HMP process with other Lower Eastern Shore Region.	Obtained feedback from adjacent jusrisdictions.
21-Jan-21	HMPC Stakeholder Meeting #1	HMPC Stakeholders	Webex Meeting- Agenda & Meeting Packet (PDF)	Meeting Notes, Fillable PDF Mitigation Status, Community Perspective Survey & Project Website Preview
4-Feb-21	Data Collection	Planning Zoning & Community Development	Permit Data Collection	Permit data for some of the municipalities will be provided by WC PZCD but not all. Follow-up with municipalities.
10-Feb-21	Website Link on County Website & New Release	Public	Link to Project Website & News Release	Public Survey
17-Feb-21	Facebook Post	Public	Included New Release and project webiste	https://www.wicomicohazards.org/#preparewicomico #wcdes
2-Mar-21	NFIP/CRS	Floodplain Coordinator	Repetitive Loss Property Listing & 2016 WC HMP Appendix G	Discussed updates needed for Appendix G: NFIP & CRS; intended and denoted as "For Official Use Only"
2-Mar-21	Social Equity Mtg. and Hazard Mitigation	Lower Shore Vulnerable Populations Workgroup	Vulnerable Population Discussion	Adding two new mitigation action items; ideas for updates to project website to include non-english speaking populations.
3-Mar-21	Vulnerable Population Task Force Morning Mt.	Task Force Members	Introduce Hazard Mitigation & Resilence Plan and project website	Task Force reviewed website and public survey.
3-Mar-21	VPTF-Language Workgroup	Workgroup Members	Review of Project Website	Feedback on project website.
5-Mar-21	Website Content	Public	Added HIRA Results Table and PDF to project website.	New Content
17-Mar-21	Website Content	Public	Stakeholder Meeting # 2 Agenda	The agenda is under the meeting box with sign-up.
23-Mar-21	News Release	Public	News Release- CivicReady System is a citizen notification system.	Encouraging registration- DES web site at: http://www.wicomicocounty.org/ES
24-Mar-21	Social Equity Mtg. and Hazard Mitigation	Lower Shore Vulnerable Populations Workgroup	Public Survey	Language workgroup provided suggested modifications for public survey; using more consise language
25-Mar-21	HMPC Stakeholder Meeting #2	HMPC Stakeholders	Webex Meeting- Agenda & Meeting Packet (PDF)	Meeting Notes, Fillable Capabilities Form
31-Mar-21	Facebook Post	Public	Project website and survey	Both links were shared with FB post.
1-Apr-21	News Release	Public	News release with project website link, survey, and facebook	Sent to all media outlets by WC PIO and posted on County website.
13-Apr-21	Flood Insurance Webinar	surance and Real Estate Ager	Flood risk and insurance presenattion and handouts.	Flood risk, regulations, insurance, and insights into the floodplain regulatory process.

Date	Meeting, Training, or Outreach Activity	Target Audience	Materials Provided	Comments/Input
3-May-21	Public Health Group	Stakeholder Group	Reviewed content and discussed plan integration for Pandemic & EID	Direction from Public Health Group informed the Pandemic & Emerging Infectious Disease Chapter & New Action Items.
4-May-21	Municipal Meeting	Hebron	Reviewed Municipal Questionnaire, Capabilities, and new Mitigation Ideas;	Completed Municipal Questionnaire & Current Capabilities for Hebron & Fruitland submitted their form
6-May-21	Municipal Meeting	City of Salisbury	Reviewed Municipal Questionnaire, Flood Maps, Community Capabilities, and new Mitigation	Completed Municipal Questionnaire & Current Capabilities
11-May-21	Municipal Meeting	Pittsville & Willards	Reviewed Municipal Questionnaire, Flood Maps, Community Capabilities, and new Mitigation Ideas	Completed Municipal Questionnaire & Current Capabilities
11-May-21	Municipal Meeting	Sharptown	Reviewed Municipal Questionnaire, Flood Maps Community Capabilities, and new Mitigation Ideas	Completed Municipal Questionnaire & Current Capabilities
28-May-21	THIRA Meeting	Stakeholder Group	Discussed new Appendix & Content for Active Assailant Threat	Distributed Fillable PDF Questionnaire to obtain status of current capabilities per responsible entity.
9-Jun-21	Website Content	Public	Added NWS Baltimore/Washington En Espanol Link	Additional Reources Tab
9-Jun-21	Website Content	Public	Arc GIS StoryMap Link- MD Coast Smart Climate Ready Action Boundary	Additional Hazard Risk & Vulnerability Tab- Conveying Flood Risk Beyond the Floodplain
24-Jun-21	FEMA Hurricane Workshop	EM Community	Checklists	Wicomico County DES staff attended virtual workshop event.
14-Jul-21	MD 2021 Risk Reduction Consultation	Local Jusrisdictions	State Hazard Mitigation Plan Update	Wicomcio County Land Development Coordinator attended.
28-Jul-21	Website Content	Public	MD Climate Action Ready Boundary (CRAB) Info Added	Website tab- under "Hazard Risk & Vulnerability" tab
28-Jul-21	Website Content	Public	Resources Info Graphics Added	Website tab- under "Additional Resources" tab
28-Jul-21	Website Content	Public	Flood Info Graphic Added	Website tab- under "Hazard Risk & Vulnerability" tab
29-Jul-21	Website Content	Public	Flood Insurance FAQs in Spanish- MD Insurance Administration Flyer	Website tab- under "Additional Resources" tab
18-Aug-21	THIRA Meeting	Stakeholder Group	Reviewed & discussed new Draft Active Assailant Threat Appedix	New Appendix F- Active Assailant
19-Aug-21	Website Content	Public	My Coast Pop-Up and sign-up instructions	Website tab- under "Additional Resources" tab
27-Aug-21	Working Draft Plan Chapters	Stakeholder Group	Chapter 9 Winters Storm & Chapter 10 Extreme Heat, Drought, and Wildfire Chapters	Weekly Distribution
3-Sep-21	Working Draft Plan Chapters	Stakeholder Group	Chapter 7 Severe Weather and Chapter 8 Flood	Weekly Distribution

Date	Meeting, Training, or Outreach Activity	Target Audience	Materials Provided	Comments/Input
3-Sep-21	Social Media Post	Stakeholder Group	Social Media Image & URL	Request for Stakeholder to Post
13-Sep-21	Working Draft Plan Chapters	Stakeholder Group	Chapter 5 Climate Change and Chapter 11 Man-Made Hazards	Weekly Distribution
22-Sep-21	Working Draft Plan Chapters	Stakeholder Group	Chapter 4 Coastal Hazards	Weekly Distribution
28-Sep-21	Working Draft Plan Chapters	Stakeholder Group	Chapter 6 Shoreline Erosion & Sea Level Rise	Weekly Distribution
13-Oct-21	New Mitigation Actions	Dept. of Public Works	Action Listing & Ideas	Review & Comments
13-Oct-21	New Mitigation Actions	Planning and Zoning	Action Listing & Ideas	Review & Comments
15-Oct-21	Appendix	Planning and Zoning	Apendix G: NFIP & CRS and Appedix H: NFIP Survey	Review & Comments
18-Oct-21	Website Content	Public	Added Centers for Disease Control & Prevention (CDC) WC Social Vulnerability Index (SVI)	Website tab- under "Hazard Risk & Vulnerability" tab.
18-Oct-21	Website Content	Public	Added Maryland Historical Trust Hazard Mitigation Planning for historic and cultural resources	Website tab- under "Prevention & Adaption" tab.
18-Oct-21	Website Content	Public	Added University of Maryland Center for Environmental Science (UMCES) public seminars	Website tab- under "Additional Resources" tab.
21-Oct-21	Read Ahead Materials	Stakeholder Group	Goals & Objectives and Draft Mitigation Action Item Table	Review & Comments
28-Oct-21	HMPC Stakeholder Meeting #3	HMPC Stakeholders	Webex Meeting- Agenda & Meeting Packet (PDF)	New Mitigation Actions Workshop
28-Oct-21	Meeting Notes & Next Steps	Stakeholder Group	Meeting Notes & Upcoming Steps with Dates	Comment due date, which will produce a finalized Mitigation Action Item Table for prioritization by committee members.
29-Oct-21	Targeted Emails	Municiplaities	Municipal specific information collected and identification od gaps, if any.	Request to review, comment and/or confirm municpal specific information.
5-Nov-21	Mitigation Action Final Review Period	Stakeholder Group & Municiplaities	Listing of fifty-one mitigation action items discussed and updated following HMPC Mtg. #3	Committee members and municipal representation were urged to review and comment one more time on action items.
8-Nov-21	Mitigation Action Prioritization	Stakeholder Group & Municiplaities	Mitigation Action Prioritization Survey Links were sent to all HMPC & municipalities.	Municipalities had their own mitigation prioity survey link, while remaining HMPC used survey links for one or more categories.
12-Nov-21	Mitigation Action Prioritization Results	Stakeholder Group & Municiplaities	Survey were collected & tabulated. Mitigation action items were assigned priority ranking.	Results integrated into Chapter 14 Mitigation Staregies.
15-Nov-21	Final Draft Plan	Stakeholder Group & Municiplaities	Final Draft Plan distributed for review and comment.	While the plan has been distrbuted as a working draft and comments were provided and integrated. The darft plan was distributed again with the mitigation action rankings.

Facebook Twitter YouTube

- Committees/Plans
- Department of Emergency Services Speaker Bureau
- Divisions
- Emergency Preparedness Topics
- Facility Tours
- National Terrorism Advisory System
- Organizational Chart
- Sign Up for Emergency Alerts
- Weather

Emergency Services

The Department of Emergency Services is committed to providing the highest quality customer service to the residents and first responders of Wicomico County. The department coordinates a comprehensive, all-hazard emergency operational plan and provides a professional 9-1-1 response to calls from citizens. This coordination includes effective communications for and the coordination of those first responders dispatched to calls for service.

The Department of Emergency Services is made up of three divisions:

- Communications Division
  - Calling 9-1-1 What To Expect
  - Text To 9-1-1
- Emergency Management Division
- Radio Division

HAZARD MITIGATION PLAN LINK

We are currently updating our hazard mitigation plan as required every five years. Please select the link above for additional information. We encourage community participation to update this important plan.

WICOMICO COUNTY HAZARD MITIGATION PLAN PRESS RELEASE

CONTACT US

411 Naylor Mill Road
Suite 200
Salisbury, MD 21801

Ph: 410-334-3178
Fx: 410-341-6031

QUICK LINKS

- ESPANOL (translate to Spanish)
- KREYOL AYISYEN (translate to Haitian Creole)
- Local Emergency Planning Committee
- Maryland Emergency Management Agency (MEMA)
- Community Emergency Response Training (CERT)
- Red Cross

CITIZENS INVITED TO JOIN PLANNING PROCESS

SALISBURY, MD - Wicomico County is in the process of updating its Hazard Mitigation & Resilience Plan and citizens are requested to participate in the process. The Hazard Mitigation & Resilience Plan forms the foundation for Wicomico County and its municipalities' long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction and repeated damage.

The purpose of this plan is to identify, plan, and implement cost-effective hazard mitigation measures through a comprehensive approach known as "hazard mitigation planning". The 2021 plan is an update to the 2016 Wicomico County Hazard Mitigation Plan.

Wicomico County participates in the National Flood Insurance Program (NFIP) so that its citizens can purchase flood insurance through the reduced premium governmental program. Maintaining an updated Hazard Mitigation Plan is a requirement of participating in the NFIP, as well as for obtaining grants through the Federal Emergency Management Agency (FEMA).

A project website has been established for this plan review cycle at www.wicomicohazards.org and it includes a brief questionnaire for citizens to complete. This survey will help citizens voice their concerns regarding various hazards, such as flooding, severe weather, climate change, pandemics and more.

"Citizen participation in the planning process will provide a valuable insight into the concerns we need to address with the 2021 Hazard Mitigation & Resilience Plan," stated John Psota, acting County Executive.

The 2021 plan is expected to be completed and ready for County Council review in late Summer. Employees from all County departments, as well as representatives from incorporated municipalities are participating in the plan review process.

For more information on the plan development process and how you can participate, please visit the project website at www.wicomicohazards.org or call Wicomico County Department of Emergency Services-Emergency Management Division at 410-548-4820.

WICOMICO COUNTY, MARYLAND
DEPARTMENT OF EMERGENCY SERVICES
411 NAYLOR MILL ROAD, SUITE 200
SALISBURY, MARYLAND 21801
410-334-3178
FAX: 410-341-6031

John D. Psota
Acting County Executive

David G. Shipley
Director Dept. of Emergency Services

PRESS RELEASE
March 23, 2021

Emergency Alerts & Notifications

CIVIC READY
Powered by Regroup
EMERGENCY NOTIFICATION SIGN UP

(Citizen Notification System)

Register to receive emergency alerts and other notifications via the County's CivicReady Citizen Notification System.

The CivicReady System is a citizen notification method that will automatically notify the citizens of Wicomico County of important information in the event of an impending or occurring emergency via phone call (cell & land line), text message, and/or email.

If you wish to receive these emergency messages you must register with the Department of Emergency Services (DES).

To register you must go to the DES web site at http://www.wicomicocounty.org/ES and select the section entitled:

Sign Up
For Emergency Alerts

Once you have logged in to the portal, follow the instructions to register.

WICOMICO COUNTY, MARYLAND
DEPARTMENT OF EMERGENCY SERVICES
411 NAYLOR MILL ROAD, SUITE 200
SALISBURY, MARYLAND 21801
410-334-3178
FAX: 410-341-6031

John D. Psota
Acting County Executive

David G. Shipley
Director Dept. of Emergency Services

Press Release

April 1, 2021

SALISBURY, MD — Wicomico County is seeking public input on its Hazard Mitigation and Resilience Plan. The Hazard Mitigation Plan identifies potential threats and lists future projects that may reduce or eliminate damage before a disaster strikes.

Mitigation not only saves lives, but also reduces disaster costs. For every $1 spent on disaster mitigation, more than $6 are saved that would have been used responding to or recovering from disaster.

Input from residents, community members, workers, and business owners will help ensure the success of the County's hazard mitigation plan and projects. There are a variety of ways community members and stakeholders can participate:

- ***Public Survey:*** ***Take a survey*** to provide feedback on concerns regarding local hazards and disaster risk. The survey is only nine questions and takes around four minutes to complete.
- ***Follow Us:*** Follow us on Facebook at https://www.facebook.com/WicomicoDES
- for Hazard Mitigation updates and other emergency preparedness, response, and recovery information.
- ***Spread the Word:*** Tell your Wicomico County family, friends, and neighbors about the plan and how they can help!
- ***Reach Out:*** For questions regarding the plan, contact Lorenzo Cropper, Department of Emergency Services at lcropper@wicomicocounty.org.

Learn more about the Wicomico County Hazard Mitigation and Resilience Plan at www.wicomicohazards.com.

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #1

January 21, 2021 9:30 AM

The following attendees comprise the Wicomico County Hazard Mitigation & Resilience Planning Committee (HMRPC):

Name	Organization/Department
Andy Kitzrow	City of Salisbury- Deputy Administrator
Antonio Fascelli	Wicomico County- DPW
Chris Classing	Wicomico County- DPW
Chris Truitt	Salisbury Fire
Christopher Shockley	Salisbury University Police
Chuck Rousseau	Wicomico County- Civic Center
Cori Cameron	City of Salisbury- Water Works
David Fitzgerald	Wicomico County- DES
David Shipley	Wicomico County- DES
Ed Werkhiser	MEMA
Heather Lankford	City of Salisbury-Infrastructure & Development
Jack Heath	City of Salisbury- Council President
Jalessa Tate	MEMA
John Chatham	MD Natural Resources Police WC Supervisor
John Petito	Pepco
Julia Glanz	City of Salisbury- City Administrator
Karen Wells	Town of Delmar- Mayor
Laura Hurley	Wicomico County -Council Administrator
Lorenzo Cropper	Wicomico County- DES
Marilyn Williams	Wicomico County- Planning & Zoning
Mark Rickards	Wicomico County- Parks & Recreation
Mark Whitelock	Wicomico County- DPW
Michael Parsons	MIEMSS
Michele Ennis	Tri Community Remediation
Mike Dunn	Greater Salisbury Committee
Richard Hoppes	Chesapeake Gas
Roy Brewington	MD DHS Social Services
Teresa Mammi	Coraluzza Petroleum Trnsport
Tony Rudy	Wicomico County-Airport

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #1

January 21, 2021 9:30 AM

Planning Committee Meeting #1 Overview

- **Hazard Mitigation Overview**
  - 2016 Wicomico County Hazard Mitigation Plan (HMP) is in the plan update process. The 2016 WC HMP is available for review on the new plan update project website at www.wicomicohazards.org
    - For this Plan Update we have added resiliency. **Resiliency** is the ability of the community to bounce back after a disaster. This will be discussed from a hazard perspective and be integrated throughout the Plan Update, referred to as Wicomico County Hazard Mitigation & Resilience Plan (HMRP)
  - FEMA Requirements
    - FEMA requires hazard mitigation plans to be updated every five (5) years.
    - Stakeholder/public engagement is vital throughout all stages of the plan development process to be approved by MEMA & FEMA.
    - In order for municipalities to be covered under the Wicomico County HMRP, municipalities must participate throughout the planning process. A small group meeting of municipalities will be scheduled in February.
  - Cost effective
    - Natural hazard mitigation provides the nation $6 in benefit for every $1 invested.
- **Project Timeline**
  - The initial project team meeting was held in December, where it was decided that the project Stakeholder Group should be expanded.
    - The Stakeholder Group will meet three (3) times at a minimum, with small/targeted group meetings scheduled as needed.
      - e.g. municipal group will meet separately to discuss topics specific to municipalities
  - A Draft plan for local stakeholder review will be made available this summer (*see project timeline on next page*)

Hazard Mitigation is any action taken to permanently reduce or eliminate long-term risk to people and their property from the effects of hazards.

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #1

January 21, 2021 9:30 AM

Project Timeline

	Nov. 2020	Dec.	Jan. 2021	Feb.	March	April	May	June	July	August	Sept.
Project Milestones											
Organize Resources & Planning Team		Project Initiated- P.O. 12/1									
Project Team Meeting (Key County Staff)		*									
Planning Committee Meeting #1			*								
2016 Mitigation Strategies Update Process											
HIRA 2020-2021 Update											
Mitigation Strategies Report											
Public Outreach Campaign (Website, Survey, Social Media)											
Planning Committee Meeting #2					*						
Hazard Vulnerability Assessment											
Capability Assessment & Gaps											
Planning Committee Meeting #3							*				
2021 Mitigation Actions & Projects											
DRAFT PLAN											
Local & Public Review & Comments											
State & FEMA Review & Comments											
Adoption by Wicomico County											

- **Stakeholder & Public Participation**
  - Stakeholders from a broad cross-section of the community were invited to participate, including municipalities.
    - Stakeholders may have public outreach initiatives that pair well with hazard mitigation and resilience. SP&D requests that stakeholders reach out and provide details of these public outreach initiatives for collaboration and documentation.
    - SP&D is requesting photos, data, and ideas as they relate to hazard mitigation and resilience from stakeholders.
  - A project website will be utilized to provide updates, post links, and share new information relating to the Plan Update. This website will be updated throughout the plan development process.

- **NEXT STEPS**
  - Meeting #1 Notes - distributed to all stakeholders and uploaded to project website. Stakeholders to review and comment on website prior to public launch.
  - Hazard Risk Survey Link for Stakeholders:
    - *January 26 - February 3, 2021*
  - Mitigation Status Fillable PDF distributed to stakeholders for completion.
  - Project Website Launch:
    - *February 2021*
  - Targeted Small Group Meetings:
    - *February-March 2021*
  - Meeting #2:
    - *March 2021*

- **QUESTIONS/COMMENTS**
  - Question asked regarding the 2016 Plan (Ed Werkhiser): The Project Website contains a PDF copy of the 2016 HMP for reference by stakeholders and the public.
  - Comment (Ed Werkhiser): development to the Port of Salisbury will create changes to the river, which may create new/changing flood hazards. A project-Port of Salisbury representative should be invited to the Stakeholder Group.
  - Comment (Michele Ennis): Vulnerable populations (e.g., non-native English speakers, low literacy, etc.) will need representation and access to the Plan Update process. How do we "meet people where they are" and serve these vulnerable populations and what constraints or eligibility requirements are there? A small group meeting will be scheduled in February to further discuss this topic.

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #2

March 25, 2021 9:30-11:00 AM

The following meeting Wicomico County Hazard Mitigation & Resilience Planning Committee (HMRPC) members attended the March 25th meeting.

Name	Organization/Department
Amanda Pollack	City of Salisbury
Antonio Fascelli	Wicomico County- DPW
Brian Soper	Wicomico County- Planning & Zoning
Chris Classing	Wicomico County- DPW
Chris Davala	MSP Barrack Commander
Chris Truitt	Salisbury Fire
Christopher Shockley	Salisbury University Police
Chuck Rousseau	Wicomico County- Civic Center
David Fitzgerald	WC DES
Donna Smith	MAC Maintaining Active Citizens, Inc.
Frank Cruice Perdue	Industry
Greg Grey	Wor-Wic College
Jalessa Tate	MEMA
Kayhla Cornell	MEMA
Leisl Ashby	WC Board of Education
Lorenzo Cropper	WC DES
Marilyn Williams	Wicomico County- Planning & Zoning
Melinda Stafford	Town of Hebron
Mark Rickards	Wicomico County- Parks & Recreation
Michele Ennis	Tri Community Mediation
Robert Souza	WC Board of Education
Roy Brewington	MD DHS Social Services
Sand Hoffman	Industry
Steve Schweikert	PRMC-Tidal Health
Tim Emge	Industry
Tony Rudy	Wicomico County

Hazard Mitigation Overview

A brief overview of hazard mitigation and the plan update process was provided for those stakeholders who did not attend the previous meeting held on January 21st.

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #2

March 25, 2021 9:30-11:00 AM

Guest Speakers

Guest speakers from the Maryland Emergency Management Agency and the City of Salisbury presented during the meeting.

- **What Is Maryland Emergency Management Agency (MEMA)/Mitigation?**
  - Co-Presenters Jaleesa Tate, Maryland State Hazard Mitigation Officer & Kayhla Cornell, Senior Hazard Mitigation Specialist

  A YouTube video was shared during the presentation, please see video link: https://www.youtube.com/watch?v=mmAsy3PbYes

  Information on the types and benefits of hazard mitigation, along with FEMA grant funding sources under the Hazard Mitigation Assistance Program were presented.

- **Port of Salisbury Feasibility Study**
  - Amanda Pollack, P.E., Director, Department Of Infrastructure And Development

  Information on the feasibility study components and timeline were presented. Opportunities for integrated information derived from the study into the Hazard Mitigation & Resilience Plan will be explored, specifically in relation to the flood hazard and hazardous materials.

2021 Hazard Identification Risk Assessment (HIRA) Results

One of the first steps in the planning process was to complete the Hazard Identification Risk Assessment. As shown in the orange text box, risk is the chance, whether high or low, that any hazard will occur and what is the severity or impact for that hazard. The HIRA focused on the (12) natural hazards identified for the 2021 Plan. FEMA requires natural hazards be identified and assessed.

Risk is the chance, high or low, that any hazard will occur and the severity or impact from that hazard.

In order to complete the HIRA, eight parameters were used for assessment as shown on the bulleted listing above.

- Death
- Injury
- Annualized Events

- Geographic Extent
- Property Damage
- Crop Damage
- Future Probability
- Community Perspective

The full methodology and hazard data table is Appendix A in the plan document and is also on the project website. When you visit the project website, go to the Hazard Risk & Vulnerability tab, click on the PDF to review.

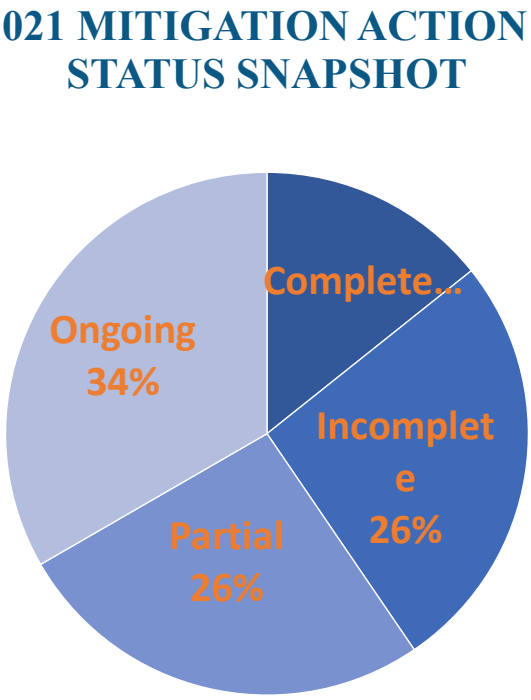
Below are the results for the HIRA and are also on the website under the Hazard Risk & Vulnerability Assessment tab. One (1) natural hazard was added "Pandemic and Emerging Infectious Disease" and a new plan chapter is under development.

Hazards that have the potential to impact Wicomico County are listed below. These hazards have been ranked by Stakeholder members, as follows: High, Medium-High, Medium, Medium-Low.

Natural Hazard Identification and Risk Assessment Ranking Results		
Hazards	2016 Hazard Ranking	2021 Hazard Ranking
*Flood (Flash/Heavy Rain)	Medium	Medium-High
Drought	Medium	Medium
Tornado	Medium	Medium-Low
Thunderstorm	Medium	High
High Wind	Medium-High	Medium
Wildfire	Medium	Medium
Earthquake	Low	Medium-Low
Extreme Cold – Cold/Wind Chill	Medium	Medium-Low
Winter Storm	Medium-High	Medium-Low
Extreme Heat	Medium	Medium
Coastal Storm and Flooding	Medium-High	Medium-High
Pandemic and Emerging Infectious Diseases	No 2016 Ranking	High

2017-2021 Mitigation Status Report

The status of individual action items identified in the previous plan was obtained from the fillable forms completed by stakeholders. Applicable mitigation items, such as those identified as incomplete, will be carried over for the 2021 plan. Stakeholders will review and discuss Mitigation Actions at Meeting #3 in May.



Project Website- Addition of MyCoast: Maryland Information

MyCoast: Maryland is a project of the Chesapeake & Coastal Service and Maryland Department of Natural Resources. The app is "a portal to collect and analyze pictures and data relating to flooding caused by precipitation or coastal events. If a person wishes to submit a report, all they need to do is install the MyCoast.org app and create an account. The app is currently available for iPhone and Android users and is free. Alternatively, a user may also use the web platform to submit information. At this time, the county will not include on project website, as they are evaluating the use of pictures displaying houses with flooding and potential implications for residents wanted to sale their homes.

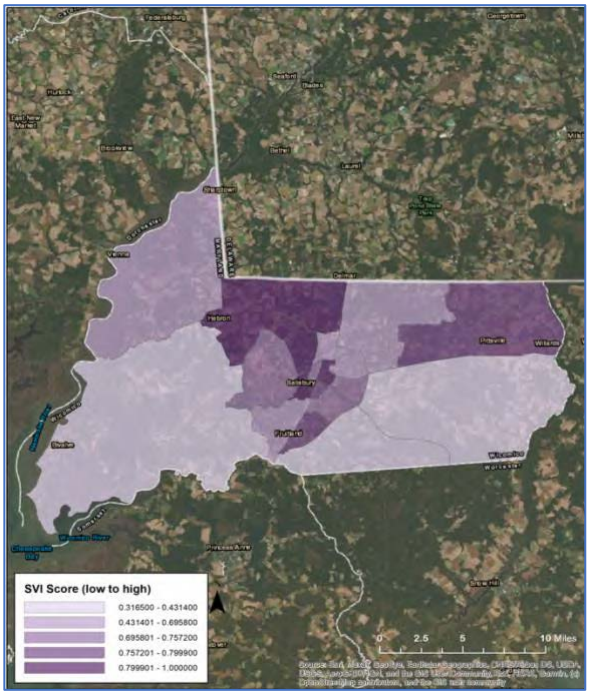
Critical and Public Facility Geodatabase

In order to complete the vulnerability assessment, we need to identify what is vulnerable to the hazards within the plan. Therefore, an updated critical & public facility geodatabase is needed. The 2017 geodatabase was updated by cross-refencing information with the county's data. Frank McKenzie, Planning and Zoning, provided current county data. This ensured the accuracy of the data which is important because these facilities will be used for applicable hazard vulnerability assessments.

The basic information for facilities was available however additional data columns were added for the purpose of assessing vulnerability. This included county parcel data such as account ID, year built, improvement value, number of building stories. As necessary, changes were made, or information added to those data cells that were empty. These attribute tables will continue to evolve during the vulnerability assessment. Additional columns will be included to note if the facility is impacted by a particular hazard. For example, a column for the 1% annual chance floodplain will be added and if a facility is within the floodplain, it will be noted yes and if the depth of flood is available, it will be included as well. This will be completed for other hazards such as for storm surge and sea level. This information will be integrated into the vulnerability assessment sections within hazard chapters.

Social Vulnerability

The next important plan update is the inclusion of a Social Vulnerability Index within hazard chapters. Literature on the importance of integrating social vulnerability analyses into hazard mitigation planning has existed for decades, but many hazard mitigation plans do not explicitly acknowledge or incorporate social vulnerability into their risk assessments or mitigation actions. This is due to several reasons, some of which include: a lack of access to demographic data at neighborhood levels, the lack of social capital and visibility of vulnerable populations, and lack of awareness and understanding of how to incorporate understandings of social vulnerability into hazard mitigation planning.



However, there are developed methods for integrating social vulnerability into hazard mitigation plans. The SVI method we are utilizing was originally developed specifically for the Center for Disease Control (CDC) and is designed to aid public health officials and emergency response planners identify vulnerable populations that most likely need support before, during, or after a hazard event. The SVI is calculated for the County overall (by census tract) and will also be calculated for hazards with a well-defined geographic extent. Currently, the existing SVI for Wicomico County utilizes 2018 ACS 5-year estimate data. The SVI included in this Plan Update, at the very least, includes 2019 ACS data, which is currently the best available demographic data to work with for this type of analysis. If the Census Bureau is on-time with the release of their 2020 data, then that will be utilized as extensively as possible for the SVI.

Public Survey

Assistance is needed with public outreach. The public survey is available on the project website and at the following link: https://www.surveymonkey.com/r/V6GHGQZ. Please consider sharing this link.

The **Lower Shore Vulnerable Populations Task Force- Language Workgroup** reviewed the project website and offered suggested changes specific to the public survey. Suggestions included the "use of more concise and clear language, avoiding more stilted style, so as to be more accessible to the community as a whole." As such, the public survey was modified.

Next Steps

- Meeting #2 Notes- Distributed to all stakeholders and uploaded to project website.
- Capability Assessment- Will need stakeholder input and review.
- Develop & collect new mitigation ideas.
- Promote project website and public survey.
- Update hazard vulnerability assessment and include social vulnerability.
- Continue Targeted Small Group Meetings: April-May 2021
- Meeting #3- May 2021

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #2

October 28, 2021 - 9:30-11:00 AM

The following members attended the Wicomico County Hazard Mitigation & Resilience Planning Committee (HMRPC) meeting on October 28th.

Name	Organization/Department
Amanda Pollack	City of Salisbury
Alyssa Hastings	City of Salisbury
Lori Carter	Wicomico County- Planning & Zoning
Sara Bynum-King	Town of Delmar
Darrin Scott	Salisbury Fire
Lt. Chris Truitt	Salisbury Fire
Lt. Christopher Shockley	Salisbury University Police
Donna Smith	MAC Maintaining Active Citizens, Inc.
Frank Cruice Perdue	Industry
Greg Grey	Wor-Wic College
Steve Garvin	Wicomico County DES
Lorenzo Cropper	Wicomico County DES
Marilyn Williams	Wicomico County- Planning & Zoning
Mark Richards	Wicomico County- Parks & Recreation
Roy Brewington	MD DHS Social Services
W. David Owens	WC Board of Education
Rochelle Tyler	PRMC-Tidal Health
Lori Brewster	Wicomico County- Health Department

Plan Status- Where are we?

A review of what has been accomplished to date was provided.

- Online hazard public survey will continue to be functional on the website. Public survey results as of October have been included in the plan update.
- Project website developed. Content has been updated periodically.
- New Hazard Identification Risk Assessment (HIRA) Completed
- Mitigation Status Report Completed
- Capabilities Assessment- Completed for the County, however we still need information from a couple municipalities.
- All working draft hazard chapters have been distributed for committee review and comment.
- New Threat Hazard Identification Risk Assessment (THIRA) completed with recommendations. A sub-committee was established to work specifically on the THIRA over the summer. The Active Assailant-THIRA has been included as an Appendix and is for "official use only."

WICOMICO COUNTY HAZARD MITIGATION & RESILIENCE PLANNING COMMITTEE
PLANNING COMMITTEE MEETING #2
October 28, 2021 - 9:30-11:00 AM

Grant Funding Opportunities

- FEMA requires state, local, tribal and territorial governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for hazard mitigation assistance projects.
  - FEMA provides federal funds for the Building Resilient Infrastructures and Communities (BRIC) grant program to states, local communities, tribes and territories for mitigation activities. BRIC is a FEMA annual hazard mitigation program. Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) authorizes this program. The priorities are to:
    - Incentivize natural hazard risk reduction activities that mitigate risk to public infrastructure
    - Prioritize benefits to disadvantaged communities
    - Mitigate risk to one or more community lifelines
    - Incorporate nature-based solutions
    - Enhance climate resilience and adaptation
    - Increase funding to applicants that facilitate the adoption and enforcement of the latest published editions of building codes
  - BRIC- **National Competition for Mitigation Projects: $919,000,000 (estimated).** Any funds that are not awarded from the State/Territory Allocation will be re-allocated to the national competition. Any funds that are not awarded from the Tribal Set-Aside will be re-allocated to the non-financial Direct Technical Assistance for tribes.
    - Generally, the cost share for this program is 75% federal/25% non-federal.
    - Economically disadvantaged rural communities are eligible for an increase in cost share up to 90% federal/10% non-federal.
  - **New FEMA Policy:** For certain non-critical actions involving structure elevation, dry floodproofing, and mitigation reconstruction in the **Special Flood Hazard Area a minimum of the base flood elevation plus 2 feet of freeboard will be required** (unless doing so would cause the project to be unable to meet applicable program cost-effectiveness requirements).
  - **Hazard Mitigation Grant Program (HMGP)** For eligible mitigation projects, HMGP funding can cover 75% of total project costs and states or communities cover the remaining share. Preparing and mitigating for the impacts of climate change, which is one of the most important threats facing the United States, requires the full collaboration of the Federal Government to support state, local, tribal, and territorial governments.
    - 4491DR Maryland $93,289,392
  - **Flood Mitigation Assistance (FMA) Grant** the Flood Mitigation Assistance Program is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.

  - The application period to apply for fiscal year 2021 (FY 2021) FMA funding will open on Sept. 30, 2021, and close at 3 p.m. on Jan. 28, 2022. FEMA encourages sub-applicants and applicants to apply. There is **$160 million available in FMA funding**.
- Additional grant opportunities will be included in Appendix K of the plan.

Mitigation Strategies

- **Goals & Objectives** were distributed as "read ahead" prior to the committee meeting. Goals and objectives were reviewed during the meeting, specifically those added as "new." Comments provided by meeting participants for both existing and new goals and objectives have been incorporated into the plan. Modified goals and objectives are attached.
- **Mitigation Actions** were distributed as "read ahead" prior to the committee meeting. During this portion of the meeting, participants:
  - Provided review comments and clarification to further refine the action items table. Discussion comments provided during the meeting and emailed comments from the "read ahead" materials were incorporated. Particular attention was given to "responsible entity" assigned to each action item. Follow-up targeted emails will be provided to ensure that municipal action items are correct. The updated Mitigation Action Items table is attached.
  - Each action item was categorized under six categories and identified "red" on mitigation action table.
    - **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.
    - **Property Protection.** Actions that involve the modification of existing critical and public facilities, buildings, structures, and public infrastructure to protect them from hazards. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and infrastructure modification.
    - **Public Education and Awareness.** Actions to inform and educate citizens, elected officials, and property owners about potential ways to mitigate for hazards that can occur in the County. Such actions include outreach programs, projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
    - **Natural Resource Protection.** Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural protection systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration preservation.
    - **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.
    - **Structural Projects.** Actions that involve the construction of structures to reduce the impact of a hazard event. Such structures include dams, levees, floodwalls, seawalls, retaining walls, barrier islands, and safe rooms.

Prioritization Process

All action items will be prioritized and a ranking of high, medium, or low will be assigned accordingly. Those action items that are raked as a high priority will be developed further into projects. Projects may include one or more action items, as applicable, and background information, costs, and potential funding sources will be identified.

- An online survey will be used as a tool for ranking purposes by committee meeting.
- The ranking process is based on the STAPLEE evaluation method uses the following criteria for evaluating mitigation actions: **Social, Technical, Administrative, Political, Legal, Economic, and Environmental**
- Information along with survey link will be distributed to all committee members.

Additional Comments and Discussion

Plan maintenance and implementation was discussed by meeting participants. Questions were posed regarding who is responsible to ensure that the plan is being maintained and that actions items and/or projects are being reviewed for status updates. The Department of Emergency Services will continue to be the lead agency for coordinating the hazard mitigation plan maintenance and implementation. However, the establishment of a formalized group to meet, at a minimum, two times per year, will be determined and included in the plan update.

Next Steps

- Meeting #3 Notes- Distributed to all stakeholders and uploaded to project website. (Distribution- October 28, 2021)
- Finalization of Mitigation Action Items (Comments due by November 5, 2021)
- Prioritization of Action Items by Committee Members (Online Survey) (Distributed Monday, November 8th with a return date of Friday November 12th)
- Completion of Chapter 14- Mitigation Strategies including projects (Completion November 17th)
- Draft Plan distribution to committee members on November 19, 2021. Please keep in mind all hazard chapters and other plan components have been distributed over the past few months for review and comment. This will essentially be the second opportunity for committee review and comment.
- MDEM Submittal- November 19, 2021
- FEMA Review- TBD
- County Adoption
- Municipal Adoption- Jurisdictions with land use authority.

SAMPLE MITIGATION ACTION PRIORITIZATION SURVEY - PREVENTION

Q1 Update 2006 Hazardous Materials Commodity Flow Studies for both US Route 13 and 50.

Answered: 6 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	83.33% 5	0.00% 0	16.67% 1	6	0.83
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	83.33% 5	0.00% 0	16.67% 1	6	0.83
Do you think the benefits of this mitigation action will exceed the likely costs?	83.33% 5	16.67% 1	0.00% 0	6	0.67
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	83.33% 5	16.67% 1	0.00% 0	6	0.67
Is this project consistent with environment goals?	100.00% 6	0.00% 0	0.00% 0	6	1.00

Q2 Request FEMA to develop and provide Flood Risk Products for sections of the County at risk to riverine flooding.

Answered: 6 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	83.33% 5	16.67% 1	0.00% 0	6	0.67
Do you think the benefits of this mitigation action will exceed the likely costs?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Is this project consistent with environment goals?	83.33% 5	16.67% 1	0.00% 0	6	0.67

Q3 High and significant hazard potential dams should be reviewed each time the project is scheduled for inspection, or at least once each 5 years. This allows for periodic changes in the assigned hazard potential category based on changed reservoir or downstream development. The Mitchell Pond #1 is close to 5 years since previous inspection, and therefore should be inspected to ensure there is no potential for dam failure.

Answered: 6 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	66.67% 4	33.33% 2	0.00% 0	6	0.33
Do you think the benefits of this mitigation action will exceed the likely costs?	100.00% 6	0.00% 0	0.00% 0	6	1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	83.33% 5	0.00% 0	16.67% 1	6	0.83
Is this project consistent with environment goals?	100.00% 6	0.00% 0	0.00% 0	6	1.00

MUNICIPAL INPUT

Town Of Hebron

QUESTIONNAIRE

Please complete the questions below for the Town of Hebron. This information will be included within the 2021 Wicomico County Hazard Mitigation Plan. FEMA requires participation by all municipalities who plan to adopt the 2021 Plan. To that end, we request that a representative(s) from your jurisdiction complete this questionnaire.

New Mitigation Ideas

Do you have any mitigation action items for your jurisdiction for inclusion in the 2021 Plan? If so, please provide action item and provide details, as available.

Keep flooded roadways for Hebron listed in the previous plan and add: Corner of Main Street and Maryland Avenue, low spot in roadway causes flooding issues.

With grant funding, a SWM survey was completed in August 2019 and construction of a water tower costing $1.3 million that will be completed by September 2022.

In order to determine current capabilities, the following questions have been developed for your review and input. Questions have been included under the following groups: Planning and Regulatory, Administrative and Technical, Financial, and Education and Outreach.

Planning and Regulatory

1. Does your jurisdiction have a comprehensive or master plan? If so, what year was it adopted? Does the plan include hazard risk areas and/or other hazard mitigation type information?

   Yes, there is a Master Plan in effect.

2. Does your jurisdiction have an emergency operations plan? If so, what year was it adopted?

   No, the Town does not have an EOP; the Town follows the County's EOP.

3. Does your jurisdiction have a continuity of operations plan? If so, what year was it adopted?

   The Town does not currently have a formal COOP. One is needed.

4. What Building Code/Year is your municipality using?

   The Town issues permits for Town items such as fences and sheds. Anything greater than 20'x12' in square footage goes to the County for approval/permit issuance.

5. Does your jurisdiction issue have land use authority- issue building permits?

   Yes

6. Does your jurisdiction have an adopted floodplain ordinance; or do you use Wicomico County's? If you use your own, what year was it adopted? Does your ordinance include freeboard (e.g., 1ft above Base Flood Elevation)?

   The Town uses the County adopted floodplain ordinance.

7. Has your jurisdiction acquired land for open space or public recreation?

   Not a the present time. The Town is looking at connecting Town land for a playground or community center within 5 years.

Administrative and Technical

Please complete as you are able.

Government Department & Staff Resources															
Community	Land Use Authority	Land Use/ Development Planning		Public Works & Engineering		Emergency Services (Includes Police & Fire)		Floodplain Manager		Town Manager		Fiscal Staff		Planning Commission	
	Y/N	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff
				Y	2					Y	1	Y	1		

8. Does your jurisdiction use a hazard warning/notification system? If so, what is the name of the system?

   The Town uses the County's hazard warning/notification system.

Financial

9. Does your jurisdiction plan to expend funding, including grant funding, on hazard mitigation and resilience projects within the next five years? If so, please provide amount and project description.

   At the present time, the Town does not plan to expend funding for HMP projects.

10. Does your jurisdiction have the ability to levy taxes for specific purposes? If so, please explain.

    Currently, the Town does not have the ability to levy taxes for specific purposes.

11. Do you use the Community Development Block Grant? If so, how has your community used this funding or plan to use this funding?

    The Town does not currently utilize the Community Block Grant funding.

12. Has your jurisdiction completed flood acquisitions or elevation projects? If so, please provide funding source, year and project description(s).

    The Town has not completed flood acquisition or elevation projects.

From:	Marc Henderson
To:	Virginia Smith; dodiek98@yahoo.com; Raye Ellen Thomas; Linda Powell
Cc:	Lorenzo Cropper; Michele King; Matthew Smith
Subject:	RE: Municipal Participation-2021 Wicomico County Hazard Mitigation & Resilience Plan
Date:	Wednesday, April 14, 2021 1:06:14 PM
Attachments:	image001.png image002.png

From the information I gathered from employees who have been here over 20 years, there has been no sever flooding in Fruitland's jurisdiction and no property damage due to flooding.

From: Virginia Smith <vsmith@smithp-d.com>
Sent: Wednesday, April 14, 2021 12:58 PM
To: Marc Henderson <mhenderson@cityoffruitland.com>; dodiek98@yahoo.com; Raye Ellen Thomas <rthomas@cityoffruitland.com>
Cc: Lorenzo Cropper <lcropper@wicomicocounty.org>; Michele King <mking@smithp-d.com>; Matthew Smith <msmith@smithp-d.com>
Subject: Re: Municipal Participation-2021 Wicomico County Hazard Mitigation & Resilience Plan

Thank you.

We see from the FEMA 1% annual chance flood event mapping that Fruitland includes small portions of floodplain. Specifically, Morris Mill Pond floodplain area. Has your jurisdiction been impacted by flooding in the past. If so, what were the impacts and/or damages?

SP&D
Smith Planning and Design

Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
http://smithp-d.com
Office: 301.724.7611
Mobile: 301.707.1173
vsmith@smithp-d.com

From: Marc Henderson <mhenderson@cityoffruitland.com>
Date: Tuesday, April 13, 2021 at 9:14 AM
To: Virginia Smith <vsmith@smithp-d.com>, dodiek98@yahoo.com <dodiek98@yahoo.com>, Raye Ellen Thomas <rthomas@cityoffruitland.com>
Cc: Lorenzo Cropper <lcropper@wicomicocounty.org>, Michele King <mking@smithp-d.com>, Matthew Smith <msmith@smithp-d.com>
Subject: RE: Municipal Participation-2021 Wicomico County Hazard Mitigation & Resilience

Plan

Please see attached

From: Virginia Smith <vsmith@smithp-d.com>
Sent: Friday, April 9, 2021 11:03 AM
To: dodiek98@yahoo.com; Marc Henderson <mhenderson@cityoffruitland.com>; Raye Ellen Thomas <rthomas@cityoffruitland.com>
Cc: Lorenzo Cropper <lcropper@wicomicocounty.org>; Michele King <mking@smithp-d.com>; Matthew Smith <msmith@smithp-d.com>
Subject: Municipal Participation-2021 Wicomico County Hazard Mitigation & Resilience Plan

Town of Fruitland- 2021 Wicomico County Hazard Mitigation & Resilience Plan

Attached is a fillable questionnaire that has been developed for your municipality. The information collected will be included within the 2021 Wicomico County Hazard Mitigation & Resilience Plan. FEMA requires participation by all municipalities who plan to adopt the 2021 Plan. To that end, we request that a representative(s) from the Town of Fruitland complete this questionnaire.

In addition, we are scheduling virtual meetings to discuss the questionnaire and new mitigation action items for each jurisdiction. Potential meeting dates include:

- May 3rd at 10 AM or 11 AM and
- May 6th at 3 PM.

Please reply at your earliest convenience. If you should have any questions, please do not hesitate to contact me at 301-724-7611.

Thank you.

SP&D
Smith Planning and Design

Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
http://smithp-d.com
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Mobile: 301.707.1173
vsmith@smithp-d.com

FRUITLAND
Maryland

QUESTIONNAIRE

Please complete the questions below for the City of Fruitland. This information will be included within the 2021 Wicomico County Hazard Mitigation Plan. FEMA requires participation by all municipalities who plan to adopt the 2021 Plan. To that end, we request that a representative(s) from your jurisdiction complete this questionnaire.

Mitigation Status Update

Action items identified in the 2015 Wicomico County Hazard Mitigation Plan for your jurisdiction are in need of a status update and/or we have further questions.

- Mr. Gibbons indicated that Fruitland has not procured chippers for tree removal following severe storms. Should this action item be included in the 2021 Plan?

We have not procured a wood chipper as of this date. Yes, please include in the 2021 plan.

New Mitigation Ideas

Do you have any mitigation action items for your jurisdiction for inclusion in the 2021 Plan? If so, please provide action item and provide details, as available.

None to report.

In order to determine current capabilities, the following questions have been developed for your review and input. Questions have been included under the following groups: Planning and Regulatory, Administrative and Technical, Financial, and Education and Outreach.

Planning and Regulatory

1. Does your jurisdiction have a comprehensive or master plan? If so, what year was it adopted? Does the plan include hazard risk areas and/or other hazard mitigation type information?

We do not. We follow the County's

2. Does your jurisdiction have an emergency operations plan? If so, what year was it adopted?

Wicomico County's

3. Does your jurisdiction have a continuity of operations plan? If so, what year was it adopted?

Don't know what that is.

4. What Building Code/Year is your municipality using?

ICC 2018

5. Does your jurisdiction issue have land use authority- issue building permits?

Yes, however electrical and plumbing permits are issued and inspected by the Wicomico County.

6. Does your jurisdiction have an adopted floodplain ordinance; or do you use Wicomico County's? If you use your own, what year was it adopted? Does your ordinance include freeboard (e.g., 1ft above Base Flood Elevation)?

Yes, June 9, 2015

7. Has your jurisdiction acquired land for open space or public recreation?

Nothing since 2015

Administrative and Technical

Please complete as you are able.

Government Department & Staff Resources															
Community	Land Use Authority		Land Use/ Development Planning		Public Works & Engineering		Emergency Services (Includes Police & Fire)		Floodplain Manager		GIS		Fiscal Staff		Planning Commission	
	Y/N		Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff
			y	1	y	16							y	7	y	5

8. Does your jurisdiction use a hazard warning/notification system? If so, what is the name of the system?

We use Wicomico

Financial

9. Does your jurisdiction plan to expend funding, including grant funding, on hazard mitigation and resilience projects within the next five years? If so, please provide amount and project description.

None to date

10. Does your jurisdiction have the ability to levy taxes for specific purposes? If so, please explain.

Wicomico

11. Do you use the Community Development Block Grant? If so, how has your community used this funding or plan to use this funding?

No

12. Has your jurisdiction completed flood acquisitions or elevation projects? If so, please provide funding source, year and project description(s).

No

Education and Outreach

13. Does your jurisdiction work with any local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, and vulnerable populations, etc.?

Not currently

14. Does your jurisdiction have any ongoing public education or information program (e.g., responsible water use, fire safety, household emergency preparedness, or environmental education)?

yes

Q1 Include green infrastructure design into mitigation efforts to improve drainage and water retention. Also, incorporate green infrastructure such as open space and tree plantings in community designs to improve public health and expand recreational space.

Answered: 1 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the benefits of this mitigation action will exceed the likely costs?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Is this project consistent with environment goals?	100.00% 1	0.00% 0	0.00% 0	1	1.00

Q2 As heat risks increase, it is important to educate and inform the public about the dangers of heat and how to avoid them. Continue efforts to conduct public information and awareness campaigns throughout the summer months.

Answered: 1 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the benefits of this mitigation action will exceed the likely costs?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Is this project consistent with environment goals?	0.00% 0	0.00% 0	100.00% 1	1	0.00

Q3 Ensure that all health-related announcements, information, and materials are accessible to all socially vulnerable groups, including but not limited to those: over the age of 65, under the age of 5, with limited English-speaking proficiency, with disability, and those at or below the poverty line. Coordinate with municipalities on distribution.

Answered: 1 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think the benefits of this mitigation action will exceed the likely costs?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Is this project consistent with environment goals?	0.00% 0	0.00% 0	100.00% 1	1	0.00

Q4 Conduct county wide dry hydrant assessment to ascertain the need for additional dry hydrants.

Answered: 1 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think the benefits of this mitigation action will exceed the likely costs?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	0.00% 0	100.00% 1	0.00% 0	1	-1.00
Is this project consistent with environment goals?	0.00% 0	100.00% 1	0.00% 0	1	-1.00

Q5 Procure chippers needed for tree removal from storms.

Answered: 1 Skipped: 0

	YES	NO	NULL	TOTAL	WEIGHTED AVERAGE
Do you think there would be community acceptance/general support for this mitigation action?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think implementation of this mitigation action will enhance the health and safety of the community?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the County/Town will be able to sufficiently staff and/or provide technical support to implement this mitigation action?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the benefits of this mitigation action will exceed the likely costs?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Do you think the maintenance requirements for this option will be affordable and not provide an undue burden on the County or Town?	100.00% 1	0.00% 0	0.00% 0	1	1.00
Is this project consistent with environment goals?	100.00% 1	0.00% 0	0.00% 0	1	1.00

From:	Virginia Smith
To:	kortney.robinson711@gmail.com; deputymard@yahoo.com
Cc:	Lorenzo Cropper; Michele King; Matthew Smith
Subject:	Wicomico County Hazard Mitigation & Resilience Plan
Date:	Friday, October 29, 2021 4:13:14 PM
Attachments:	Town of Mardela Springs- Information Collection.docx image001.png

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We are pleased to inform you that we are in the final stages of the plan update. Thank you for providing information specific to your municipality. We have just a few more questions and a couple of items for your review and comment that are specific to your jurisdiction. Please see the attachment.

Thank you for your assistance.

SP&D

Smith Planning and Design

Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
http://smithp-d.com
Office: 301.724.7611
Mobile: 301.707.1173
vsmith@smithp-d.com

Email: October 29, 2021 - No Changes Noted

Town of Mardela Springs

In our effort to complete the draft Wicomico County Hazard Mitigation & Resilience Plan, we are in need of additional information from your municipality.

The table below was included in the previous plan document. Please review and modify/delete the information, as necessary. Also, let us know if you would like to add to the table. Finally, would you still prioritize the issues the same and the "2016 Ranking?"

Flood Related Issue	Evacuation Issue (Y/N)	SWM or ElevationProblem	2016 Ranking (High, Medium, Low)
Municipal Roads			
Town of Mardela Springs Main St. and Main St. Extended to Route 50.	Yes	SWM	Low
Town of Mardela Springs Bridge St. to Main St. and Athol Rd.	Yes	SWM	Low
Town of Mardela Springs Station St. to Route 50	Yes	SWM	Low
Town of Mardela Springs Spring Grove Rd. to Route 50	Yes	SWM	Low
Town of Mardela Springs Bratton St. to Route 50	Yes	SWM	Low

The following mitigation action items were identified for your municipality or labeled as "municipalities" under the responsible entity column and are included in the table below. Please review and comment on these action items, as appropriate. Also, please let us know if you have any mitigation action items specific to the Town of Mardela Springs. We will add those to the existing table.

ID #	ACTION	RESPONSIBLE ENTITY	TIME-FRAME	HAZARD
11	Include green infrastructure design into mitigation efforts to improve drainage and water retention. Also, incorporate green infrastructure such as open space and tree plantings in community designs to improve public health and expand recreational space.	Municipalities	Long-term	Flood, Coastal, Climate Change
23	As heat risks increase, it is important to educate and inform the public about the dangers of heat and how to avoid them. Continue efforts to conduct public information and awareness campaigns throughout the summer months.	Emergency Services, Municipalities	Short-term	Extreme Heat, Drought & Wildfires
27	Ensure that all health-related announcements, information, and materials are accessible to all socially vulnerable groups, including but not limited to those: over the age of 65, under the age of 5, with limited English-speaking proficiency, with disability, and those at or below the poverty line. Coordinate with municipalities on distribution.	Health Department, Municipalities	Short-term	Pandemic and Emerging Infectious Disease
33	Conduct county wide dry hydrant assessment to ascertain the need for additional dry hydrants.	DPE, Emergency Services, Municipalities	Long-term	Wildfire

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, April 01, 2021 12:23:15 PM
Last Modified: Thursday, April 01, 2021 12:26:49 PM
Time Spent: 00:03:34

Q1

Do you live in Wicomico County?

Yes

Q2

Where in Wicomico County do you live?

Mardela Springs

Q3

what age group are you in?

45-64

Q4

Do you work in Wicomico County?

Yes

Q5

Please indicate your level of concern for each hazard.

	Level of Concern
Coastal Storms - Coastal Storms include hurricanes, tropical storm, and tropical depressions. The most common coastal storms that impact Wicomico County are Category One Hurricanes and Tropical Storms. The three probable hazard impacts from coastal storms are hurricane wind, coastal flooding and storm surge.	**Very Concerned**
Climate Change - Climate change is caused by both natural and human factors. Natural factors include earth's orbit, solar activity or volcanic eruptions. The major human factor affecting climate change is greenhouse gases.	**Concerned**
Shoreline Erosion & Sea Level Rise - Shoreline erosion hazard in Wicomico County is influenced by natural conditions, which include soil composition, weather, topography, water depth, fetch, surface water/groundwater conditions. Sea level rise is another factor contributing to shore erosion in Maryland. Sea level rise contributes to shoreline erosion by influencing and exacerbating on-going coastal processes, making coastal areas more vulnerable to extreme events.	**Very Concerned**
Severe Weather - Severe weather as described herein includes thunderstorms, tornadoes, lightning, hail, and wind. The effects of thunderstorms, tornadoes, hail, lightning, and wind may cause many types of hazards including power outages, communication failures, road closures, and loss of infrastructure.	**Very Concerned**
Flooding - There are two different types of flooding that are associated with rivers and streams: flash flooding and riverine flooding. Riverine flooding is caused by persistent moderate or heavy rain over one or more days. According to the FEMA Flood Insurance Study, Wicomico County has a low lying, relatively undisturbed topography, high seasonal water tables, poor drainage and high soil runoff characteristics. These factors combine to result in a high flooding potential.	**Very Concerned**
Winter Storms - Winter storms can cause a wide variety of impacts including school, government and business closings, traffic accidents, power outages, loss of communication, and damage to buildings such as a roof collapsing due to the amount of snow pack. Sleet, freezing rain, snow, and extremely cold temperatures are all associated with winter storms.	**Concerned**
Drought & Wildfire - The hazard risks from both drought and wildfire occur during the same months of the year, specifically from April to November. Wildfires and drought can cause both ecological and socioeconomic problems and have the potential to affect a large portion of the population.	**Concerned**
Human Impacted Hazards - Human impacted hazards include dam failure, transportation and fixed-site hazardous materials events, airplane accidents, and rail accidents. The effects of human impacted hazards include power outages, communication failures, road closures, loss of infrastructure, evacuation, and loss of life. The location of their occurrence and effects may be predicted to some degree by past incidents.	**Concerned**
Pandemic & Emerging Infectious Disease - Pandemics happen when a new virus emerges to infect people and can spread between people sustainably. This hazard strains the healthcare system, requires school closures, causes high rates of illness. Previous events that exemplify this hazard include the 1918 Spanish flu, the 2003 SARS outbreak (which had pandemic potential), 2009 Swine flu influenza, and now COVID-19.	**Very Concerned**
Active Assailant - Per the Department of Homeland Security (DHS) the definition of an Active Assailant is "an individual actively engaged in killing or attempting to kill people in a confined and populated area," noting that, "in most cases, active shooters use firearm(s) and there is generally no pattern or method to their selection of victims."	**Concerned**

Q6

Which of these do you think will affect your community? (Please check all that apply.)

Shoreline Erosion & Sea Level Rise,

Severe Weather ,

Flooding ,

Pandemic & Emerging Infectious Disease

Q7

Are you worried about any other hazards/emergencies?

Respondent skipped this question

Q8

Please indicate the group(s), if it is listed, or describe it in the box below.

Age Group,

Disabled or Mobility Impaired/Medically Dependent,

Homeless

Q9

Based on the group(s) you have selected, please select which hazard events you feel may affect those the most? (Multiple options may be chosen.)

Coastal Storms ,

Shoreline Erosion & Sea Level Rise ,

Flooding ,

Winter Storms ,

Severe Weather ,

Drought & Wildfire,

Pandemic & Emerging Infectious Disease,

Active Assailant

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Thursday, April 01, 2021 1:50:04 PM
Last Modified: Thursday, April 01, 2021 1:55:18 PM
Time Spent: 00:05:14

Q1

Do you live in Wicomico County?

Yes

Q2

Where in Wicomico County do you live?

Pittsville

Q3

what age group are you in?

65 & older

Q4

Do you work in Wicomico County?

Yes

Q5

Please indicate your level of concern for each hazard.

	Level of Concern
Coastal Storms - Coastal Storms include hurricanes, tropical storm, and tropical depressions. The most common coastal storms that impact Wicomico County are Category One Hurricanes and Tropical Storms. The three probable hazard impacts from coastal storms are hurricane wind, coastal flooding and storm surge.	**Very Concerned**
Climate Change - Climate change is caused by both natural and human factors. Natural factors include earth's orbit, solar activity or volcanic eruptions. The major human factor affecting climate change is greenhouse gases.	**Somewhat Concerned**
Shoreline Erosion & Sea Level Rise - Shoreline erosion hazard in Wicomico County is influenced by natural conditions, which include soil composition, weather, topography, water depth, fetch, surface water/groundwater conditions. Sea level rise is another factor contributing to shore erosion in Maryland. Sea level rise contributes to shoreline erosion by influencing and exacerbating on-going coastal processes, making coastal areas more vulnerable to extreme events.	**Concerned**
Severe Weather - Severe weather as described herein includes thunderstorms, tornadoes, lightning, hail, and wind. The effects of thunderstorms, tornadoes, hail, lightning, and wind may cause many types of hazards including power outages, communication failures, road closures, and loss of infrastructure.	**Very Concerned**
Flooding - There are two different types of flooding that are associated with rivers and streams: flash flooding and riverine flooding. Riverine flooding is caused by persistent moderate or heavy rain over one or more days. According to the FEMA Flood Insurance Study, Wicomico County has a low lying, relatively undisturbed topography, high seasonal water tables, poor drainage and high soil runoff characteristics. These factors combine to result in a high flooding potential.	**Somewhat Concerned**
Winter Storms - Winter storms can cause a wide variety of impacts including school, government and business closings, traffic accidents, power outages, loss of communication, and damage to buildings such as a roof collapsing due to the amount of snow pack. Sleet, freezing rain, snow, and extremely cold temperatures are all associated with winter storms.	**Concerned**
Drought & Wildfire - The hazard risks from both drought and wildfire occur during the same months of the year, specifically from April to November. Wildfires and drought can cause both ecological and socioeconomic problems and have the potential to affect a large portion of the population.	**Somewhat Concerned**
Human Impacted Hazards - Human impacted hazards include dam failure, transportation and fixed-site hazardous materials events, airplane accidents, and rail accidents. The effects of human impacted hazards include power outages, communication failures, road closures, loss of infrastructure, evacuation, and loss of life. The location of their occurrence and effects may be predicted to some degree by past incidents.	**Somewhat Concerned**
Pandemic & Emerging Infectious Disease - Pandemics happen when a new virus emerges to infect people and can spread between people sustainably. This hazard strains the healthcare system, requires school closures, causes high rates of illness. Previous events that exemplify this hazard include the 1918 Spanish flu, the 2003 SARS outbreak (which had pandemic potential), 2009 Swine flu influenza, and now COVID-19.	**Very Concerned**
Active Assailant - Per the Department of Homeland Security (DHS) the definition of an Active Assailant is "an individual actively engaged in killing or attempting to kill people in a confined and populated area," noting that, "in most cases, active shooters use firearm(s) and there is generally no pattern or method to their selection of victims."	**Very Concerned**

Q6

Which of these do you think will affect your community? (Please check all that apply.)

Coastal Storm ,

Severe Weather ,

Winter Storms,

Flooding ,

Drought & Wildfire,

Pandemic & Emerging Infectious Disease

Q7

Are you worried about any other hazards/emergencies?

No

Q8

Please indicate the group(s), if it is listed, or describe it in the box below.

Age Group,

Disabled or Mobility Impaired/Medically Dependent

Q9

Based on the group(s) you have selected, please select which hazard events you feel may affect those the most? (Multiple options may be chosen.)

Coastal Storms ,

Flooding ,

Winter Storms ,

Severe Weather ,

Drought & Wildfire,

Pandemic & Emerging Infectious Disease

QUESTIONNAIRE

Please complete the questions below for the Town of Pittsville. This information will be included within the 2021 Wicomico County Hazard Mitigation Plan. FEMA requires participation by all municipalities who plan to adopt the 2021 Plan. To that end, we request that a representative(s) from your jurisdiction complete this questionnaire.

New Mitigation Ideas

Do you have any mitigation action items for your jurisdiction for inclusion in the 2021 Plan? If so, please provide action item and provide details, as available.

1. Conduct a Stormwater Management Assessment to evaluate:
   a. Roadside drainage ditch assessment for conveyance and adequacy, including maintenance.
   b. Regional Stormwater Detention Basin to attenuate stormwater runoff prior to discharge to Pocomoke River.

In order to determine current capabilities, the following questions have been developed for your review and input. Questions have been included under the following groups: Planning and Regulatory, Administrative and Technical, Financial, and Education and Outreach.

Planning and Regulatory

1. Does your jurisdiction have a comprehensive or master plan? If so, what year was it adopted? Does the plan include hazard risk areas and/or other hazard mitigation type information?

   Yes, the Town of Pittsville has a comp/master plan last updated in 2019.

2. Does your jurisdiction have an emergency operations plan? If so, what year was it adopted?

   No, the Town of Pittsville follows the County's EOP.

3. Does your jurisdiction have a continuity of operations plan? If so, what year was it adopted?

   No COOP has been prepared for the Town.

4. What Building Code/Year is your municipality using?

   The Town of Pittsville follows the County building codes.

5. Does your jurisdiction issue have land use authority- issue building permits?

   Yes, it is a joint permit. The Town of Pittsville issues zoning permits; building permits are issued by the County.

6. Does your jurisdiction have an adopted floodplain ordinance; or do you use Wicomico County's? If you use your own, what year was it adopted? Does your ordinance include freeboard (e.g., 1ft above Base Flood Elevation)?

   The Town of Pittsville follows the County's adopted floodplain ordinance.

7. Has your jurisdiction acquired land for open space or public recreation?

   The Town of Pittsville has not acquired land for open space or public recreation.

Administrative and Technical

Please complete as you are able.

Government Department & Staff Resources															
Community	Land Use Authority	Land Use/ Development Planning		Public Works & Engineering		Emergency Services (Includes Police & Fire)		Floodplain Manager		GIS		Fiscal Staff		Planning Commission	
	Y/N	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff
Pittsville	Y	Y	1	Y	3	N		N		N		Y	2	Y	5

8. Does your jurisdiction use a hazard warning/notification system? If so, what is the name of the system?

   The Town of Pittsville utilizes the County's hazard warning /notification system.

Financial

9. Does your jurisdiction plan to expend funding, including grant funding, on hazard mitigation and resilience projects within the next five years? If so, please provide amount and project description.

   No.

10. Does your jurisdiction have the ability to levy taxes for specific purposes? If so, please explain.

    No.

11. Do you use the Community Development Block Grant? If so, how has your community used this funding or plan to use this funding?

    Yes, the Town utilizes Block Grants to fund the position of Town Manager.

12. Has your jurisdiction completed flood acquisitions or elevation projects? If so, please provide funding source, year and project description(s).

    No.

Education and Outreach

13. Does your jurisdiction work with any local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, and vulnerable populations, etc.?

    No.

14. Does your jurisdiction have any ongoing public education or information program (e.g., responsible water use, fire safety, household emergency preparedness, or environmental education)?

    The local Fire Company provides fire prevention and safety outreach education information.

From:	Virginia Smith
To:	bluehen1@peoplepc.com; sharptown@comcast.net; s_adkins777@comcast.net
Cc:	Lorenzo Cropper; Matthew Smith; Michele King
Subject:	Wicomico County Hazard Mitigation & Resilience Plan
Date:	Friday, October 29, 2021 3:28:53 PM
Attachments:	Town of Sharptown- Information Collection.docx image001.png

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We are pleased to inform you that we are in the final stages of the plan update. Thank you for providing information specific to your municipality. We have just a few more questions and a couple of items for your review and comment that are specific to your jurisdiction. Please see the attachment.

Thank you for your assistance.

SP&D
Smith Planning and Design

Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
http://smithp-d.com
Office: 301.724.7611
Mobile: 301.707.1173
vsmith@smithp-d.com

Email: October 29, 2021 - No Changes Noted.

Town of Sharptown

In our effort to complete the draft Wicomico County Hazard Mitigation & Resilience Plan, we are in need of additional information from your municipality.

The following mitigation action items were identified for your municipality or labeled as "municipalities" under the responsible entity column and are included in the table below. Please review and comment on these action items, as appropriate. Also, please let us know if you have additional mitigation action items. We will add those to the existing table.

ID #	ACTION	RESPONSIBLE ENTITY	TIME-FRAME	HAZARD
12	Due to increased storm severity and projected sea-level rise, consider mitigation measures for the following sanitary facilities: o Salisbury Pumping Station – 611 Ridge Road o Salisbury Pumping Station M Park – North Park Drive o Salisbury Sewage Pumping Plant – 100 Delaware Avenue o Sharptown Sewer Plant – Little Water Street	Town of Sharptown	Short-term	Flood, Coastal,Sea Level Rise
21	Target residents and businesses for outreach campaign preparedness in high hazard areas such as the 1 percent annual chance flood hazard area. Note: This action item is specific to SFHA and structures.	Town of Sharptown	Long-term	Flood
11	Include green infrastructure design into mitigation efforts to improve drainage and water retention. Also, incorporate green infrastructure such as open space and tree plantings in community designs to improve public health and expand recreational space.	Municipalities	Long-term	Flood, Coastal, Climate Change
23	As heat risks increase, it is important to educate and inform the public about the dangers of heat and how to avoid them. Continue efforts to conduct public information and awareness campaigns throughout the summer months.	Emergency Services, Municipalities	Short-term	Extreme Heat, Drought & Wildfires
27	Ensure that all health-related announcements, information, and materials are accessible to all socially vulnerable groups, including but not limited to those: over the age of 65, under the age of 5, with limited English-speaking proficiency, with disability, and those at or below the poverty line. Coordinate with municipalities on distribution.	Health Department, Municipalities	Short-term	Pandemic and Emerging Infectious Disease
33	Conduct county wide dry hydrant assessment to ascertain the need for additional dry hydrants.	DPE, Emergency Services, Municipalities	Long-term	Wildfire

QUESTIONNAIRE

Please complete the questions below for the Town of Sharptown. This information will be included within the 2021 Wicomico County Hazard Mitigation Plan. FEMA requires participation by all municipalities who plan to adopt the 2021 Plan. To that end, we request that a representative(s) from your jurisdiction complete this questionnaire.

New Mitigation Ideas

Do you have any mitigation action items for your jurisdiction for inclusion in the 2021 Plan? If so, please provide action item and provide details, as available.

In order to determine current capabilities, the following questions have been developed for your review and input. Questions have been included under the following groups: Planning and Regulatory, Administrative and Technical, Financial, and Education and Outreach.

Planning and Regulatory

1. Does your jurisdiction have a comprehensive or master plan? If so, what year was it adopted? Does the plan include hazard risk areas and/or other hazard mitigation type information?

   Yes, the Town of Sharptown has a comp/master plan that was last updated/adopted in 2008.

2. Does your jurisdiction have an emergency operations plan? If so, what year was it adopted?

   No.

3. Does your jurisdiction have a continuity of operations plan? If so, what year was it adopted?

   No.

4. What Building Code/Year is your municipality using?

   The Town of Sharptown is using 2015 building codes.

5. Does your jurisdiction issue have land use authority- issue building permits?

   Yes, the Town of Sharptown has joint jurisdiction and building permits are joint Town/County.

6. Does your jurisdiction have an adopted floodplain ordinance; or do you use Wicomico County's? If you use your own, what year was it adopted? Does your ordinance include freeboard (e.g., 1ft above Base Flood Elevation)?

   The Town of Sharptown follows the County's adopted floodplain ordinance.

7. Has your jurisdiction acquired land for open space or public recreation?

   The Town of Sharptown purchased an old school from the County to be converted into a Community Center.

Administrative and Technical

Please complete as you are able.

Government Department & Staff Resources															
Community	Land Use Authority	Land Use/ Development Planning		Public Works & Engineering		Emergency Services (Includes Police & Fire)		Floodplain Manager		GIS		Fiscal Staff		Planning Commission	
	Y/N	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff
Sharptown	N	N		Y	2	N		N		N		Y	1	Y	5

8. Does your jurisdiction use a hazard warning/notification system? If so, what is the name of the system?

   The Town of Sharptown utilizes the County's hazard warning/notification system.

Financial

9. Does your jurisdiction plan to expend funding, including grant funding, on hazard mitigation and resilience projects within the next five years? If so, please provide amount and project description.

   No. However, the Town of Sharptown currently has a grant from DNR to complete a shoreline erosion project along the Nanticoke River in the form of bulkhead repair to be completed in 2021.

10. Does your jurisdiction have the ability to levy taxes for specific purposes? If so, please explain.

    No.

11. Do you use the Community Development Block Grant? If so, how has your community used this funding or plan to use this funding?

    Yes, the Town utilizes Block Grants to fund the position of Grants Administrator.

12. Has your jurisdiction completed flood acquisitions or elevation projects? If so, please provide funding source, year and project description(s).

    No.

Education and Outreach

13. Does your jurisdiction work with any local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, and vulnerable populations, etc.?

    No.

14. Does your jurisdiction have any ongoing public education or information program (e.g., responsible water use, fire safety, household emergency preparedness, or environmental education)?

    The local Fire Company provides fire prevention and safety outreach education information.

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Tuesday, January 26, 2021 8:10:18 AM
Last Modified: Tuesday, January 26, 2021 8:16:06 AM
Time Spent: 00:05:47

Q1

Do you live in Wicomico County?

Yes

Q2

Where in Wicomico County do you live?

Willards

Q3

what age group are you in?

65 & older

Q4

Do you work in Wicomico County?

Yes

Q5

Please indicate your level of concern for each hazard.

	Level of Concern
Coastal Storms - Coastal Storms include hurricanes, tropical storm, and tropical depressions. The most common coastal storms that impact Wicomico County are Category One Hurricanes and Tropical Storms. The three probable hazard impacts from coastal storms are hurricane wind, coastal flooding and storm surge.	**Somewhat Concerned**
Climate Change - Climate change is caused by both natural and human factors. Natural factors include earth's orbit, solar activity or volcanic eruptions. The major human factor affecting climate change is greenhouse gases.	**Somewhat Concerned**
Shoreline Erosion & Sea Level Rise - Shoreline erosion hazard in Wicomico County is influenced by natural conditions, which include soil composition, weather, topography, water depth, fetch, surface water/groundwater conditions. Sea level rise is another factor contributing to shore erosion in Maryland. Sea level rise contributes to shoreline erosion by influencing and exacerbating on-going coastal processes, making coastal areas more vulnerable to extreme events.	**Somewhat Concerned**
Severe Weather - Severe weather as described herein includes thunderstorms, tornadoes, lightning, hail, and wind. The effects of thunderstorms, tornadoes, hail, lightning, and wind may cause many types of hazards including power outages, communication failures, road closures, and loss of infrastructure.	**Somewhat Concerned**
Flooding - There are two different types of flooding that are associated with rivers and streams: flash flooding and riverine flooding. Riverine flooding is caused by persistent moderate or heavy rain over one or more days. According to the FEMA Flood Insurance Study, Wicomico County has a low lying, relatively undisturbed topography, high seasonal water tables, poor drainage and high soil runoff characteristics. These factors combine to result in a high flooding potential.	**Somewhat Concerned**
Winter Storms - Winter storms can cause a wide variety of impacts including school, government and business closings, traffic accidents, power outages, loss of communication, and damage to buildings such as a roof collapsing due to the amount of snow pack. Sleet, freezing rain, snow, and extremely cold temperatures are all associated with winter storms.	**Somewhat Concerned**
Drought & Wildfire - The hazard risks from both drought and wildfire occur during the same months of the year, specifically from April to November. Wildfires and drought can cause both ecological and socioeconomic problems and have the potential to affect a large portion of the population.	**Somewhat Concerned**
Human Impacted Hazards - Human impacted hazards include dam failure, transportation and fixed-site hazardous materials events, airplane accidents, and rail accidents. The effects of human impacted hazards include power outages, communication failures, road closures, loss of infrastructure, evacuation, and loss of life. The location of their occurrence and effects may be predicted to some degree by past incidents.	**Not Concerned**
Pandemic & Emerging Infectious Disease - Pandemics happen when a new virus emerges to infect people and can spread between people sustainably. This hazard strains the healthcare system, requires school closures, causes high rates of illness. Previous events that exemplify this hazard include the 1918 Spanish flu, the 2003 SARS outbreak (which had pandemic potential), 2009 Swine flu influenza, and now COVID-19.	**Somewhat Concerned**

	Level of Concern
Active Assailant - Per the Department of Homeland Security (DHS) the definition of an Active Assailant is “an individual actively engaged in killing or attempting to kill people in a confined and populated area,” noting that, “in most cases, active shooters use firearm(s) and there is generally no pattern or method to their selection of victims.”	**Somewhat Concerned**

Q6

Which of these do you think will affect your community? (Please check all that apply.)

Climate Change,

Severe Weather ,

Winter Storms,

Flooding ,

Drought & Wildfire

Q7

Are you worried about any other hazards/emergencies?

no

Q8

Please indicate the group(s), if it is listed, or describe it in the box below.

Age Group

Q9

Based on the group(s) you have selected, please select which hazard events you feel may affect those the most? (Multiple options may be chosen.)

Climate Change,

Flooding ,

Winter Storms ,

Severe Weather ,

Drought & Wildfire,

Pandemic & Emerging Infectious Disease

QUESTIONNAIRE

Please complete the questions below for the Town of Willards. This information will be included within the 2021 Wicomico County Hazard Mitigation Plan. FEMA requires participation by all municipalities who plan to adopt the 2021 Plan. To that end, we request that a representative(s) from your jurisdiction complete this questionnaire.

Mitigation Status Update

Action items identified in the 2015 Wicomico County Hazard Mitigation Plan for your jurisdiction are in need of a status update and/or we have further questions.

- The Town of Willards identified the need for a generator at each storage lift station. Have either or both of these generators been purchased and installed? If not, should this action item be included 2021 Plan?

  According to the Mitigation Actions Questionnaire, this item is listed as incomplete and therefore will be included as an Action Item is the 2021 Plan Update.

New Mitigation Ideas

Do you have any mitigation action items for your jurisdiction for inclusion in the 2021 Plan? If so, please provide action item and provide details, as available.

Conduct a Stormwater Management Assessment to evaluate:

a. Roadside drainage ditch assessment for conveyance and adequacy, including maintenance.
b. Regional Stormwater Detention Basin to attenuate stormwater runoff prior to discharge to Pocomoke River.

In order to determine current capabilities, the following questions have been developed for your review and input. Questions have been included under the following groups: Planning and Regulatory, Administrative and Technical, Financial, and Education and Outreach.

Planning and Regulatory

1. Does your jurisdiction have a comprehensive or master plan? If so, what year was it adopted? Does the plan include hazard risk areas and/or other hazard mitigation type information?

   Yes, the Town of Willards has a comp/master plan that was last updated/adopted in 2020.

2. Does your jurisdiction have an emergency operations plan? If so, what year was it adopted?

   Yes the Town of Willards as an EOP that was last adopted in 2019.

3. Does your jurisdiction have a continuity of operations plan? If so, what year was it adopted?

   Yes, the Town of Willards has a COOP adopted in 2009.

4. What Building Code/Year is your municipality using?

   The Town of Willards is using 2015 building codes.

5. Does your jurisdiction issue have land use authority- issue building permits?

   Yes, the Town of Willards has joint jurisdiction and building permits are joint Town/County.

6. Does your jurisdiction have an adopted floodplain ordinance; or do you use Wicomico County's? If you use your own, what year was it adopted? Does your ordinance include freeboard (e.g., 1ft above Base Flood Elevation)?

   The Town of Willards follows the County's adopted floodplain ordinance.

7. Has your jurisdiction acquired land for open space or public recreation?

   The Town of Willards has not acquired land for open space or public recreation.

Administrative and Technical

Please complete as you are able.

Government Department & Staff Resources															
Community	Land Use Authority	Land Use/ Development Planning		Public Works & Engineering		Emergency Services (Includes Police & Fire)		Floodplain Manager		GIS		Fiscal Staff		Planning Commission	
	Y/N	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff	Y/N	# of Staff
Willards	Y	Y	1	Y	1	N		N		N		Y	2	Y	5

8. Does your jurisdiction use a hazard warning/notification system? If so, what is the name of the system?

   The Town of Willards utilizes the County's hazard warning/notification system.

Financial

9. Does your jurisdiction plan to expend funding, including grant funding, on hazard mitigation and resilience projects within the next five years? If so, please provide amount and project description.

   No.

10. Does your jurisdiction have the ability to levy taxes for specific purposes? If so, please explain.

    No.

11. Do you use the Community Development Block Grant? If so, how has your community used this funding or plan to use this funding?

    Yes, the Town utilizes Block Grants to fund the position of Grants Administrator.

12. Has your jurisdiction completed flood acquisitions or elevation projects? If so, please provide funding source, year and project description(s).

    No.

Education and Outreach

13. Does your jurisdiction work with any local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, and vulnerable populations, etc.?

    No.

14. Does your jurisdiction have any ongoing public education or information program (e.g., responsible water use, fire safety, household emergency preparedness, or environmental education)?

    The local Fire Company provides fire prevention and safety outreach education information.

EASTERN SHORE EMERGENCY MANAGEMENT PLANNER'S MEETING

From:	Virginia Smith
To:	Michele King; Eric Messick
Subject:	FW: [EXTERNAL] Planners Meeting
Date:	Monday, February 14, 2022 4:07:24 PM
Attachments:	Upper Eastern Shore Regional Recovery Plan - Final Draft for Distributio....pdf image001.png

SP&D
Smith Planning and Design

Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
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Office: 301.724.7611
Mobile: 301.707.1173
vsmith@smithp-d.com

From: Lorenzo Cropper <lcropper@wicomicocounty.org>
Date: Monday, February 14, 2022 at 4:05 PM
To: Virginia Smith <vsmith@smithp-d.com>
Subject: FW: [EXTERNAL] Planners Meeting

From: Geneva Schaffle <GSchaffle@talbotcountymd.gov>
Sent: Wednesday, August 18, 2021 4:04 PM
To: Ashleigh Bothwell <ashleigh.bothwell@ccdps.org>; Michelle.Lloyd@ccdps.org; vgregg@kentgov.org; Lori Morris <lmorris@qac.org>; Thomas Sardelis <tsardelis@qac.org>; Jeffrey Ludwig <jludwig@carolinemd.org>; Samuel Grant <sgrant@carolinemd.org>; Stephen Garvin <sgarvin@wicomicocounty.org>; Lorenzo Cropper <lcropper@wicomicocounty.org>; Edward Werkheiser <ewerkheiser@wicomicocounty.org>; William Hildebrand -MEMA- <william.hildebrand@maryland.gov>; lbuck@co.worcester.md.us; Jerred Johnson (jajohnson@somersetmd.us) <jajohnson@somersetmd.us>; Bob Rhode (brhode@oceancitymd.gov) <brhode@oceancitymd.gov>; mcollins@oceancitymd.gov; Amanda Lewis <ALewis@oceancitymd.gov>
Subject: [EXTERNAL] Planners Meeting
Importance: High

Hi Everyone,

Thank you for calling in to our Eastern Shore Planners Meeting yesterday! **Please take the survey below by Friday August 27th** so we can get our next meeting nailed down in November. This meeting will be timely post tropical storm season, post DETF meeting, and pre winter season.

https://doodle.com/poll/mpvsdgbuz6wcnqbq?utm_source=poll&utm_medium=link

Upper Shore:
We discussed the Upper Easter Shore Regional Recovery Plan that has was finalized in 2016. With changes of staff, both locally and at MEMA, and approaching the five year mark with that plan, we thought it would be best to revisit. Attached is the plan and below is a short survey. Please take some time to review the plan and your local section. The survey is just to collect feedback on the plan as a whole, if you feel we need to do a major or minor update, and if your local section is accurate. If there is a consensus that this plan needs major updates, the upper shore can get together separately and hash it out. **Please review the plan and complete this survey by September 10th.**

https://forms.gle/JP8GDP9NZ5ZSjojQ7

Below are a brief notes taken from the meeting for those who missed.
Jurisdiction Round Table:
Cecil: Supporting Susquehanna Running Festival and 5 Star Event in October. Updating Hazard Mitigation Plan. Peach Bottom coming up next spring. Supporting COVID.
Kent: Hazard Mitigation Plan approved. Seeking input for Commodity POD Plan and Flood Mitigation Plan. Shelter Drill next Friday. Preparedness month prep.
Queen Anne's:
Caroline: Jeff now PHEP for Health Department. Suggest working with PHEP on cross planning with EM activities. Starting Hazard Mitigation and EOP Updates.
Talbot: Director position for DES is vacant. Updating Hazard Mitigation Plan. Supporting COVID and Special Events.
Dorchester:
Wicomico: Supporting National Folk Festival and County Fair. Revising Risk Management and Safety. David Fitzgerald back part time supporting COVID and Opioids.
Worchester: Updating Evacuation of Government Building Plans and Emergency Preparedness Booklets. CERT Train the Trainer. County AED updates.
Ocean City: Supporting special events. Foreign Student workforce increased (over 1900, plus many others). Spoken with Bethany Brown about relocation strategies (end location Baltimore).
Somerset: Has Flood Mitigation Plan if anyone needs reference. Supporting Opioids, Crab Derby, and Home Elevation Projects.
MEMA: RLO Program – Mr. Bill will cover the entire shore until the end of 2021 at the least. Waiting on MEMA transition to hire another RLO for the shore. CPOD discussions at the state – used to be a

big topic especially when Wal Mart was heavily involved. May be some CPOD trailers on the shore. Harford County could be a resources for questions regarding these plan.

Topics:
Commodity Points of Distribution Plan: Wicomico has a sample. Cross planning with Health Department Closed POD Plans.
Flood Mitigation Plan: Somerset has one. Dorchester updating (with nuisance flood plan).
Red Cross: Many conversations between Red Cross and jurisdictions. Each conversation has gone a little different. No concrete answers on how they can exactly provide support.
Response/communications for incidents is not consistent. Going to suggest Red Cross be at DEFT to speak to region on their capabilities and processes for support.
UES Recovery Plan: See narrative above.

Geneva Schaffle
Emergency Management Coordinator
Talbot County Department of Emergency Services
gharrison@talbgov.org
O: (410) 770-8166
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From:	Virginia Smith
To:	Michele King
Subject:	FW: [EXTERNAL] Hazard Mitigation Plan Surprise
Date:	Monday, February 14, 2022 4:00:51 PM
Attachments:	image002.png

Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
http://smithp-d.com
Office: 301.724.7611
Mobile: 301.707.1173
vsmith@smithp-d.com

From: Lorenzo Cropper <lcropper@wicomicocounty.org>
Date: Monday, February 14, 2022 at 3:43 PM
To: Virginia Smith <vsmith@smithp-d.com>
Subject: FW: [EXTERNAL] Hazard Mitigation Plan Surprise

From: Ashleigh Bothwell <Ashleigh.Bothwell@ccdps.org>
Sent: Thursday, February 3, 2022 2:25 PM
To: Lorenzo Cropper <lcropper@wicomicocounty.org>
Subject: [EXTERNAL] Hazard Mitigation Plan Surprise

[Sent from an email account outside of the Wicomico County network. Use caution when clicking on links or opening attachments.]

Good afternoon Lorenzo,

I only had the chance to jump on for the end of the planners meeting today. I heard you mention the issues you have had with your updates to your Hazard Mitigation Plan. Could you tell me more about the surprise issues you had with FEMA? Or who to contact regarding these changes for more information? I was about to submit our update and want to try to get ahead of these issues if possible. I would be happy to set up a call with you if it is too much for an email.

Thank you,
Ashleigh

Ashleigh A. Bothwell

Emergency Planner

Cecil County Department of Emergency Services

107 Chesapeake Blvd. Suite 108

Elkton, MD 21921

ashleigh.bothwell@ccdps.org

O: 410-392-2037

C: 443-945-2826

From:	Virginia Smith
To:	Michele King
Subject:	FW: [EXTERNAL] RE: [EXTERNAL] Hazard Mitigation
Date:	Monday, February 14, 2022 4:00:20 PM
Attachments:	image001.png image002.png

SP&D
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Virginia Smith, AICP
76 Baltimore Street
Cumberland, MD 21502
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From: Lorenzo Cropper <lcropper@wicomicocounty.org>
Date: Monday, February 14, 2022 at 3:43 PM
To: Virginia Smith <vsmith@smithp-d.com>
Subject: FW: [EXTERNAL] RE: [EXTERNAL] Hazard Mitigation

From: Jerred A. Johnson <jajohnson@somersetmd.us>
Sent: Thursday, February 10, 2022 8:28 AM
To: Lorenzo Cropper <lcropper@wicomicocounty.org>
Subject: [EXTERNAL] RE: [EXTERNAL] Hazard Mitigation

[Sent from an email account outside of the Wicomico County network. Use caution when clicking on links or opening attachments.]

Gotcha, thanks for the information. I will keep that in mind during our planning meetings.

Thanks and stay safe,

Jerred A. Johnson, MSEM
Emergency Planner / PIO
Somerset County Emergency Services
11916 Somerset Avenue Room 120

Princess Anne, MD 21853
www.somerset911.org
jajohnson@somersetmd.us
Office: (410) 651-3457 **| Cell: (**410) 726-4138
Fax: (410) 651-3350

From: Lorenzo Cropper <lcropper@wicomicocounty.org>
Sent: Tuesday, February 8, 2022 3:36 PM
To: Jerred A. Johnson <jajohnson@somersetmd.us>
Subject: RE: [EXTERNAL] Hazard Mitigation

Jerred is was FEMA not MDEM ; the reviewer wanted to hold Wicomico responsible for things that were not official when we initiated our update nor were we made aware during the planning process. That being said the contractor in concert with the department was able to make the necessary changes/ updates.

Lorenzo

From: Jerred A. Johnson <jajohnson@somersetmd.us>
Sent: Monday, February 7, 2022 2:51 PM
To: Lorenzo Cropper <lcropper@wicomicocounty.org>
Subject: [EXTERNAL] Hazard Mitigation

[Sent from an email account outside of the Wicomico County network. Use caution when clicking on links or opening attachments.]

Good Afternoon,

You mentioned that there were some changes to how MDEM and FEMA are reviewing the HazMit plans. Anything that you think will be a problem for Somerset? Our update is due in November.

Thanks and stay safe,

Jerred A. Johnson, MSEM
Emergency Planner / PIO
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11916 Somerset Avenue Room 120
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Office: (410) 651-3457 **| Cell: (**410) 726-4138
Fax: (410) 651-3350

Appendix F Sources

CHAPTER 1 – INTRODUCTION

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CHAPTER 12 – MAN-MADE HAZARDS

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Appendix G
National Flood Insurance Program & Community Rating System

OFFICIAL USE ONLY

Appendix H
National Flood Insurance Program (NFIP) Survey

NFIP SURVEY – WICOMICO COUNTY

The National Flood Insurance Program (NFIP) Survey was completed by Wicomico County Land Development Coordinator, Department of Planning & Zoning.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the jurisdiction maintain accessible copies of the most recent Flood Insurance Study (FIS)?	If yes, specify the responsible office.	Yes	Copies available at the Planning a & Zoning office
b. Has the jurisdiction adopted the most current DFIRM/FIRM and FIS?		Yes	8/17/2015
c. Does the jurisdiction support request for map updates?	If yes, specify how.	Yes	We help homeowners understand the LOMA process, if it applies, and advise them to hire a surveyor.
d. Does the jurisdiction share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify the responsible office.	N/A	Have not had any new data.
e. Does the jurisdiction provide assistance with local floodplain determinations?	If yes, specify how.	Yes	Provide information on flood zone for individual properties
f. Does the jurisdiction maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Planning & Zoning. We have a record of those submitted to our office.

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Has the jurisdiction adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	
(1) Does the jurisdiction issue permits for all proposed development in the Special Flood Hazard Areas (SFHAs)?	If yes, specify the office responsible.	Yes	Planning & Zoning
(2) Does the jurisdiction obtain, review, and utilize any Base Flood Elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	Planning & Zoning
(3) Does the jurisdiction identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	Planning & Zoning
(4) Does the jurisdiction document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	Planning & Zoning
b. If a compliant floodplain ordinance was adopted, does the jurisdiction enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	Enforced through construction process. Issue "Stop Work" order on any non-compliant construction; no Certificate of Occupancy issued if non-compliant.

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
c. Has the jurisdiction considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	Yes	We currently have a 2' freeboard requirement, as well as a Coastal A Zone. We are currently working on an application to become part of the CRS.

3. FLOOD INSURANCE			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction educate community members about the availability and value of flood insurance?	If yes, specify how.	Yes	Encourage homeowners to obtain flood insurance.
b. Does the jurisdiction inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	Yes	When changes are made. The LIMWA is being reviewed now and when changes are made, we will let the public know about the map changes.
c. Does the jurisdiction provide general assistance to community members regarding insurance issues?	If yes, specify how.	Yes	Help homeowners to understand improvements they can make to their homes to reduce their risks and premiums. Also express the importance of obtaining a flood elevation certificate in the insurance process.

NFIP SURVEY – CITY OF SALISBURY

The National Flood Insurance Program (NFIP) Survey for the City of Salisbury.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the jurisdiction maintain accessible copies of the most recent Flood Insurance Study (FIS)?	If yes, specify the responsible office.	Yes	Infrastructure & Development & Building, Permitting & Inspections – within the Office
b. Has the jurisdiction adopted the most current DFIRM/FIRM and FIS?		Yes	8/17/2015
c. Does the jurisdiction support request for map updates?	If yes, specify how.	Yes	The City of Salisbury supports requests for map updates as needed.
d. Does the jurisdiction share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify the responsible office.	N/A	No new data is available at this time.
e. Does the jurisdiction provide assistance with local floodplain determinations?	If yes, specify how.	Yes	Provides assistance with local floodplain determinations as needed.
f. Does the jurisdiction maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Infrastructure & Development & Building, Permitting & Inspections

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Has the jurisdiction adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	
(1) Does the jurisdiction issue permits for all proposed development in the Special Flood Hazard Areas (SFHAs)?	If yes, specify the office responsible.	Yes	Infrastructure & Development: Building, Permitting & Inspections

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
(2) Does the jurisdiction obtain, review, and utilize any Base Flood Elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	Infrastructure & Development: Building, Permitting & Inspections
(3) Does the jurisdiction identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	Infrastructure & Development: Building, Permitting & Inspections
(4) Does the jurisdiction document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	Infrastructure & Development: Building, Permitting & Inspections
b. If a compliant floodplain ordinance was adopted, does the jurisdiction enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	During construction, the local permitting official or an authorized representative shall inspect the site to determine that the work is in compliance with the permit. Any work found to be noncompliant must be corrected before any additional work is undertaken.

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
c. Has the jurisdiction considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	Yes	"Flood-protection elevation (FPE)" means the elevation of the base flood plus one foot freeboard."

3. FLOOD INSURANCE			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction educate community members about the availability and value of flood insurance?	If yes, specify how.	Yes	Homeowners are encouraged to obtain flood insurance.
b. Does the jurisdiction inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	Yes	Informs community property owners about changes to the DFIRM/FIRM that would impact their insurance rates, this was done in 2015 when the City adopted new FIRM's and floodplain ordinance.
c. Does the jurisdiction provide general assistance to community members regarding insurance issues?	If yes, specify how.	Yes	The City provides general assistance regarding insurance issues as needed.

NFIP SURVEY – CITY OF FRUITLAND

The National Flood Insurance Program (NFIP) Survey for the City of Fruitland. While the one percent annual chance floodplain is along the eastern border of the City of Fruitland, assessment results indicated that no structures are within the flood hazard area.

> Information gathered from employees who have been employed by the City for over 20 years, there has been no severe flooding in Fruitland's jurisdiction and no property damage due to flooding.
>
> *Source: Marc Henderson, the City of Fruitland representative – 4/14/2021*

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the jurisdiction maintain accessible copies of the most recent Flood Insurance Study (FIS)?	If yes, specify the responsible office.	Yes	Floodplain Administrator; Land Use/ Development Office – within the Office
b. Has the jurisdiction adopted the most current DFIRM/FIRM and FIS?		Yes	8/17/2015
c. Does the jurisdiction support request for map updates?	If yes, specify how.	Yes	LOMA process would be reviewed, however the SFHA is limited in Fruitland.
d. Does the jurisdiction share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify the responsible office.	N/A	No new data is available at this time.
e. Does the jurisdiction provide assistance with local floodplain determinations?	If yes, specify how.	Yes	Where floodways are not delineated or base flood elevations are not shown on the FIRMs, the Floodplain Administrator has the authority to require the applicant to use information provided by the Floodplain Administrator, information that is available from federal, state, or other sources, or to determine such information using accepted

			engineering practices or methods approved by the Floodplain Administrator.
f. Does the jurisdiction maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Floodplain Administrator; Land Use/ Development Office

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Has the jurisdiction adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	
(1) Does the jurisdiction issue permits for all proposed development in the Special Flood Hazard Areas (SFHAs)?	If yes, specify the office responsible.	Yes	Land Use/ Development Office
(2) Does the jurisdiction obtain, review, and utilize any Base Flood Elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	Land Use/ Development Office
(3) Does the jurisdiction identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	Land Use/ Development Office
(4) Does the jurisdiction document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	Land Use/ Development Office
b. If a compliant floodplain ordinance was adopted, does the jurisdiction enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	The Floodplain Administrator shall make periodic inspections of development permitted in special flood hazard areas, at appropriate times throughout the period of construction in order to monitor compliance.

2. FLOODPLAIN MANAGEMENT			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
c. Has the jurisdiction considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	Yes	"FLOOD PROTECTION ELEVATION. The base flood elevation plus two feet of freeboard." § 152.36 MANUFACTURED HOMES. (A) New manufactured homes shall not be placed or installed in floodways. § 152.38 CRITICAL AND ESSENTIAL FACILITIES. Critical and essential facilities shall: (A) Not be located in floodways; or (B) If located in flood hazard areas other than floodways, be elevated to the higher of elevation required by these regulations plus one foot, the elevation required by the building code, or the elevation of the 0.2% chance (500-year) flood. (Ord. 275, passed 6-9-2015)

3. FLOOD INSURANCE			
Requirement	**Recommended Action**	**Yes/No**	**Comments**
a. Does the jurisdiction educate community members about the availability and value of flood insurance?	If yes, specify how.	Yes	Homeowners are encouraged to obtain flood insurance.
b. Does the jurisdiction inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	Yes	Yes, information is posted on the city website under "News Listings."
c. Does the jurisdiction provide general assistance to community members regarding insurance issues?	If yes, specify how.	Yes	If needed, yes the Floodplain Administrator assists community members.

NFIP SURVEY – TOWN OF DELMAR

The National Flood Insurance Program (NFIP) Survey for the Town of Delmar. While the one percent annual chance floodplain is along the eastern border of the Town of Delmar, assessment results indicated that no structures are within the flood hazard area. **Table 8.11: NFIP Insurance Report – Policies** and **Table 8.12: NFIP Insurance Report - Claims** provides documentation that the Town of Delmar has no policies or claims within the State of Maryland.

NFIP SURVEY – WICOMICO COUNTY & JOINT PERMITTING WITH MUNICIPALITIES

Wicomico County the Wicomico County Department of Planning & Zoning has a formal agreement to conducted NFIP activities, including building permits, for the following jurisdictions.

- Town of Hebron
- Town of Mardela Springs
- Town of Pittsville
- Town of Sharptown
- Town of Willards

Please refer to the **NFIP Survey – Wicomico County** on pages H-1 to H-3.

Appendix I
Vulnerability Reports

HAZUS HURRICANE WIND REPORT

Hazus-MH: Hurricane Event Report

Region Name: Wicomico_Hurricane Isabel

Hurricane Scenario: Scenario-16Jul2015

Print Date: Friday, July 17, 2015

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Maryland

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 383.68 square miles and contains 19 census tracts. There are over 37 thousand households in the region and has a total population of 98,733 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 35 thousand buildings in the region with a total building replacement value (excluding contents) of 11,170 million dollars (2010 dollars). Approximately 97% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 35,388 buildings in the region which have an aggregate total replacement value of 11,170 million (2006 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	8,999,684	80.6%
Commercial	1,488,038	13.3%
Industrial	300,609	2.7%
Agricultural	41,941	0.4%
Religious	164,741	1.5%
Government	51,758	0.5%
Education	123,617	1.1%
Total	**11,170,388**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 4 hospitals in the region with a total bed capacity of 474 beds. There are 42 schools, 13 fire stations, 6 police stations and 1 emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name: Scenario-16Jul2015

Type: Deterministic

Maximum Peak Gust in Study Region: 73 mph

User Defined Storm Track Input Data

Point	Latitude	Longitude	Time Step (hour)	Translation Speed (mph)	Radius To Max Winds (miles)	Max. Sustained Wind Speed (mph @ 10m)	Cental Pressure (mBar)	Profile Parameter	Radius to Hurricane Force Winds (miles)
1	35.40	-76.60	292.00	--	--	90.40	957.00	--	88.55
2	37.33	-77.34	294.00	--	--	90.40	959.00	--	88.55
3	38.32	-77.56	296.00	--	--	90.40	960.00	--	74.69
4	39.49	-77.66	298.00	--	--	83.32	965.00	--	0.00
5	40.68	-77.92	308.00	--	--	53.56	987.00	--	0.00

Building Damage

General Building Stock Damage

Hazus estimates that about 4 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	16	99.49	0	0.49	0	0.02	0	0.00	0	0.00
Commercial	678	99.45	4	0.53	0	0.01	0	0.00	0	0.00
Education	8	99.47	0	0.53	0	0.00	0	0.00	0	0.00
Government	32	99.38	0	0.62	0	0.00	0	0.00	0	0.00
Industrial	89	99.42	1	0.58	0	0.00	0	0.00	0	0.00
Religion	65	99.53	0	0.46	0	0.01	0	0.00	0	0.00
Residential	34,378	99.66	113	0.33	4	0.01	0	0.00	0	0.00
Total	**35,266**		**117**		**4**		**0**		**0**	

Table 3: Expected Building Damage by Building Type

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	470	99.19	4	0.81	0	0.00	0	0.00	0	0.00
Masonry	9,153	99.42	51	0.56	2	0.03	0	0.00	0	0.00
MH	2,656	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	442	99.38	3	0.61	0	0.01	0	0.00	0	0.00
Wood	22,534	99.76	53	0.23	1	0.01	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had 474 hospital beds available for use. On the day of the hurricane, the model estimates that 474 hospital beds (only 100.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Fire Stations	13			13
Hospitals	4	1	0	4
Police Stations	6	0	0	6
Schools	42	0	0	42

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 27,837 tons of debris will be generated. Of the total amount, 23,705 tons (85%) is Other Tree Debris. Of the remaining 4,132 tons, Brick/Wood comprises 17% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 28 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 3,442 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 98,733) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 13.7 million dollars, which represents 0.12 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 14 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 98% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	10,419.57	193.99	31.29	41.15	10,686.00
	Content	2,949.56	0.00	0.00	0.00	2,949.56
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**13,369.13**	**193.99**	**31.29**	**41.15**	**13,635.56**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	28.23	1.83	0.00	0.19	30.25
	Rental	24.77	0.00	0.00	0.00	24.77
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**53.00**	**1.83**	**0.00**	**0.19**	**55.02**
Total						
	Total	**13,422.13**	**195.82**	**31.29**	**41.34**	**13,690.58**

Appendix A: County Listing for the Region

Maryland
- Wicomico

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Maryland				
Wicomico	98,733	8,999,684	2,170,704	11,170,388
Total	**98,733**	**8,999,684**	**2,170,704**	**11,170,388**
Study Region Total	**98,733**	**8,999,684**	**2,170,704**	**11,170,388**

NON-REGULATORY COASTAL FLOOD RISK REPORT

Flood Risk Report

Wicomico County, Maryland Coastal Study

County: Wicomico*

Community Names: Wicomico County (Unincorporated Areas)*, City of Salisbury*, City of Fruitland*, Town of Mardela Springs, Town of Sharptown

State: Maryland

**This report only covers the area within the coastal region of this county.*

Report Number 001

09/30/2015

FEMA

RiskMAP

Increasing Resilience Together

Preface

The Department of Homeland Security (DHS), Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states, tribes, and local communities with flood risk information and tools that they can use to increase their resilience to flooding and better protect their citizens. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP has transformed traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

This Flood Risk Report (FRR) provides non-regulatory information to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their flood risk, take steps to mitigate those risks, and communicate those risks to their citizens and local businesses.

Because flood risk often extends beyond community limits, the FRR provides flood risk data for the entire Flood Risk Project as well as for each individual community. This also emphasizes that flood risk reduction activities may impact areas beyond jurisdictional boundaries.

Flood risk is always changing, and there may be other studies, reports, or sources of information available that provide more comprehensive information. The FRR is not intended to be regulatory or the final authoritative source of all flood risk data in the project area. Rather, it should be used in conjunction with other data sources to provide a comprehensive picture of flood risk within the project area.

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FLOOD RISK REPORT

1 Introduction

1.1 About Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over normally dry areas. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the generation of unwanted debris. Severe flooding can destroy buildings, ruin crops, and cause critical injuries or death.

Flooding is a natural part of our world and our communities. Flooding becomes a significant hazard, however, when it intersects with the built environment.

1.1.1 Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Just because one knows where a flood occurs does not mean they know the **risk** of flooding. The most common method for determining flood risk, also referred to as vulnerability, is to identify the probability of flooding and the consequences of flooding. In other words:

Flood Risk = Probability x Consequences; where

- **Probability** = the likelihood of occurrence
- **Consequences** = the estimated impacts associated with the occurrence

The probability of a flood is the likelihood that a flood will occur. The probability of flooding can change based on physical, environmental, and/or contributing engineering factors. Factors affecting the probability that a flood will impact an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood and the level of accuracy for that assessment are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the water body in question.

The consequences of a flood are the estimated impacts associated with the flood occurrence. Consequences relate to humans' activities within an area and how a flood impacts the natural and built environments.

Which picture below shows more flood risk?

Even if you assume that the flood in both pictures was the same probability—let's say a 10-percent-annual-chance flood—the consequences in terms of property damage and potential injury as a result of the flood in the bottom picture are much more severe. Therefore, the flood risk in the area shown in the bottom picture is higher.

1.1.2 Flood Risk Products

Through Risk MAP, FEMA provides communities with updated Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) Reports that focus on the probability of floods and that show where flooding may occur as well as the calculated 1-percent-annual-chance flood elevation. The 1-percent-annual-chance flood, also known as the base flood, has a 1% chance of being equaled or exceeded in any given year. FEMA understands that flood risk is dynamic—that flooding does not stop at a line on a map—and as such, provides the following flood risk products:

Whether or not an area might flood is one consideration. The extent to which it might flood adds a necessary dimension to that understanding.

- **Flood Risk Report (FRR)**: The FRR presents key risk analysis data for the Flood Risk Project.
- **Flood Risk Map (FRM)**: Like the example found in Section 3.1 of this document, the FRM shows a variety of flood risk information in the project area. More information about the data shown on the FRM may be found in Section 2 of this report.
- **Flood Risk Database (FRD)**: The FRD is in Geographic Information System (GIS) format and houses the flood risk data developed during the course of the flood risk analysis that can be used and updated by the community. After the Flood Risk Project is complete, this data can be used in many ways to visualize and communicate flood risk within the Flood Risk Project.

These Flood Risk Products provide flood risk information at both the Flood Risk Project level and community level (for those portions of each community within the Flood Risk Project). They demonstrate how decisions made within a Flood Risk Project can impact properties downstream, upstream, or both. Community-level information is particularly useful for mitigation planning and emergency management activities, which often occur at a local jurisdiction level.

1.2 Uses of this Report

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

Vulnerability of infrastructure is another important consideration.

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

State, local, and tribal officials can use the summary information provided in this report, in conjunction with the data in the FRD, to:

- **Update local hazard mitigation plans.** As required by the 2000 Federal Stafford Act, local hazard mitigation plans must be updated at least every five (5) years. Summary information presented in Section 3 of this report and the FRM can be used to identify areas that may need additional focus when updating the risk assessment section of a local hazard mitigation plan. Information found in Section 4 pertains to the different mitigation techniques and programs and can be used to inform decisions related to the mitigation strategy of local plans.
- **Update community comprehensive plans.** Planners can use flood risk information in the development and/or update of comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes may be changed to better provide for appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans.** Emergency managers can identify low-risk areas for potential evacuation and sheltering and can help first responders avoid areas of high-depth flood water. Risk assessment results may reveal vulnerable areas, facilities, and infrastructure for which planning for continuity of operations plans (COOP), continuity of government (COG) plans, and emergency operations plans (EOP) would be essential.

Flooding along the Wabash River in Clark County, Illinois, contributed to a federal disaster declaration on June 24, 2008.

- **Develop hazard mitigation projects.** Local officials (e.g., planners and public works officials) can use flood risk information to re-evaluate and prioritize mitigation actions in local hazard mitigation plans.
- **Communicate flood risk.** Local officials can use the information in this report to communicate with property owners, business owners, and other citizens about flood risks, changes since the last FIRM, and areas of mitigation interest. The report layout allows community information to be extracted in a fact sheet format.
- **Inform the modification of development standards.** Floodplain managers, planners, and public works officials can use information in this report to support the adjustment of development standards for certain locations. For example, heavily developed areas tend to increase floodwater runoff because paved surfaces cannot absorb water, indicating a need to adopt or revise standards that provide for appropriate stormwater retention.

The Flood Risk Database, Flood Risk Map, and Flood Risk Report are “non-regulatory” products. They are available and intended for community use but are neither mandatory nor tied to the regulatory development and insurance requirements of the National Flood Insurance Program (NFIP). They may be used as regulatory products by communities if authorized by state and local enabling authorities.

1.3 Sources of Flood Risk Assessment Data Used

To assess potential community losses, or the consequences portion of the "risk" equation, the following data is typically collected for analysis and inclusion in a Flood Risk Project:

- Information about local assets or resources at risk of flooding
- Information about the physical features and human activities that contribute to that risk
- Information about where the risk is most severe

For most Flood Risk Projects, FEMA uses the following sources of flood risk information to develop this report:

- Hazus-estimated flood loss information
- New engineering analyses (e.g., coastal, hydrologic, and/or hydraulic modeling) to develop new flood boundaries
- Locally supplied data (see Section 7 for a description)
- Sources identified during the Discovery process

FEMA data can be leveraged to identify and measure vulnerability by including local building information (i.e. building type). The examples above show various ways to display flooding intersecting with buildings.

1.4 Related Resources

For a more comprehensive picture of flood risk, FEMA recommends that state and local officials use the information provided in this report in conjunction with other sources of flood risk data, such as those listed below.

- **FIRMs and FIS Reports.** This information indicates areas with specific flood hazards by identifying the limit and extent of the 1-percent-annual-chance floodplain and the 0.2-percent-annual-chance floodplain. FIRMs and FIS Reports do not identify all floodplains in a Flood Risk Project. The FIS Report includes summary information regarding other frequencies of flooding, as well as flood profiles for riverine sources of flooding. In rural areas and areas for which flood hazard data are not available, the 1-percent-annual-chance floodplain may not be identified. In addition, the 1-percent-annual-chance floodplain may not be identified for flooding sources with very small drainage areas (less than 1 square mile).
- **Hazus Flood Loss Estimation Reports.** Hazus can be used to generate reports, maps and tables on potential flood damage that can occur based on new/proposed mitigation projects or future development patterns and practices. Hazus can also run specialized risk assessments, such as what happens when a dam or levee fails. Flood risk assessment tools are available through other agencies as well, including the

National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE). Other existing watershed reports may have a different focus, such as water quality, but may also contain flood risk and risk assessment information. See Section 6 for additional resources.

- **Flood or multi-hazard mitigation plans.** Local hazard mitigation plans include risk assessments that contain flood risk information and mitigation strategies that identify community priorities and actions to reduce flood risk. This report was informed by any existing mitigation plans in the Flood Risk Project.
- **Hurricane Evacuation Studies.** Produced through a joint effort by FEMA, NOAA, and USACE, Hurricane Evacuation Studies provide tools and information to the state and county emergency management offices to help determine who should evacuate during hurricane threats, and when those evacuations should occur. The information can be used to supplement or update hurricane evacuation plans and operational procedures for responding to hurricane threats.
- **FEMA Map Service Center (MSC).** The MSC has useful information, including fly sheets, phone numbers, data, etc. Letters of Map Change are also available through the MSC. The user can view FIRM databases and the National Flood Hazard Layer (NFHL) Database.

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2 Flood Risk Analysis

2.1 Overview

Flood hazard identification uses FIRMs, and FIS Reports identify where flooding can occur along with the probability and depth of that flooding. Flood risk assessment is the systematic approach to identifying how flooding impacts the environment. In hazard mitigation planning, flood risk assessments serve as the basis for mitigation strategies and actions by defining the hazard and enabling informed decision making. Fully assessing flood risk requires the following:

- Identifying the flooding source and determining the flood hazard occurrence probability
- Developing a complete profile of the flood hazard including historical occurrence and previous impacts
- Inventorying assets located in the identified flood hazard area
- Estimating potential future flood losses caused by exposure to the flood hazard area

Flooding impacts non-populated areas too, such as agricultural lands and wildlife habitats.

Flood risk analyses are different methods used in flood risk assessment to help quantify and communicate flood risk. Flood risk analysis can be performed on a large scale (state, community) level and on a very small scale (parcel, census block). Advantages of large-scale flood risk analysis, especially at the watershed level, include identifying how actions and development in one community can affect areas up- and downstream. On the parcel or census block level, flood risk analysis can provide actionable data to individual property owners so they can take appropriate mitigation steps.

2.2 Analysis of Risk

The FRR, FRM, and FRD contain a variety of flood risk analysis information and data to help describe and visualize flood risk within the project area. Depending on the scope of the Flood Risk Project for this project area, this information may include some or all of the following elements:

- Changes Since Last FIRM
- Flood Depth and Analysis Grids
- Flood Risk Assessments
- Areas of Mitigation Interest

State and Local Hazard Mitigation Plans are required to have a comprehensive all-hazard risk assessment. The flood risk analyses in the FRR, FRM, and FRD can inform the flood hazard portion of a community's or state's risk assessment. Further, data in the FRD can be used to develop information that meets the requirements for risk assessments as it relates to the hazard of flood in hazard mitigation plans.

2.2.1 Changes Since Last FIRM

The Changes Since Last FIRM (CSLF) dataset, stored in the FRD and shown in Section 3 of this report, illustrates where changes to flood risk may have occurred since the last FIRM was published for the subject area. Communities can use this information to update their mitigation plans, specifically quantifying "what is at risk" and identifying possible mitigation activities.

Please note that Changes Since Last FIRM are not provided in this project since the countywide FIRM update (effective August 17, 2015) is the first digital FIRM for Wicomico County and Incorporated Areas.

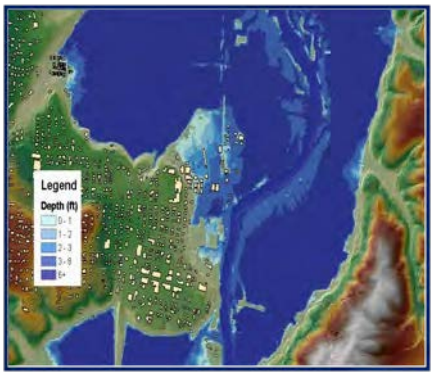
CSLF data can be used to communicate changes in the physical flood hazard area (size, location) as part of the release of new FIRMs. It can also be used in the development or update of hazard mitigation plans to describe changes in hazard as part of the hazard profile.

CSLF data is shown in the FRR, and underlying data is stored in the FRD.

The CSLF dataset identifies changes in the Special Flood Hazard Area (SFHA) and floodway boundary changes since the previous FIRM was developed. These datasets quantify land area increases and decreases to the SFHA and floodway, as well as areas where the flood zone designation has changed (e.g., Zone A to AE, AE to VE, shaded Zone X protected by levee to Zone AE for de-accredited levees).

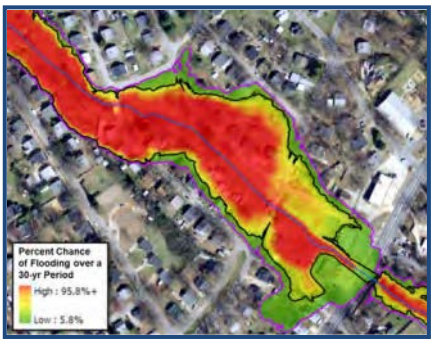
The CSLF dataset is created in areas that were previously mapped using digital FIRMs. The CSLF dataset for this project area includes:

- **Floodplain and/or Floodway Boundary Changes**: Any changes to the existing floodplain or floodway boundaries are depicted in this dataset
- **Floodplain Designation Changes**: This includes changed floodplain designations (e.g., Zone A to Zone AE).



2.2.2 Flood Depth and Analysis Grids

Grids are FEMA datasets provided in the FRD to better describe the risk of the flood hazard. Much like the pixels in a photo or graphic, a grid is made up of square cells, where each grid cell stores a value representing a particular flood characteristic (elevation, depth, velocity, etc.) While the FIRM and FIS Report describe "what" is at risk by identifying the hazard areas, water surface, flood depth, and other analysis grids can help define "how bad" the risk is within those identified areas. These grids are intended to be used by communities for additional analysis, enhanced visualization, and communication of flood risks for hazard mitigation planning and emergency management. The Flood Depth and Analysis Grids provide an alternative way to



Grid data can make flood mapping more informative. The top image is a flood depth grid showing relative depths of water in a scenario flood event. The bottom image is a percent annual chance of flooding grid, which shows inundation areas of various frequency floods.

visualize how a particular flood characteristic (depth, velocity, etc.) vary within the floodplain. Since they are derived from the engineering modeling results, they are typically associated with a particular frequency-based flooding event (e.g., 1-percent-annual-chance event). Grids provided in the FRD for this project area include the following:

- **Water Surface Elevation Grid:**

  This dataset represents the flood elevations calculated for the 1-percent-annual-chance flood event.

- **Flood Depth Grid:**

  Flood Depth Grids are created for each flood frequency calculated during the course of a Flood Risk Project. These grids communicate flood depth as a function of the difference between the calculated water surface elevation and the ground. Coastal flood depth grids are created for areas where the dominant wave hazard is overland wave propagation. The grid depicts the difference in elevation between the wave crest elevation, or BFE, and the ground. Coastal areas will typically only receive a depth grid for the 1-percent-annual-chance (base) flood for which overland wave propagation results are produced as a part of the FIS; however, approximate methods may be used to estimate wave crest elevations for other flood frequencies, if desired.

  Depth grids form the basis for refined flood risk assessments (as presented in a table in Section 3 of this report) and are used to calculate potential flood losses for display on the FRM and for tabular presentation in this report. Depth grids may also be used for a variety of ad-hoc risk visualization and mitigation initiatives.

Grid data can be used to communicate the variability of floodplains, such as where floodplains are particularly deep or hazardous, where residual risks lie behind levees, and where losses may be great after a flood event. For mitigation planning, grid data can inform the hazard profile and vulnerability analysis (what is at risk for different frequencies) and can be used for preliminary benefit-cost analysis screening. For floodplain management, higher regulatory standards can be developed in higher hazard flood prone areas (i.e., 10-percent-annual-chance floodplains or deep floodplains).

Grid data is stored in the FRD, and a list of available grid data is provided in the FRR.

2.2.3 Flood Risk Assessments

Flood risk assessment results reported in the FRR were developed using a FEMA flood loss estimation tool, Hazus. Hazus (www.fema.gov/Hazus) is a nationally-applicable and standardized risk assessment tool that estimates potential losses from earthquakes, floods, and hurricanes. It uses GIS technology to estimate physical, economic, and social impacts of disasters, Hazus can be used to help individuals and communities graphically visualize the areas where flood risk is highest. Some benefits of using Hazus include the following:

- Outputs that can enhance state and local mitigation plans and help screen for cost-effectiveness in FEMA mitigation grant programs
- Analysis refinement through updating inventory data and integrating data produced using other flood models

- Widely available support documents and networks (Hazus Users Groups)

Files from the FRD can be imported into Hazus to develop other risk assessment information including:

- Debris generated after a flood event
- Dollar loss of the agricultural products in a study region
- Utility system damages in the region
- Vehicle loss in the study region
- Damages and functionality of lifelines such as highway and rail bridges, potable water, and wastewater facilities

Hazus is a loss estimation methodology developed by FEMA for flood, wind, and earthquake hazards. The methodology and data established by Hazus can also be used to study other hazards.

Scenario-Based Flood Loss Estimates:

For the Average Annualized Loss (AAL) study, scenario-based flood losses have been calculated using Hazus (Version 2.1) for the 2-, 1-, 0.5-, and 0.2 percent-annual-chance flood events. For the 'refined' study, Hazus (Version 2.2) was used to calculate coastal flood losses for the 1-percent-annual-chance flood event. In this report, these losses are expressed in dollar amounts and are provided for the Coastal Flood Risk Project area only, even though results are shown at the local jurisdiction level.

Loss estimates are based on best available data, and the methodologies applied result in an approximation of risk. These estimates should be used to understand relative risk from flood and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, demographics, or economic parameters).

Flood loss estimates in this report are being provided at the project and community levels for multiple flood frequencies, and include the following:

- **Residential Asset Loss**: These include direct building losses (estimated costs to repair or replace the damage caused to the building) for all classes of residential structures including single family, multi-family, manufactured housing, group housing, and nursing homes. This value also includes content losses.
- **Commercial Asset Loss**: These include direct building losses for all classes of commercial buildings

Flood risk assessment data can be used in many ways to support local decision making and explanation of flood risk. For mitigation planning purposes, loss data can be used to help meet requirements to develop loss information for the hazard of flood. Also, the FRM can show where flood risk varies by geographic location. For emergency management, risk assessment data can help forecast losses based on predicted events, and resources can be assigned accordingly. Loss information can support floodplain management efforts, including those to adopt higher regulatory standards. Awareness of at-risk essential facilities and infrastructure also encourages mitigation actions to protect citizens from service disruption should flooding occur.

Flood risk assessment loss data is summarized in the FRR and on the FRM and stored in the FRD.

including retail, wholesale, repair, professional services, banks, hospitals, entertainment, and parking facilities. This value also includes content and inventory losses.

- **Other Asset Loss**: This includes losses for facilities categorized as industrial, agricultural, religious, government, and educational. This value also includes content and inventory losses.
- **Business Disruption**: This includes the losses associated with the inability to operate a business due to the damage sustained during the flood. Losses include inventory, income, rental income, wage, and direct output losses, as well as relocation costs.
- **Annualized Losses**: Annualized losses are calculated using Hazus by taking losses from multiple events over different frequencies and expressing the long-term average by year. This factors in historic patterns of frequent smaller floods with infrequent but larger events to provide a balanced presentation of flood damage.
- **Loss Ratio:** The loss ratio expresses the scenario losses divided by the total building value for a local jurisdiction and can be a gage to determine overall community resilience as a result of a scenario event. For example, a loss ratio of 5 percent for a given scenario would indicate that a local jurisdiction would be more resilient and recover more easily from a given event, versus a loss ratio of 75 percent which would indicate widespread losses. An annualized loss ratio uses the annualized loss data as a basis for computing the ratio. Loss ratios are not computed for business disruption. These data are presented in the FRR.
- **Hazus Flood Risk Value:** On the FRM, flood risk is expressed in the following five categories: very low, low, medium, high, and very high for census blocks that have flood risk. It is based on the 1-percent-annual-chance total asset loss by census block.
- **Annualized Losses:** Annualized losses are calculated using Hazus by taking losses from mulitple events over different frequencies and expressing the long-term average by year. This factors in historic patterns of frequent smaller floods with infrequent but larger events to provide a balanced presentation of flood damage.

2.2.4 Areas of Mitigation Interest

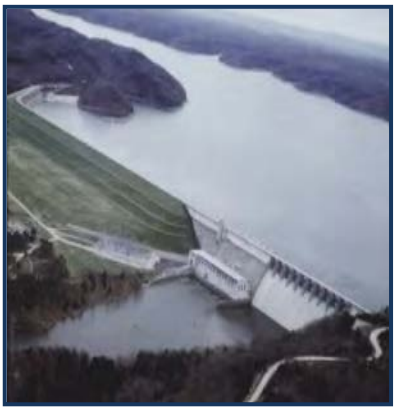
Many factors contribute to flooding and flood losses. Some are natural, and some are not. In response to these risks, there has been a focus by the Federal government, State agencies, and local jurisdictions to mitigate properties against the impacts of flood hazards so that future losses and impacts can be reduced. An area identified as an Area of Mitigation Interest (AoMI) is an important element of defining a more comprehensive picture of flood risk and mitigation activity in a watershed, identifying target areas and potential projects for flood hazard mitigation, encouraging local collaboration, and communicating how various mitigation activities can successfully reduce flood risk.

AoMIs are identified through coordination with local stakeholders; through revised hydrologic and hydraulic and/or coastal analyses; by leveraging other studies or previous flood studies; from community mitigation plans, floodplain management plans, and local surveys; and from the mining of federal government databases (e.g., flood claims, disaster grants, and data from other

agencies). Below is a list of the types of Areas of Mitigation Interest, however specific AoMIs were not identified as part of this project.

- **Dams**

A dam is a barrier built across a waterway for impounding water. Dams vary from impoundments that are hundreds of feet tall and contain thousands of acre-feet of water (e.g., Hoover Dam) to small dams that are a few feet high and contain only a few acre-feet of water (e.g., small residential pond). “Dry dams,” which are designed to contain water only during floods and do not impound water except for the purposes of flood control, include otherwise dry land behind the dam.



Dams vary in size and shape, the amount of water they impound, and their assigned hazard classification.
Whether or not an area might flood is one consideration. The extent to which it might flood adds a necessary dimension to that understanding.

While most modern, large dams are highly engineered structures with components such as impervious cores and emergency spillways, most smaller and older dams are not. State dam safety programs emerged in the 1960s, and the first Federal Guidelines for Dam Safety were not prepared until 1979. By this time, the vast majority of dams in the United States had already been constructed.

- **Reasons dams are considered AoMIs:**
  - Many older dams were not built to any particular standard and thus may not withstand extreme rainfall events. Older dams in some parts of the country are made out of an assortment of materials. These structures may not have any capacity to release water and could be overtopped, which could result in catastrophic failure.
  - Dams may not always be regulated, given that the downstream risk may have changed since the dam was constructed or since the hazard classification was determined. Years after a dam is built, a house, subdivision, or other development may be constructed in the dam failure inundation zone downstream of the dam. Thus, a subsequent dam failure could result in downstream consequences, including property damage and the potential loss of life. Since these dams are not regulated, it is impossible to predict how safe they are.

This dam failure caused flooding that damaged several homes and vehicles.

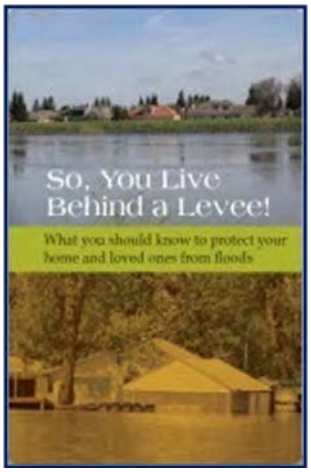
  - A significant dam failure risk is structural deficiencies associated with older dams that are not being adequately addressed today through needed inspection/maintenance practices.

- For larger dams a flood easement may have been obtained on a property upstream or downstream of the dam. However, there may have been buildings constructed in violation of the flood easement.
- When a new dam is constructed, the placement of such a large volume of material in a floodplain area (if that is the dam location) will displace flood waters and can alter how the watercourse flows. This can result in flooding upstream, downstream, or both.
- For many dams, the dam failure inundation zone is not known. Not having knowledge of these risk areas could lead to unprotected development in these zones.

- **Levees**

FEMA defines a levee as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding." Levees are sometimes referred to as dikes. Soil used to construct a levee is compacted to make the levee as strong and stable as possible. To protect against erosion and scouring, levees can be covered with everything from grass and gravel to harder surfaces like stone (riprap), asphalt, or concrete.

Similar to dams, levees have not been regulated in terms of safety and design standards until relatively recently. Many older levees were constructed in a variety of ways, from a farmer piling dirt along a stream to prevent nuisance flooding to levees made out of old mining spoil material. As engineered structures, levees are designed to a certain height and can fail if a flood event is greater than anticipated.



For more information about the risks associated with living behind levees, consult the publication "So, You Live Behind a Levee!" published by the American Society of Civil Engineers at http://content.asce.org/ASCELeveeGuide.html

A floodwall is a vertical wall that is built to reduce the flood hazard in a similar manner as a levee. Typically made of concrete or steel, floodwalls often are erected in urban locations where there is not enough room for a levee. Floodwalls are sometimes constructed on a levee crown to increase the levee's height.

Most new dams and levees are engineered to a certain design standard. If that design is exceeded, they could be overtopped and fail catastrophically, causing more damage than if the levee was not there in the first place. Few levees anywhere in the nation are built to more than a 1-percent-annual-chance flood, and the areas behind them are still at some risk for flooding. In some states, the flooding threat can extend up to 15 miles from a riverbank. Although the probability of flooding may be lower because a levee exists, risk is nonetheless still present. The American Society of Civil Engineers' publication "So, You Live Behind a Levee!" provides an in-depth explanation of levee and residual risk.

- **Reasons levees are considered AoMIs:**

Canal levee breaches as a result of Hurricane Katrina in New Orleans in 2005. Note damages can be more extensive due to high velocity flood flows than if the levee was not there.

  - Like dams, many levees in the United States were constructed using unknown techniques and materials. These levees have a higher failure rate than those that have been designed to today's standards.
  - A levee might not provide the flood risk reduction it once did as a result of flood risk changes over time. Flood risk can change due to a number of factors, including increased flood levels due to climate change or better estimates of flooding, development in the watershed increasing flood levels and settlement of the levee or floodwall, and sedimentation in the levee channel. Increased flood levels mean decreased reduction of the flood hazard. The lack of adequate maintenance over time will also reduce the capability of a levee to contain the flood levels for which it was originally designed.
  - Given enough time, any levee will eventually be overtopped or damaged by a flood that exceeds the levee's capacity. Still, a widespread public perception of levees is that they will always provide protection. This perception may lead to not taking mitigation actions such as purchasing flood insurance.
  - A levee is a system that can fail due to its weakest point, and therefore maintenance is critical. Many levees in the United States are poorly maintained or not maintained at all. Maintenance also includes maintaining the drainage systems behind the levees so they can keep the protected area dry.

- **Coastal Structures**

Coastal structures, such as seawalls and revetments, are typically used to stabilize the shoreline to mitigate or prevent flood and/or erosion losses. Structures, such as jetties, groins and breakwaters, are constructed along naturally dynamic shorelines to alter the physical processes (e.g. sediment transport) for purposes that include reduction of long-term erosion rates, improvements to safe navigation (e.g., into ports), and reduction of erosive wave forces impacting a coast.

- **Reasons coastal structures are considered AoMIs:**
  - Coastal structures may provide flood or erosion protection for one site. However, they may also interrupt the sediment transport process, resulting in accelerated coastal erosion downdrift of the structure.
  - Coastal structures are typically designed to withstand the forces associated with extreme design conditions of waves and water levels. Adequate protection may not be provided if these conditions are exceeded.

- As with other infrastucture such as roads, bridges, and utilities, regular maintenance of shoreline protection structures is essential to ensure that they continue to provide the intended protection from flooding and erosion.

- **Stream Flow Constrictions**

  A stream flow constriction occurs when a human-made structure, such as a culvert or bridge, constricts the flow of a river or stream. The results of this constriction can be increased damage potential to the structure, an increase in velocity of flow through the structure, and the creation of significant ponding or backwater upstream of the structure. Regulatory standards regarding the proper opening size for a structure spanning a river or stream are not consistent and may be non-existent. Some local regulations require structures to pass a volume of water that corresponds to a certain size rain event; however, under sizing, these openings can result in flood damage to the structure itself. After a large flood event, it is not uncommon to have numerous bridges and culverts "washed out."

  - **Reasons stream flow constrictions are considered AoMIs:**
    - Stream flow constrictions can back water up on property upstream of the structure if not designed properly.
    - These structures can accelerate the flow through the structure causing downstream erosion if not properly mitigated. This erosion can affect the structure itself, causing undermining and failure.
    - If the constriction is a bridge or culvert, it can get washed out causing an area to become isolated and potentially more difficult to evacuate.
    - Washed-out culverts and associated debris can wash downstream and cause additional constrictions.

- **At-Risk Essential Facilities**

  Essential facilities, sometimes called "critical facilities," are those whose impairment during a flood could cause significant problems to individuals or communities. For example, when a community's wastewater treatment is flooded and shut down, not only do contaminants escape and flow into the floodwaters, but backflows of sewage can contaminate basements or other areas of the community. Similarly, when a facility such as a hospital is flooded, it can result in a significant hardship on the community not only during the event but long afterwards as well.

  - **Reasons at-risk essential facilities are considered AoMIs:**
    - Costly and specialized equipment may be damaged and need to be replaced.
    - Impairments to facilities such as fire stations may result in lengthy delays in responding and a focus on evacuating the facility itself.
    - Critical records and information stored at these facilities may be lost.

- **Past Flood Insurance Claims and Individual Assistance/Public Assistance Hotspots**

Assistance provided after flood events (flood insurance in any event and Individual Assistance [IA] or Public Assistance [PA] after declared disasters) occurs in flood affected areas. Understanding geographically where this assistance is being provided may indicate unique flood problems.

Clusters of past flood insurance claims can show where there is a repetitive flood problem.

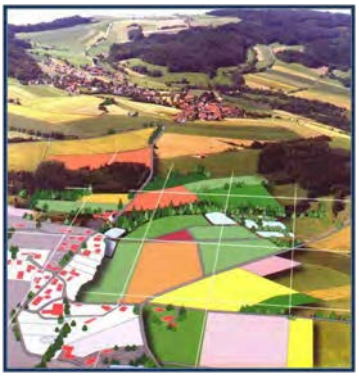
Flood insurance claims are not always equally distributed in a community. Although estimates indicate that 20 to 50 percent of structures in identified flood hazard areas have flood insurance, clusters of past claims may indicate where there is a flood problem. However, clusters of past claims and/or areas where there are high payments under FEMA's IA or PA Programs may indicate areas of significant flood hazard.

- **Reasons past claim hotspots are considered AoMIs:**
  - A past claim hotspot may reflect an area of recent construction (large numbers of flood insurance policies as a result of a large number of mortgages) and an area where the as-built construction is not in accordance with local floodplain management regulations.
  - Sometimes clusters of past claims occur in subdivisions that were constructed before flood protection standards were in place, places with inadequate stormwater management systems, or in areas that may not have been identified as SFHAs.
  - Clusters of IA or PA claims may indicate areas where high flood insurance coverage or other mitigation actions are needed.

- **Areas of Significant Land Use Change**

  Development, whether it is a 100-lot subdivision or a single lot big box commercial outlet, can result in large amounts of fill and other material being deposited in flood storage areas, thereby increasing flood hazards downstream.

  Additionally, when development occurs, hard surfaces such as parking lots, buildings and driveways do not allow water to absorb into the ground, and more of the rainwater becomes runoff flowing directly into streams. As a result, the "peak flow" in a stream after a storm event will be higher and will occur faster. Without careful planning, major land use changes can affect the impervious area of a site and result in a significant increase in flood risk caused by streams that cannot handle the extra storm water runoff.



Changes in land use in areas vulnerable to coastal flooding may affect the severity of wave hazards. Wave energy dissipates as waves propagate through forested areas or areas with dense development while wave energy can increase in open areas such as agricultural fields or parking lots. Changes in land use can affect wave hazards beyond the immediate area of land use change.

Rooftops, pavements, patios, and driveways contribute to the impervious area in a watershed. This occurs in both urban areas and rural areas being developed.

- **Reasons Areas of Significant Land Use Change are considered AoMIs:**
  - Development in areas mapped SFHA reduces flood storage areas, which can make flooding worse at the development site and downstream of it.
  - Impervious surfaces speed up the water flowing in the streams, which can increase erosion and the danger that fast-flowing floodwaters pose to people and buildings.
  - Open areas can allow wave energy to increase while densely developed areas and dense vegetation cover often obstruct waves. These obstructions diminish the wave's potentially destructive forces in areas inland of the obstructions.
  - Rezoning flood-prone areas to high densities and/or higher intensity uses can result in more people and property at risk of flooding and flood damage.

- **Key Emergency Routes Overtopped During Frequent Flooding Events**

  Roads are not always elevated above estimated flood levels, and present a significant flood risk to motorists during flooding events. When alternate routes are available, risks may be reduced, including risks to life and economic loss.

When large highways close due to flooding, traffic is detoured causing inconvenience and economic loss.

  - **Reasons overtopped roads are considered AoMIs:**
    - Such areas, when identified, can be accounted for and incorporated into Emergency Action Plans.
    - Roads may be elevated or reinforced to reduce the risk of overtopping during flood events.

- **Drainage or Stormwater-Based Flood Hazard Areas, or Areas Not Identified as Floodprone on the FIRM But Known to Be Inundated**

Flood hazard areas exist everywhere. While FEMA maps many of these, others are not identified. Many of these areas may be located in communities with existing, older, and often inadequate stormwater management systems or in very rural areas. Other similar areas could be a result of complex or unique drainage characteristics. Even though they are not mapped, awareness of these areas is important so adequate planning and mitigation actions can be performed.

- **Reasons drainage or stormwater-based flood hazard areas or unidentified floodprone locations are considered AoMIs:**
  - So further investigation of such areas can occur and, based on scientific data, appropriate mitigation actions can result (i.e., land use and building standards).
  - To create viable mitigation project applications in order to reduce flood losses.

- **Areas of Mitigation Success**

Flood mitigation projects are powerful tools to communicate the concepts of mitigation and result in more resilient communities. Multiple agencies have undertaken flood hazard mitigation actions for decades. Both structural measures—those that result in flood control structures—and non-structural measures have been implemented in thousands of communities. An extensive list of mitigation actions can be found in Section 4.

- **Reasons areas of mitigation success are considered AoMIs:**
  - Mitigation successes identify those areas within the community that have experienced a reduction or elimination of flood risk.
  - Such areas are essential in demonstrating successful loss reduction measures and in educating citizens and officials on available flood hazard mitigation techniques.
  - Avoided losses can be calculated and shown.

- **Areas of Significant Riverine or Coastal Erosion**

Stream channels are shaped by a number of factors, including: degradation, aggradation, general scour, local scour, deposition, and lateral migration. Streams are constantly progressing towards a state of dynamic equilibrium involving water and sediment.

Coastal shorelines erode in response to wave and water level conditions and other factors. As sea levels rise, erosion is typically exasperated.

- **Reasons why areas of significant riverine or coastal erosion are considered AoMIs:**
  - Riverine flood damage assessments generally consider inundation alone
  - Bank erosion caused by within channel flows is not recognized as a significant hazard in Federal floodplain management regulations

- Riverine and coastal erosion can undercut structures and roads, causing instability and possible collapse.
- Landslides and mudslides are a result of erosion
- Approximately one-third of the nation's streams experience severe erosion problems
- Erosion of coastal barrier islands can result in breaches, washing out roads and cutting off access routes
- Erosion often occurs along beaches during storms, especially severe storms that stay offshore for long durations and result in ongoing "battering" of the shoreline from high winds and waves. As the beach erodes, vulnerable properties are placed at even greater risk to coastal flooding from later storm surge, high tides, and wave action.

- **Other**

  Other types of flood risk areas include drainage or stormwater-based flood hazard areas, or areas known to be inundated during storm events.

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3 Flood Risk Analysis Results

The following pages provide summary flood risk results for the Flood Risk Project as follows:

- **Flood Risk Map (FRM).** Within the Flood Risk Project the FRM displays base data reflecting community boundaries, major roads, and stream lines; potential losses for the refined 1-percent-annual-chance Coastal Flood Risk Study; new Flood Risk Project areas; and graphics and text that promote access and usage of additional data available through the FRD, FIRM, and National Flood Hazard Layer and viewers (desktop or FEMA website, etc.). This information can be used to assist in Flood Risk Project-level planning as well as for developing mitigation actions within each jurisdiction located within the Flood Risk Project.

  The FRM provides a graphical overview of the Flood Risk Project which highlights areas of risk that should be noted, based on potential losses, exposed facilities, etc., based on data found in the FRD. Refer to the data in the FRD to conduct additional analyses.

- **Flood Risk Project Summary.** Within the Flood Risk Project area, summary data for some or all of the following datasets are provided for the entire project area and also on a jurisdiction by jurisdiction basis:
  - **Changes Since Last FIRM (CSLF).** This is a summary of where the floodplain and flood zones have increased or decreased (only analyzed for areas that were previously mapped using digital FIRMs).
  - **Flood Depth and Analysis Grids.** A general discussion of the data provided in the FRD, including coastal analysis grids if furnished as part of the project.
  - **Flood Risk Assessments.** A loss estimation of potential flood damages from the 1-percent-annual-chance flood scenario.

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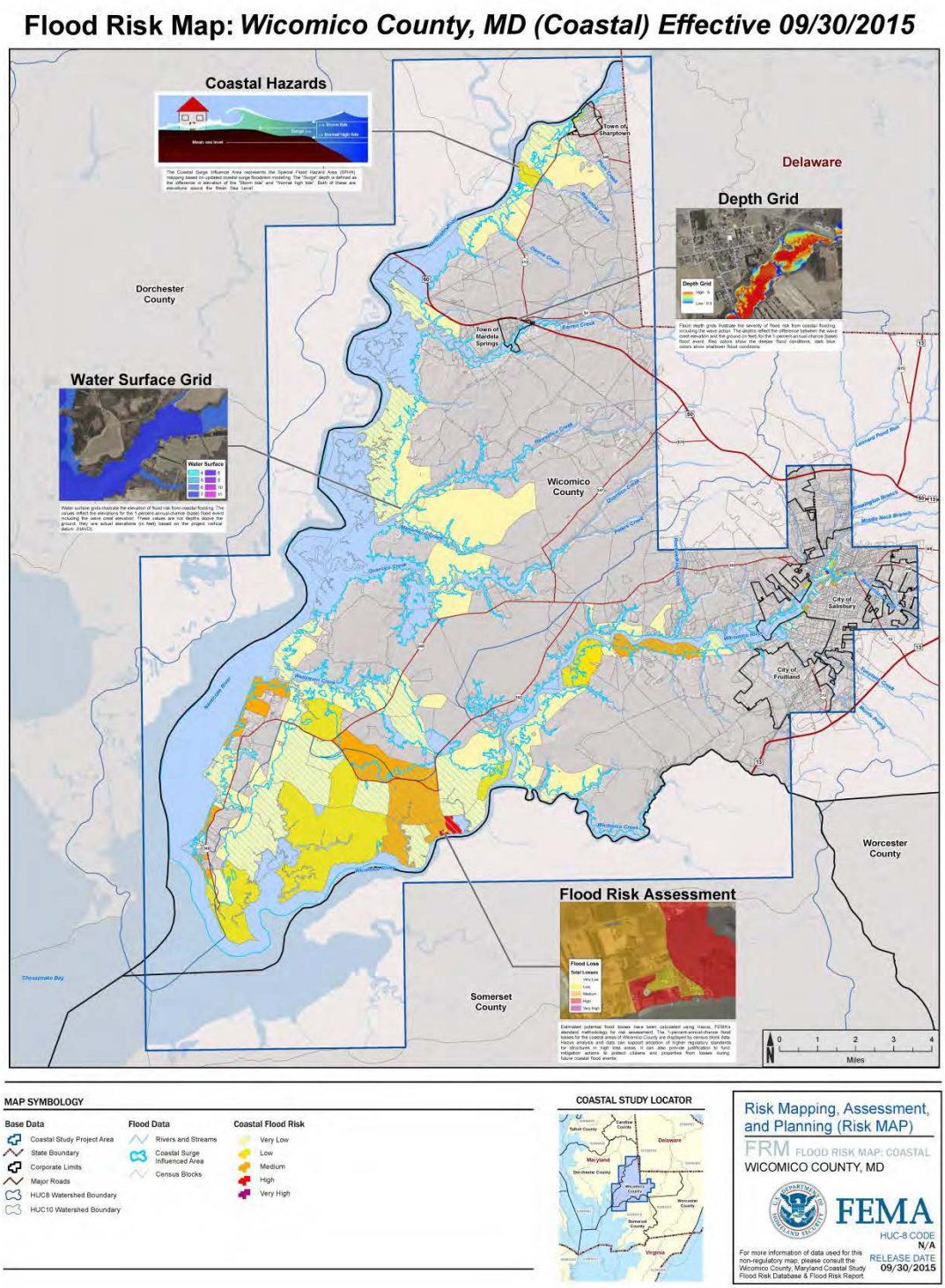
3.1 Flood Risk Map

The Flood Risk Map for this Flood Risk Project is shown below. In addition to this reduced version of the map, a full size version is available within the FRD.



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3.2 Wicomico County, Maryland Coastal Study Summary

Wicomico County is located in Southeastern Maryland along the Eastern Shore of the Chesapeake Bay. It is bordered to the north by Dorchester County and the state of Delaware, to the south by Somerset County, and to the west by Worcester County. The county has 374 square miles of land area and a population of 98,733. Salisbury is the largest community in the county and also acts as the county seat. Although agriculture is the county's primary industry, commercial fishing occurs in coastal areas and services are prevalent in urban centers.

Even though Wicomico County has a continental climate, temperature fluctuations over the year are moderated by the county's close proximity to the Chesapeake Bay and the Atlantic Ocean. The county has an average annual temperature of 58°F and averages approximately 46 inches of rainfall per year. Because much of the county has flat terrain, poor drainage, high seasonal water tables, and soils that exacerbate runoff, it continues to be susceptible to flooding during large storms. The coastal flood risk is highest in areas of the county that lie close to the Chesapeake Bay and the Nanticoke and Wicomico Rivers. Recent flooding events in the county include Hurricane Irene in September 2011 and Hurricane Sandy in October 2012. (FEMA, 2015a; U.S. Census Bureau, 2015; Wicomico County Government, 2015)

3.2.1 Overview

Wicomico County, located in Maryland, includes the following communities within the coastal region:

Community Name	CID	Total Community Population[1]	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
City of Salisbury	240080	30,343	72	13.4	53	Y	10	Y
City of Fruitland	240139	4,866	81	3.8	81	Y	10	Y
Town of Mardela Springs	240079	347	100	0.4	100	Y	10	Y
Town of Sharptown	240081	651	100	0.4	100	Y	10	Y
Wicomico County (Unincorporated Areas)	240078	56,064	51	350.3	49	Y	10	Y

[1]Population according to 2010 U.S. Census

Community-specific results are provided on subsequent pages. Data provided below and on subsequent pages only includes areas located within the Wicomico County, Maryland Coastal Flood Risk Project and do not necessarily represent community-wide totals.

Section 2 of the FRR provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section 7 of the FRR and are found in the FRD.

3.2.2 Flood Risk Datasets

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Flood Depth and Analysis Grids**
  - The FRD contains datasets in the form of depth grids for the entire Flood Risk Project that can be used for additional analysis, enhanced visualization, and communication of flood risks for hazard mitigation planning and emergency management. The data provided within the FRD should be used to further isolate areas where flood mitigation potential is high and may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation. Section 2 of the FRR provides general information regarding the development of and potential uses for this data. See the FRD for the following depth grid data:
    - Flood depth grid (1-percent-annual-chance flood event)
    - Water surface grid (1-percent-annual-chance flood event)
- **Flood Risk Results Information**
  - Wicomico County, Maryland's coastal flood risk analysis incorporates results from a FEMA-performed Hazus analysis (Version 2.1 for 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 with state-level tax data (parcel centroids from the MD Department of Planning) and local building footprints provided by Wicomico County to estimate loss ratios for the 1-percent-annual-chance flood scenario.
  - The following data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

    National 2010 AAL Study Data

    This set of features and tables in the FRD stores the default Hazus (Version 2.1) General Building Stock (GBS) inventory data (2000 census) and resulting losses from the FEMA National 2010 Average Annualized Loss (AAL) Study. These feature classes and data tables do not reflect any of the updates completed for this 'Refined' study.

    - **S_CenBlk_Ar_2000** – This feature class contains the default Hazus GBS inventory data (2000 census) by 2000 census blocks. It is broken down by occupancy type (residential, commercial and other) and also by loss type (building and contents).
    - **L_Exposure** – This table contains the default Hazus GBS inventory data (2000 census) by political area. It is broken down by occupancy type (residential, commercial, and other).

- **L_RA_AAL** – This table contains the results, by 2000 census block, of the FEMA National 2010 Hazus Level 1 AAL study. Hazus was used to generate depth grids for the 2-, 1-, 0.5- and 0.2-percent-annual-chance return periods. The loss analysis was completed for each return period using the default Hazus GBS inventory data (2000 census) by census block. The return period losses were used to calculate the AAL values.
- **L_RA_Summary** – This table contains a summary of the L_RA_AAL losses by political area. The loss ratio values are the percentage of the L_RA_AAL losses per L_Exposure values.

Flood Risk Project Refined Data

This set of feature classes and tables in the FRD stores the updated Hazus (Version 2.2) User-Defined Facilities (UDF) inventory data and resulting losses for this 'Refined' study. The same political area geometries were used so direct comparisons to the National 2010 AAL Study can be made. In order to more accurately represent the coastal flood risk in the county based on the current population distribution, Hazus loss estimates using the refined data are summarized by 2010 census block boundaries.

- **S_CenBlk_Ar_2010** – This feature class contains 2010 census block geometries and population counts. It can be used to examine Hazus flood losses that are summarized in the L_RA_Refined table.
- **S_UDF_Pt** – This feature class contains location and inventory data for site-specific risk assessments. State and local data was obtained for this feature class, including building footprints, structure values and landuse classifications. The data was evaluated against the coastal 1-percent-annual-chance floodplain boundaries (presented on the countywide FIRM, effective August 17, 2015), and in areas where the actual building locations are contained in the SFHA, loss calculations were included in this 'Refined' study.
- **L_Exposure_Refined** – This table is an addition to the default database schema for this project. It contains a summary of S_UDF_Pt values (building + contents value) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_Refined** – This table contains the results (by 2010 census block) of this flood risk study. Engineering models were used to generate depth grids for the 1-percent-annual-chance return period. The loss analysis was completed for the single return period using the updated Hazus UDF inventory data by 2010 census block. No AAL values were calculated since only a single return period losses were available.
- **L_RA_UDF_Refined** – This table is an addition to the default database schema for this project. It contains Hazus-estimated building and contents losses for all structures in the S_UDF_Pt feature class.
- **L_RA_Summary_Refined_100yr** – This table is an addition to the default database schema specifically for this project. It contains a summary of the L_RA_Refined losses by political area. However, because the UDF inventory

does not include all parcels within a census block, rather only parcels (and more specifically building footprints) which are located within the coastal SFHA, loss ratios for respective political areas would be skewed too high, and as a result, loss ratios are not presented in this Coastal Flood Risk Project.

- **UDF_Hazus_Input** – This table is an addition to the default database schema specifically for this project. It contains the original UDF table that was imported into Hazus in order to run loss calculations.

Table 3-1: Wicomico County (Total Project Area): Estimated Potential Losses for Flood Event Scenarios

Flood Risk Project Refined Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$83,100,000	60%	N/A	N/A	N/A	N/A	$7,000,000	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	$27,200,000	20%	N/A	N/A	N/A	N/A	$2,600,000	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	$27,300,000	20%	N/A	N/A	N/A	N/A	$700,000	N/A	N/A	N/A	N/A	N/A
Total Building & Contents[3]	**$137,600,000**	**100%**	**N/A**	**N/A**	**N/A**	**N/A**	**$10,300,000**	N/A	**N/A**	**N/A**	**N/A**	**N/A**
Business Disruption[4]	N/A	N/A	N/A	N/A	N/A	N/A	$1,100,000	N/A	N/A	N/A	N/A	N/A
TOTAL[5]	**$137,600,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$11,400,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

National 2010 AAL Study Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$3,222,100,000	64%	N/A	N/A	$47,600,000	1%	$58,900,000	2%	$84,200,000	3%	$1,100,000	<1%
Commercial Building & Contents	$1,333,400,000	26%	N/A	N/A	$33,800,000	3%	$43,500,000	3%	$63,800,000	5%	$800,000	<1%
Other Building & Contents	$488,100,000	10%	N/A	N/A	$10,200,000	2%	$13,300,000	3%	$19,800,000	4%	$200,000	<1%
Total Building & Contents[3]	**$5,043,700,000**	**100%**	**N/A**	**N/A**	**$91,700,000**	**2%**	**$115,600,000**	**2%**	**$167,700,000**	**3%**	**$2,100,000**	**<1%**
Business Disruption[4]	N/A	N/A	N/A	N/A	$4,000,000	N/A	$5,100,000	N/A	$7,200,000	N/A	$50,000	N/A
TOTAL[5]	**$5,043,700,000**	**N/A**	**N/A**	**N/A**	**$95,600,000**	**N/A**	**$120,800,000**	**N/A**	**$174,900,000**	**N/A**	**$2,100,000**	**N/A**

[1]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[2]Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent. Loss ratios were not calculated for the refined study because the analysis was restricted to parcels that were located in the coastal SFHA, which would result in highly skewed values.
[3]Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.
[4]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[5]Total = Total Building and Contents + Business Disruption
[6] Flood Risk Project Refined losses calculated using Hazus Version 2.2, National 2010 AAL Study losses calculated using Hazus Version 2.1.
The figures in this table only represent information within the Wicomico County, Maryland Coastal Study

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3.3 Communities

The following sections provide an overview of the community's floodplain management program as of the date of this publication, as well as summarize the flood risk analysis performed for each project area in Wicomico County, Maryland.

3.3.1 City of Salisbury Summary (CID 240080)

The following pages include Flood Risk data for the City of Salisbury.

3.3.1.1 Overview

The City of Salisbury is the largest community in Wicomico County and also acts as the county seat. The city is situated in the central part of the county on the Wicomico River, which flows into the Chesapeake Bay. It is located near the intersection of two major highways in Eastern Maryland, U.S Highway 50 and U.S. Highway 13. In 2010, Salisbury had a population of 30,343. For people living in Wicomico County, Salisbury is a primary place to visit for services, retail, and cultural activities. It is also home to a marina, a zoo, and Salisbury University. (U.S. Census Bureau, 2015; City of Salisbury, 2015)

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
City of Salisbury	240080	30,343	72	13.4	53	Y	10	Y

- Participating in the Wicomico County, Maryland 2011 Hazard Mitigation Plan which expires August 16, 2016
- Past Federal Disaster Declarations for flooding = 4
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 222 policies totaling approximately $57,305,300
- NFIP-recognized repetitive loss properties = 14
- NFIP-recognized severe repetitive loss properties = there are less than 5 claims (per Operational Standard 443 this is recorded as NULL in the FRD)

Data provided below only includes areas in the City of Salisbury that are located within the Wicomico County, Maryland Coastal Study Flood Risk Project, and do not necessarily represent community-wide totals. Section 2 of the FRR provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section 7 of the FRR and are found in the FRD.

3.3.1.2 Community Analyses and Results

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section 2 of the FRR provides general information regarding the development of and potential uses for this data):
    - Water surface elevation grid (1-percent-annual-chance flood event)
    - Flood depth grid (1-percent-annual-chance flood event)
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.
- **Flood Risk Results Information**
  - The City of Salisbury's coastal flood risk analysis incorporates results from a FEMA-performed Hazus analysis (Version 2.1 for 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 with state-level tax data (parcel centroids from the MD Department of Planning) and local building footprints provided by Wicomico County to estimate loss ratios for the 1-percent-annual-chance flood scenario.
  - The following data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

    National 2010 AAL Study Data

    This set of features and tables in the FRD stores the default Hazus (Version 2.1) General Building Stock (GBS) inventory data (2000 census) and resulting losses from the FEMA National 2010 Average Annualized Loss (AAL) Study. These feature classes and data tables do not reflect any of the updates completed for this 'Refined' study.

    - **S_CenBlk_Ar_2000** – This feature class contains the default Hazus GBS inventory data (2000 census) by 2000 census blocks. It is broken down by occupancy type (residential, commercial and other) and also by loss type (building and contents).
    - **L_Exposure** – This table contains the default Hazus GBS inventory data (2000 census) by political area. It is broken down by occupancy type (residential, commercial, and other).

- **L_RA_AAL** – This table contains the results, by 2000 census block, of the FEMA National 2010 Hazus Level 1 AAL study. Hazus was used to generate depth grids for the 2-, 1-, 0.5- and 0.2-percent-annual-chance return periods. The loss analysis was completed for each return period using the default Hazus GBS inventory data (2000 census) by census block. The return period losses were used to calculate the AAL values.
- **L_RA_Summary** – This table contains a summary of the L_RA_AAL losses by political area. The loss ratio values are the percentage of the L_RA_AAL losses per L_Exposure values.

Flood Risk Project Refined Data

This set of feature classes and tables in the FRD stores the updated Hazus (Version 2.2) User-Defined Facilities (UDF) inventory data and resulting losses for this 'Refined' study. The same political area geometries were used so direct comparisons to the National 2010 AAL Study can be made. In order to more accurately represent the coastal flood risk in the county based on the current population distribution, Hazus loss estimates using the refined data are summarized by 2010 census block boundaries.

- **S_CenBlk_Ar_2010** – This feature class contains 2010 census block geometries and population counts. It can be used to examine Hazus flood losses that are summarized in the L_RA_Refined table.
- **S_UDF_Pt** – This feature class contains location and inventory data for site-specific risk assessments. State and local data was obtained for this feature class, including building footprints, structure values and landuse classifications. The data was evaluated against the coastal 1-percent-annual-chance floodplain boundaries (presented on the countywide FIRM, effective August 17, 2015), and in areas where the actual building locations are contained in the SFHA, loss calculations were included in this 'Refined' study.
- **L_Exposure_Refined** – This table is an addition to the default database schema for this project. It contains a summary of S_UDF_Pt values (building + contents value) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_Refined** – This table contains the results (by 2010 census block) of this flood risk study. Engineering models were used to generate depth grids for the 1-percent-annual-chance return period. The loss analysis was completed for the single return period using the updated Hazus UDF inventory data by 2010 census block. No AAL values were calculated since only a single return period losses were available.
- **L_RA_UDF_Refined** – This table is an addition to the default database schema for this project. It contains Hazus-estimated building and contents losses for all structures in the S_UDF_Pt feature class.
- **L_RA_Summary_Refined_100yr** – This table is an addition to the default database schema specifically for this project. It contains a summary of the L_RA_Refined losses by political area. However, because the UDF inventory

does not include all parcels within a census block, rather only parcels (and more specifically building footprints) which are located within the coastal SFHA, loss ratios for respective political areas would be skewed too high, and as a result, loss ratios are not presented in this Coastal Flood Risk Project.

- **UDF_Hazus_Input** – This table is an addition to the default database schema specifically for this project. It contains the original UDF table that was imported into Hazus in order to run loss calculations.

Table 3-2: City of Salisbury (240080): Estimated Potential Losses for Flood Event Scenarios

Flood Risk Project Refined Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$11,700,000	19%	N/A	N/A	N/A	N/A	$700,000	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	$24,800,000	39%	N/A	N/A	N/A	N/A	$2,100,000	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	$26,300,000	42%	N/A	N/A	N/A	N/A	$600,000	N/A	N/A	N/A	N/A	N/A
Total Building & Contents[3]	**$62,800,000**	**100%**	**N/A**	**N/A**	**N/A**	**N/A**	**$3,300,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Business Disruption[4]	N/A	N/A	N/A	N/A	N/A	N/A	$800,000	N/A	N/A	N/A	N/A	N/A
TOTAL[5]	**$62,800,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$4,100,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

National 2010 AAL Study Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$1,314,900,000	**53%**	N/A	N/A	$7,400,000	1%	$9,900,000	1%	$14,700,000	1%	$200,000	<1%
Commercial Building & Contents	$887,100,000	**36%**	N/A	N/A	$19,100,000	2%	$26,100,000	3%	$39,600,000	4%	$500,000	<1%
Other Building & Contents	$264,900,000	**11%**	N/A	N/A	$4,600,000	2%	$6,400,000	2%	$10,000,000	4%	$100,000	<1%
Total Building & Contents[3]	**$2,466,900,000**	**100%**	**N/A**	**N/A**	**$31,200,000**	**1%**	**$42,400,000**	**2%**	**$64,300,000**	**3%**	**$800,000**	**<1%**
Business Disruption[4]	N/A	N/A	N/A	N/A	$2,000,000	N/A	$2,800,000	N/A	$4,100,000	N/A	$30,000	N/A
TOTAL[5]	**$2,466,900,000**	**N/A**	**N/A**	**N/A**	**$33,200,000**	**N/A**	**$45,200,000**	**N/A**	**$68,400,000**	**N/A**	**$800,000**	**N/A**

[1]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[2]Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent. Loss ratios were not calculated for the refined study because the analysis was restricted to parcels that were located in the coastal SFHA, which would result in highly skewed values.
[3]Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.
[4]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[5]Total = Total Building and Contents + Business Disruption
[6] Flood Risk Project Refined losses calculated using Hazus Version 2.2, National 2010 AAL Study losses calculated using Hazus Version 2.1.
The figures in this table only represent information within the Wicomico County, Maryland Coastal Study

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3.3.2 City of Fruitland Summary (CID 240139)

The following pages include Flood Risk data for the City of Fruitland.

3.3.2.1 Overview

The City of Fruitland is located in the central part of Wicomico County near the Wicomico River. It is situated near the City of Salisbury on U.S. Highway 13. According to the 2010 census, the city had 4,866 people residing in it. The city has a large recreational complex, two marinas, and free public boat ramps. Due to its close proximity to the Wicomico River and Chesapeake Bay, Fruitland offers numerous water-based recreational activities such as kayaking, crabbing, fishing, boating, and swimming. (U.S. Census Bureau, 2015; City of Fruitland, 2015)

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
City of Fruitland	240139	4,866	81	3.8	81	Y	10	Y

- Participating in the Wicomico County, Maryland 2011 Hazard Mitigation Plan which expires August 16, 2016
- Past Federal Disaster Declarations for flooding = 4
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 10 policies totaling approximately $3,360,000
- NFIP-recognized repetitive loss properties = 0
- NFIP-recognized severe repetitive loss properties = 0

Data provided below only includes areas in the City of Fruitland that are located within the Wicomico County, Maryland Coastal Study Flood Risk Project, and do not necessarily represent community-wide totals. Section 2 of the FRR provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section 7 of the FRR and are found in the FRD.

3.3.2.2 Community Analyses and Results

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section 2 of the FRR provides general information regarding the development of and potential uses for this data):
    - Water surface elevation grid (1-percent-annual-chance flood event)
    - Flood depth grid (1-percent-annual-chance flood event)
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.
- **Flood Risk Results Information**
  - The City of Fruitland's coastal flood risk analysis incorporates results from a FEMA-performed Hazus analysis (Version 2.1 for 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 with state-level tax data (parcel centroids from the MD Department of Planning) and local building footprints provided by Wicomico County to estimate loss ratios for the 1-percent-annual-chance flood scenario.
  - The following data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

    National 2010 AAL Study Data

    This set of features and tables in the FRD stores the default Hazus (Version 2.1) General Building Stock (GBS) inventory data (2000 census) and resulting losses from the FEMA National 2010 Average Annualized Loss (AAL) Study. These feature classes and data tables do not reflect any of the updates completed for this 'Refined' study.

    - **S_CenBlk_Ar_2000** – This feature class contains the default Hazus GBS inventory data (2000 census) by 2000 census blocks. It is broken down by occupancy type (residential, commercial and other) and also by loss type (building and contents).
    - **L_Exposure** – This table contains the default Hazus GBS inventory data (2000 census) by political area. It is broken down by occupancy type (residential, commercial, and other).
    - **L_RA_AAL** – This table contains the results, by 2000 census block, of the FEMA National 2010 Hazus Level 1 AAL study. Hazus was used to generate depth grids for the 2-, 1-, 0.5- and 0.2-percent-annual-chance return periods. The loss analysis was completed for each return period using the default Hazus GBS inventory data (2000 census) by census block. The return period losses were used to calculate the AAL values.

- **L_RA_Summary** – This table contains a summary of the L_RA_AAL losses by political area. The loss ratio values are the percentage of the L_RA_AAL losses per L_Exposure values.

Flood Risk Project Refined Data

This set of feature classes and tables in the FRD stores the updated Hazus (Version 2.2) User-Defined Facilities (UDF) inventory data and resulting losses for this 'Refined' study. The same political area geometries were used so direct comparisons to the National 2010 AAL Study can be made. In order to more accurately represent the coastal flood risk in the county based on the current population distribution, Hazus loss estimates using the refined data are summarized by 2010 census block boundaries.

- **S_CenBlk_Ar_2010** – This feature class contains 2010 census block geometries and population counts. It can be used to examine Hazus flood losses that are summarized in the L_RA_Refined table.
- **S_UDF_Pt** – This feature class contains location and inventory data for site-specific risk assessments. State and local data was obtained for this feature class, including building footprints, structure values and landuse classifications. The data was evaluated against the coastal 1-percent-annual-chance floodplain boundaries (presented on the countywide FIRM, effective August 17, 2015), and in areas where the actual building locations are contained in the SFHA, loss calculations were included in this 'Refined' study.
- **L_Exposure_Refined** – This table is an addition to the default database schema for this project. It contains a summary of S_UDF_Pt values (building + contents value) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_Refined** – This table contains the results (by 2010 census block) of this flood risk study. Engineering models were used to generate depth grids for the 1-percent-annual-chance return period. The loss analysis was completed for the single return period using the updated Hazus UDF inventory data by 2010 census block. No AAL values were calculated since only a single return period losses were available.
- **L_RA_UDF_Refined** – This table is an addition to the default database schema for this project. It contains Hazus-estimated building and contents losses for all structures in the S_UDF_Pt feature class.
- **L_RA_Summary_Refined_100yr** – This table is an addition to the default database schema specifically for this project. It contains a summary of the L_RA_Refined losses by political area. However, because the UDF inventory does not include all parcels within a census block, rather only parcels (and more specifically building footprints) which are located within the coastal SFHA, loss ratios for respective political areas would be skewed too high, and as a result, loss ratios are not presented in this Coastal Flood Risk Project.

- **UDF_Hazus_Input** – This table is an addition to the default database schema specifically for this project. It contains the original UDF table that was imported into Hazus in order to run loss calculations.

Table 3-3: City of Fruitland (240139): Estimated Potential Losses for Flood Event Scenarios

Flood Risk Project Refined Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Total Building & Contents[3]	**$0**	N/A	**N/A**	**N/A**	**N/A**	**N/A**	**$0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Business Disruption[4]	N/A	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
TOTAL[5]	**$0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

National 2010 AAL Study Losses

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$228,400,000	67%	N/A	N/A	$80,000	<1%	$200,000	<1%	$300,000	<1%	$0	0%
Commercial Building & Contents	$75,400,000	22%	N/A	N/A	$20,000	<1%	$90,000	<1%	$100,000	<1%	$0	0%
Other Building & Contents	$36,600,000	11%	N/A	N/A	$0	0%	$40,000	<1%	$50,000	<1%	$0	0%
Total Building & Contents[3]	**$340,400,000**	**100%**	**N/A**	**N/A**	**$100,000**	**<1%**	**$400,000**	**<1%**	**$500,000**	**<1%**	**$0**	**0%**
Business Disruption[4]	N/A	N/A	N/A	N/A	$0	N/A	$0	N/A	$10,000	N/A	$0	N/A
TOTAL[5]	**$340,400,000**	**N/A**	**N/A**	**N/A**	**$100,000**	**N/A**	**$400,000**	**N/A**	**$500,000**	**N/A**	**$0**	**N/A**

[1]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[2]Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent. Loss ratios were not calculated for the refined study because the analysis was restricted to parcels that were located in the coastal SFHA, which would result in highly skewed values.
[3]Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.
[4]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[5]Total = Total Building and Contents + Business Disruption
[6] Flood Risk Project Refined losses calculated using Hazus Version 2.2, National 2010 AAL Study losses calculated using Hazus Version 2.1.
The figures in this table only represent information within the Wicomico County, Maryland Coastal Study

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3.3.3 Town of Mardela Springs Summary (CID 240079)

The following pages include Flood Risk data for the Town of Mardela Springs.

3.3.3.1 Overview

Mardela Springs is a small town located in Northwestern Wicomico County on Barren Creek, a tributary of the Nanticoke River. The town's northern border is U.S. Highway 50. Mardela Springs became a popular resort destination in the late 19th century due to its mineral springs. Spas were built around the springs, which brought visitors from around the region to Mardela Springs. In addition, businessmen bottled the spring water and sold it to markets across the region. Today Mardela Springs maintains its small-town character and features several historic sites and buildings from as early as the 1700s. (U.S. Census Bureau, 2015; Town of Mardela Springs, 2015)

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
Town of Mardela Springs	240079	347	100	0.4	100	Y	10	Y

- Participating in the Wicomico County, Maryland 2011 Hazard Mitigation Plan which expires August 16, 2016
- Past Federal Disaster Declarations for flooding = 4
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 0 policies totaling $0
- NFIP-recognized repetitive loss properties = 0
- NFIP-recognized severe repetitive loss properties = 0

Data provided below only includes areas in the Town of Mardela Springs that are located within the Wicomico County, Maryland Coastal Study Flood Risk Project, and do not necessarily represent community-wide totals. Section 2 of the FRR provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section 7 of the FRR and are found in the FRD.

3.3.3.2 Community Analyses and Results

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section 2 of the FRR provides general information regarding the development of and potential uses for this data):
    - Water surface elevation grid (1-percent-annual-chance flood event)
    - Flood depth grid (1-percent-annual-chance flood event)
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.
- **Flood Risk Results Information**
  - The Town of Mardela Springs's coastal flood risk analysis incorporates results from a FEMA-performed Hazus analysis (Version 2.1 for 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 with state-level tax data (parcel centroids from the MD Department of Planning) and local building footprints provided by Wicomico County to estimate loss ratios for the 1-percent-annual-chance flood scenario.
  - The following data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

    National 2010 AAL Study Data

    This set of features and tables in the FRD stores the default Hazus (Version 2.1) General Building Stock (GBS) inventory data (2000 census) and resulting losses from the FEMA National 2010 Average Annualized Loss (AAL) Study. These feature classes and data tables do not reflect any of the updates completed for this 'Refined' study.

    - **S_CenBlk_Ar_2000** – This feature class contains the default Hazus GBS inventory data (2000 census) by 2000 census blocks. It is broken down by occupancy type (residential, commercial and other) and also by loss type (building and contents).
    - **L_Exposure** – This table contains the default Hazus GBS inventory data (2000 census) by political area. It is broken down by occupancy type (residential, commercial, and other).
    - **L_RA_AAL** – This table contains the results, by 2000 census block, of the FEMA National 2010 Hazus Level 1 AAL study. Hazus was used to generate depth grids for the 2-, 1-, 0.5- and 0.2-percent-annual-chance return periods. The loss analysis was completed for each return period using the default Hazus GBS inventory data (2000 census) by census block. The return period losses were used to calculate the AAL values.

- **L_RA_Summary** – This table contains a summary of the L_RA_AAL losses by political area. The loss ratio values are the percentage of the L_RA_AAL losses per L_Exposure values.

Flood Risk Project Refined Data

This set of feature classes and tables in the FRD stores the updated Hazus (Version 2.2) User-Defined Facilities (UDF) inventory data and resulting losses for this 'Refined' study. The same political area geometries were used so direct comparisons to the National 2010 AAL Study can be made. In order to more accurately represent the coastal flood risk in the county based on the current population distribution, Hazus loss estimates using the refined data are summarized by 2010 census block boundaries.

- **S_CenBlk_Ar_2010** – This feature class contains 2010 census block geometries and population counts. It can be used to examine Hazus flood losses that are summarized in the L_RA_Refined table.
- **S_UDF_Pt** – This feature class contains location and inventory data for site-specific risk assessments. State and local data was obtained for this table, including building footprints, structure values and landuse classifications. The data was evaluated against the coastal 1-percent-annual-chance floodplain boundaries (presented on the countywide FIRM, effective August 17, 2015), and in areas where the actual building locations are contained in the SFHA, loss calculations were included in this 'Refined' study.
- **L_Exposure_Refined** – This table is an addition to the default database schema for this project. It contains a summary of S_UDF_Pt values (Building + Content value) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_Refined** – This table contains the results (by 2010 census block) of this flood risk study. Engineering models were used to generate depth grids for the 1-percent-annual-chance return period. The loss analysis was completed for the single return period using the updated Hazus UDF inventory data by 2010 census block. No AAL values were calculated since only a single return period losses were available.
- **L_RA_UDF_Refined** – This table is an addition to the default database schema for this project. It contains Hazus-estimated building and content losses for all structures in the S_UDF_Pt feature class.
- **L_RA_Summary_Refined_100yr** – This table is an addition to the default database schema specifically for this project. It contains a summary of the L_RA_Refined losses by political area. However, because the UDF inventory does not include all parcels within a census block, rather only parcels (and more specifically building footprints) which are located within the coastal SFHA, loss ratios for respective political areas would be skewed too high, and as a result, loss ratios are not presented in this Coastal Flood Risk Project.

- **UDF_Hazus_Input** – This table is an addition to the default database schema specifically for this project. It contains the original UDF table that was imported into Hazus in order to run loss calculations.

Table 3-4: Town of Mardela Springs (240079): Estimated Potential Losses for Flood Event Scenarios

Flood Risk Project Refined Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Total Building & Contents[3]	**$0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$0**	N/A	**N/A**	**N/A**	**N/A**	**N/A**
Business Disruption[4]	N/A	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
TOTAL[5]	**$0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$0**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

National 2010 AAL Study Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$21,100,000	84%	N/A	N/A	$2,000,000	9%	$2,400,000	11%	$3,000,000	14%	$50,000	<1%
Commercial Building & Contents	$2,100,000	8%	N/A	N/A	$10,000	<1%	$20,000	1%	$90,000	4%	$0	0%
Other Building & Contents	$2,000,000	8%	N/A	N/A	$20,000	1%	$20,000	1%	$30,000	2%	$0	0%
Total Building & Contents[3]	**$25,200,000**	**100%**	**N/A**	**N/A**	**$2,000,000**	**8%**	**$2,400,000**	**10%**	**$3,100,000**	**12%**	**$50,000**	**<1%**
Business Disruption[4]	N/A	N/A	N/A	N/A	$10,000	N/A	$10,000	N/A	$10,000	N/A	$0	N/A
TOTAL[5]	**$25,200,000**	**N/A**	**N/A**	**N/A**	**$2,000,000**	**N/A**	**$2,400,000**	**N/A**	**$3,100,000**	**N/A**	**$50,000**	**N/A**

[1]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[2]Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent. Loss ratios were not calculated for the refined study because the analysis was restricted to parcels that were located in the coastal SFHA, which would result in highly skewed values.
[3]Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.
[4]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[5]Total = Total Building and Contents + Business Disruption
[6] Flood Risk Project Refined losses calculated using Hazus Version 2.2, National 2010 AAL Study losses calculated using Hazus Version 2.1.
The figures in this table only represent information within the Wicomico County, Maryland Coastal Study

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3.3.4 Town of Sharptown Summary (CID 240081)

The following pages include Flood Risk data for the Town of Sharptown.

3.3.4.1 Overview

The Town of Sharptown is located on the Nanticoke River in the northwestern part of Wicomico County, near the border with Delaware. It is located at the intersection of State Highway 313 and State Highway 348. In 2010, the town had a population of 651. Historically, Sharptown was a major center for shipbuilding and other maritime activities between the early 19th and early 20th centuries. Today the town is known for its Victorian architecture and the annual Fireman's Carnival. (U.S. Census Bureau, 2015; Maryland State Archives, 2015)

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
Town of Sharptown	240081	651	100	0.4	100	Y	10	Y

- Participating in the Wicomico County, Maryland 2011 Hazard Mitigation Plan which expires August 16, 2016
- Past Federal Disaster Declarations for flooding = 4
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 6 policies totaling approximately $1,465,300
- NFIP-recognized repetitive loss properties = 0
- NFIP-recognized severe repetitive loss properties = 0

Data provided below only includes areas in the Town of Sharptown that are located within the Wicomico County, Maryland Coastal Study Flood Risk Project, and do not necessarily represent community-wide totals. Section 2 of the FRR provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section 7 of the FRR and are found in the FRD.

3.3.4.2 Community Analyses and Results

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section 2 of the FRR provides general information regarding the development of and potential uses for this data):
    - Water surface elevation grid (1-percent-annual-chance flood event)
    - Flood depth grid (1-percent-annual-chance flood event)
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.
- **Flood Risk Results Information**
  - The Town of Sharptown's coastal flood risk analysis incorporates results from a FEMA-performed Hazus analysis (Version 2.1 for 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 with state-level tax data (parcel centroids from the MD Department of Planning) and local building footprints provided by Wicomico County to estimate loss ratios for the 1-percent-annual-chance flood scenario.
  - The following data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

    National 2010 AAL Study Data

    This set of features and tables in the FRD stores the default Hazus (Version 2.1) General Building Stock (GBS) inventory data (2000 census) and resulting losses from the FEMA National 2010 Average Annualized Loss (AAL) Study. These feature classes and data tables do not reflect any of the updates completed for this 'Refined' study.

    - **S_CenBlk_Ar_2000** – This feature class contains the default Hazus GBS inventory data (2000 census) by 2000 census blocks. It is broken down by occupancy type (residential, commercial and other) and also by loss type (building and contents).
    - **L_Exposure** – This table contains the default Hazus GBS inventory data (2000 census) by political area. It is broken down by occupancy type (residential, commercial, and other).
    - **L_RA_AAL** – This table contains the results, by 2000 census block, of the FEMA National 2010 Hazus Level 1 AAL study. Hazus was used to generate depth grids for the 2-, 1-, 0.5- and 0.2-percent-annual-chance return periods. The loss analysis was completed for each return period using the default Hazus GBS inventory data (2000 census) by census block. The return period losses were used to calculate the AAL values.

- **L_RA_Summary** – This table contains a summary of the L_RA_AAL losses by political area. The loss ratio values are the percentage of the L_RA_AAL losses per L_Exposure values.

Flood Risk Project Refined Data

This set of feature classes and tables in the FRD stores the updated Hazus (Version 2.2) User-Defined Facilities (UDF) inventory data and resulting losses for this 'Refined' study. The same political area geometries were used so direct comparisons to the National 2010 AAL Study can be made. In order to more accurately represent the coastal flood risk in the county based on the current population distribution, Hazus loss estimates using the refined data are summarized by 2010 census block boundaries.

- **S_CenBlk_Ar_2010** – This feature class contains 2010 census block geometries and population counts. It can be used to examine Hazus flood losses that are summarized in the L_RA_Refined table.
- **S_UDF_Pt** – This feature class contains location and inventory data for site-specific risk assessments. State and local data was obtained for this table, including building footprints, structure values and landuse classifications. The data was evaluated against the coastal 1-percent-annual-chance floodplain boundaries (presented on the countywide FIRM, effective August 17, 2015), and in areas where the actual building locations are contained in the SFHA, loss calculations were included in this 'Refined' study.
- **L_Exposure_Refined** – This table is an addition to the default database schema for this project. It contains a summary of S_UDF_Pt values (Building + Content value) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_Refined** – This table contains the results (by 2010 census block) of this flood risk study. Engineering models were used to generate depth grids for the 1-percent-annual-chance return period. The loss analysis was completed for the single return period using the updated Hazus UDF inventory data by 2010 census block. No AAL values were calculated since only a single return period losses were available.
- **L_RA_UDF_Refined** – This table is an addition to the default database schema for this project. It contains Hazus-estimated building and content losses for all structures in the S_UDF_Pt feature class.
- **L_RA_Summary_Refined_100yr** – This table is an addition to the default database schema specifically for this project. It contains a summary of the L_RA_Refined losses by political area. However, because the UDF inventory does not include all parcels within a census block, rather only parcels (and more specifically building footprints) which are located within the coastal SFHA, loss ratios for respective political areas would be skewed too high, and as a result, loss ratios are not presented in this Coastal Flood Risk Project.

- **UDF_Hazus_Input** – This table is an addition to the default database schema specifically for this project. It contains the original UDF table that was imported into Hazus in order to run loss calculations.

Table 3-5: Town of Sharptown (240081): Estimated Potential Losses for Flood Event Scenarios

Flood Risk Project Refined Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$1,900,000	95%	N/A	N/A	N/A	N/A	$200,000	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	$40,000	2%	N/A	N/A	N/A	N/A	$10,000	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	$0	N/A	N/A	N/A	N/A	N/A	$0	N/A	N/A	N/A	N/A	N/A
Total Building & Contents[3]	**$2,000,000**	**100%**	**N/A**	**N/A**	**N/A**	**N/A**	**$200,000**	N/A	**N/A**	**N/A**	**N/A**	**N/A**
Business Disruption[4]	N/A	N/A	N/A	N/A	N/A	N/A	$10,000	N/A	N/A	N/A	N/A	N/A
TOTAL[5]	**$2,000,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$200,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

National 2010 AAL Study Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$38,100,000	77%	N/A	N/A	$400,000	1%	$600,000	2%	$900,000	2%	$10,000	<1%
Commercial Building & Contents	$5,900,000	12%	N/A	N/A	$300,000	5%	$400,000	7%	$500,000	8%	$10,000	<1%
Other Building & Contents	$5,300,000	11%	N/A	N/A	$400,000	8%	$500,000	9%	$600,000	11%	$10,000	<1%
Total Building & Contents[3]	**$49,300,000**	**100%**	**N/A**	**N/A**	**$1,200,000**	**2%**	**$1,500,000**	**3%**	**$2,000,000**	**4%**	**$30,000**	**<1%**
Business Disruption[4]	N/A	N/A	N/A	N/A	$40,000	N/A	$40,000	N/A	$60,000	N/A	$0	N/A
TOTAL[5]	**$49,300,000**	**N/A**	**N/A**	**N/A**	**$1,200,000**	**N/A**	**$1,600,000**	**N/A**	**$2,100,000**	**N/A**	**$30,000**	**N/A**

[1]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[2]Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent. Loss ratios were not calculated for the refined study because the analysis was restricted to parcels that were located in the coastal SFHA, which would result in highly skewed values.
[3]Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.
[4]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[5]Total = Total Building and Contents + Business Disruption
[6] Flood Risk Project Refined losses calculated using Hazus Version 2.2, National 2010 AAL Study losses calculated using Hazus Version 2.1.
The figures in this table only represent information within the Wicomico County, Maryland Coastal Study

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3.3.5 Wicomico County (Unincorporated Areas) Summary (CID 240078)

The following pages include Flood Risk data for Wicomico County (Unincorporated Areas).

3.3.5.1 Overview

Wicomico County is located in Southeastern Maryland along the Eastern Shore of the Chesapeake Bay. It is bordered to the north by Dorchester County and the state of Delaware, to the south by Somerset County, and to the west by Worcester County. The county has 350 square miles of land area and a population of 56,064. Although agriculture is the county's primary industry, commercial fishing occurs in coastal areas and services are prevalent in urban centers.

Even though Wicomico County has a continental climate, temperature fluctuations over the year are moderated by the county's close proximity to the Chesapeake Bay and the Atlantic Ocean. The county has an average annual temperature of 58°F and averages approximately 46 inches of rainfall per year. Because much of the county has flat terrain, poor drainage, high seasonal water tables, and soils that exacerbate runoff, it continues to be susceptible to flooding during large storms. The coastal flood risk is highest in areas of the county that lie close to the Chesapeake Bay and the Nanticoke and Wicomico Rivers. Recent flooding events in the county include Hurricane Irene in September 2011 and Hurricane Sandy in October 2012. (FEMA, 2015a; U.S. Census Bureau, 2015; Wicomico County Government, 2015)

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in County (Coastal)	Total Community Land Area (sq mi)	Percent of Land Area in County (Coastal)	NFIP	CRS Rating	Mitigation Plan
Wicomico County (Unincorporated Areas)	240078	56,064	51	350.3	49	Y	10	Y

- Participating in the Wicomico County, Maryland 2011 Hazard Mitigation Plan which expires August 16, 2016
- Past Federal Disaster Declarations for flooding = 4
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 456 policies totaling approximately $120,315,900
- NFIP-recognized repetitive loss properties = 24
- NFIP-recognized severe repetitive loss properties = 0

Data provided below only includes areas in Wicomico County (Unincorporated Areas) that are located within the Wicomico County, Maryland Coastal Study Flood Risk Project, and do not necessarily represent community-wide totals. Section 2 of the FRR provides more information regarding the source and methodology used to develop the information presented below.

Datasets used toward the generation of results of this project are described in Section 7 of the FRR and are found in the FRD.

3.3.5.2 Community Analyses and Results

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section 2 of the FRR provides general information regarding the development of and potential uses for this data):
    - Water surface elevation grid (1-percent-annual-chance flood event)
    - Flood depth grid (1-percent-annual-chance flood event)
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.
- **Flood Risk Results Information**
  - Wicomico County's (Unincorporated Areas) coastal flood risk analysis incorporates results from a FEMA-performed Hazus analysis (Version 2.1 for 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 with state-level tax data (parcel centroids from the MD Department of Planning) and local building footprints provided by Wicomico County to estimate loss ratios for the 1-percent-annual-chance flood scenario.
  - The following data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

    National 2010 AAL Study Data

    This set of features and tables in the FRD stores the default Hazus (Version 2.1) General Building Stock (GBS) inventory data (2000 census) and resulting losses from the FEMA National 2010 Average Annualized Loss (AAL) Study. These feature classes and data tables do not reflect any of the updates completed for this 'Refined' study.

    - **S_CenBlk_Ar_2000** – This feature class contains the default Hazus GBS inventory data (2000 census) by 2000 census blocks. It is broken down by occupancy type (residential, commercial and other) and also by loss type (building and contents).

- **L_Exposure** – This table contains the default Hazus GBS inventory data (2000 census) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_AAL** – This table contains the results, by 2000 census block, of the FEMA National 2010 Hazus Level 1 AAL study. Hazus was used to generate depth grids for the 2-, 1-, 0.5- and 0.2-percent-annual-chance return periods. The loss analysis was completed for each return period using the default Hazus GBS inventory data (2000 census) by census block. The return period losses were used to calculate the AAL values.
- **L_RA_Summary** – This table contains a summary of the L_RA_AAL losses by political area. The loss ratio values are the percentage of the L_RA_AAL losses per L_Exposure values.

Flood Risk Project Refined Data

This set of feature classes and tables in the FRD stores the updated Hazus (Version 2.2) User-Defined Facilities (UDF) inventory data and resulting losses for this 'Refined' study. The same political area geometries were used so direct comparisons to the National 2010 AAL Study can be made. In order to more accurately represent the coastal flood risk in the county based on the current population distribution, Hazus loss estimates using the refined data are summarized by 2010 census block boundaries.

- **S_CenBlk_Ar_2010** – This feature class contains 2010 census block geometries and population counts. It can be used to examine Hazus flood losses that are summarized in the L_RA_Refined table.
- **S_UDF_Pt** – This feature class contains location and inventory data for site-specific risk assessments. State and local data was obtained for this table, including building footprints, structure values and landuse classifications. The data was evaluated against the coastal 1-percent-annual-chance floodplain boundaries (presented on the countywide FIRM, effective August 17, 2015), and in areas where the actual building locations are contained in the SFHA, loss calculations were included in this 'Refined' study.
- **L_Exposure_Refined** – This table is an addition to the default database schema for this project. It contains a summary of S_UDF_Pt values (Building + Content value) by political area. It is broken down by occupancy type (residential, commercial, and other).
- **L_RA_Refined** – This table contains the results (by 2010 census block) of this flood risk study. Engineering models were used to generate depth grids for the 1-percent-annual-chance return period. The loss analysis was completed for the single return period using the updated Hazus UDF inventory data by 2010 census block. No AAL values were calculated since only a single return period losses were available.
- **L_RA_UDF_Refined** – This table is an addition to the default database schema for this project. It contains Hazus-estimated building and content losses for all structures in the S_UDF_Pt feature class.

- **L_RA_Summary_Refined_100yr** – This table is an addition to the default database schema specifically for this project. It contains a summary of the L_RA_Refined losses by political area. However, because the UDF inventory does not include all parcels within a census block, rather only parcels (and more specifically building footprints) which are located within the coastal SFHA, loss ratios for respective political areas would be skewed too high, and as a result, loss ratios are not presented in this Coastal Flood Risk Project.
- **UDF_Hazus_Input** – This table is an addition to the default database schema specifically for this project. It contains the original UDF table that was imported into Hazus in order to run loss calculations.

Table 3-6: Wicomico County (Unincorporated Areas) (240078): Estimated Potential Losses for Flood Event Scenarios

Flood Risk Project Refined Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$69,500,000	95%	N/A	N/A	N/A	N/A	$6,100,000	N/A	N/A	N/A	N/A	N/A
Commercial Building & Contents	$2,300,000	3%	N/A	N/A	N/A	N/A	$500,000	N/A	N/A	N/A	N/A	N/A
Other Building & Contents	$1,000,000	1%	N/A	N/A	N/A	N/A	$100,000	N/A	N/A	N/A	N/A	N/A
Total Building & Contents[3]	**$72,800,000**	**100%**	**N/A**	**N/A**	**N/A**	**N/A**	**$6,700,000**	N/A	**N/A**	**N/A**	**N/A**	**N/A**
Business Disruption[4]	N/A	N/A	N/A	N/A	N/A	N/A	$300,000	N/A	N/A	N/A	N/A	N/A
TOTAL[5]	**$72,800,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$7,100,000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

National 2010 AAL Study Losses[6]

Type	Inventory Estimated Value	% of Total	10% (10-Yr) Dollar Losses[1]	10% Loss Ratio[2]	2% (50-yr) Dollar Losses[1]	2% Loss Ratio[2]	1% (100-yr) Dollar Losses[1]	1% Loss Ratio[2]	0.2% (500-yr) Dollar Losses[1]	0.2% Loss Ratio[2]	Annualized Losses[1]($/yr)	Annualized Loss Ratio[2]
Residential Building & Contents	$1,619,700,000	75%	N/A	N/A	$37,700,000	2%	$45,700,000	3%	$65,400,000	4%	$900,000	<1%
Commercial Building & Contents	$362,800,000	17%	N/A	N/A	$14,300,000	4%	$17,000,000	5%	$23,400,000	6%	$300,000	<1%
Other Building & Contents	$179,300,000	8%	N/A	N/A	$5,200,000	3%	$6,300,000	4%	$9,100,000	5%	$80,000	<1%
Total Building & Contents[3]	**$2,161,900,000**	**100%**	**N/A**	**N/A**	**$57,200,000**	**3%**	**$69,000,000**	**3%**	**$97,800,000**	**5%**	**$1,200,000**	**<1%**
Business Disruption[4]	N/A	N/A	N/A	N/A	$1,900,000	N/A	$2,200,000	N/A	$3,000,000	N/A	$10,000	N/A
TOTAL[5]	**$2,161,900,000**	**N/A**	**N/A**	**N/A**	**$59,000,000**	**N/A**	**$71,200,000**	**N/A**	**$100,800,000**	**N/A**	**$1,200,000**	**N/A**

[1]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[2]Loss ratio = Dollar Losses ÷ Estimated Value. Loss Ratios are rounded to the nearest integer percent. Loss ratios were not calculated for the refined study because the analysis was restricted to parcels that were located in the coastal SFHA, which would result in highly skewed values.
[3]Total Building and Contents = Residential Building and Contents + Commercial Building and Contents + Other Building and Contents.
[4]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[5]Total = Total Building and Contents + Business Disruption
[6] Flood Risk Project Refined losses calculated using Hazus Version 2.2, National 2010 AAL Study losses calculated using Hazus Version 2.1.
The figures in this table only represent information within the Wicomico County, Maryland Coastal Study

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4 Actions to Reduce Flood Risk

In order to fully leverage the Flood Risk Datasets and Products created for this Flood Risk Project, local stakeholders should consider many different flood risk mitigation tactics, including, but not limited the items shown in the sub-sections below.

Before Mitigation and After Mitigation

Communities will need to prioritize projects as part of the planning process. FEMA can then help route federal mitigation dollars to fund these projects.

4.1 Types of Mitigation Actions

Mitigation provides a critical foundation on which to reduce loss of life and property by avoiding or lessening the impact of hazard events. This creates safer communities and facilitates resiliency by enabling communities to return to normal function as quickly as possible after a hazard event. Once a community understands its flood risk, it is in a better position to identify potential mitigation actions that can reduce the risk to its people and property.

The mitigation plan requirements in 44 CFR Part 201 encourage communities to understand their vulnerability to hazards and take actions to minimize vulnerability and promote resilience. Flood mitigation actions generally fall into the following categories:

4.1.1 Preventative Measures

Preventative measures are intended to keep flood hazards from getting worse. They can reduce future vulnerability to flooding, especially in areas where development has not yet occurred or where capital improvements have not been substantial. Examples include:

- Comprehensive land use planning
- Zoning regulations
- Subdivision regulations
- Open space preservation
- Building codes
- Floodplain development regulations
- Stormwater management
- Purchase development rights or conservation

NFIP's CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions meeting the three goals of the CRS: to reduce flood losses, to facilitate accurate insurance rating, and to promote the awareness of flood insurance.

For CRS participating communities, flood insurance premium rates are discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount. (A Class 10 is not participating in the CRS and receives no discount.)

easements

- Participation in the NFIP Community Rating System (CRS)

4.1.2 Property Protection Measures

Property protection measures protect existing buildings by modifying the building to withstand floods, erosion, and waves or by removing buildings from hazardous locations. Examples include:

- Building relocation
- Acquisition and clearance
- Building elevation
- Barrier installation
- Building retrofit

4.1.3 Natural Resource Protection Activities

Natural resource protection activities reduce the impact of floods by preserving or restoring natural areas such as floodplains, wetlands, and dunes and their natural functions. Examples include:

- Wetland protection
- Habitat protection
- Erosion and sedimentation control
- Best management practices (BMP)
- Prevention of stream dumping activities (anti-litter campaigns)
- Improved forestry practices such as reforesting or selective timbering (extraction)
- Beach Nourishment
- Dune Construction
- Dune protection measures such as walkovers, sand fencing, and vegetation

4.1.4 Structural Mitigation Projects

Structural mitigation projects lessen the impact of floods by modifying the environmental natural progression of the flooding event. Structural protection such as upgrading dams/levees for already existing development and critical facilities may be a realistic alternative. However, citizens should be made aware of their residual risk. Examples include:

- Reservoirs, retention, and detention basins

- Levees and floodwalls
- Channel modifications
- Channel maintenance
- Seawalls, reventments, and bulkheads
- Groins, offshore breakwaters, and jetties

4.1.5 Public Education and Awareness Activities

Public education and awareness activities advise residents, business owners, potential property buyers, and visitors about floods, hazardous areas, and mitigation techniques they can use to reduce the flood risk to themselves and their property. Examples include:

- Readily available and readable updated maps
- Outreach projects
- Libraries
- Technical assistance
- Real estate disclosure
- Environmental education
- Risk information via the nightly news

For more information regarding hazard mitigation techniques, best practices, and potential grant funding sources, visit www.fema.gov or contact your local floodplain manager, emergency manager, or State Hazard Mitigation Officer.

4.1.6 Emergency Service Measures

Although not typically considered a mitigation technique, emergency service measures minimize the impact of flooding on people and property. These are actions commonly taken immediately prior to, during, or in response to a hazard event. Examples include:

- Hazard warning system
- Emergency response plan
- COOP and COG planning
- Critical facilities protection
- Health and safety maintenance
- Post flood recovery planning

Refer to FEMA Mitigation Planning How To Guide #3 (FEMA 386-3) "Developing the Mitigation Plan - Identifying Mitigation Actions and Implementation Strategies" for more information on how to identify specific mitigation actions to address hazard risk in your community.

4.2 Identifying Specific Actions for Your Community

As many mitigation actions are possible to lessen the impact of floods, how can a community decide which ones are appropriate to implement? There are many ways to identify specific actions most appropriate for a community. Some factors to consider may include the following:

- **Site characteristics.** Does the site present unique challenges (e.g., significant slopes or erosion potential)?
- **Flood characteristics.** Are the flood waters affecting the site fast or slow moving? Are there wave hazards? Is there debris associated with the flow? How deep is the flooding?
- **Social acceptance.** Will the mitigation action be acceptable to the public? Does it cause social or cultural problems?
- **Technical feasibility.** Is the mitigation action technically feasible (e.g., making a building watertight to a reasonable depth)?
- **Administrative feasibility.** Is there administrative capability to implement the mitigation action?
- **Legal.** Does the mitigation action meet all applicable codes, regulations, and laws? Public officials may have a legal responsibility to act and inform citizens if a known hazard has been identified.
- **Economic.** Is the mitigation action affordable? Is it eligible under grant or other funding programs? Can it be completed within existing budgets?
- **Environmental.** Does the mitigation action cause adverse impacts on the environment or can they be mitigated? Is it the most appropriate action among the possible alternatives?

FEMA in collaboration with the American Planning Association has released the publication, "Integrating Hazard Mitigation into Local Planning." This guide explains how hazard mitigation can be incorporated into several different types of local planning programs. For more information, go to www.planning.org or http://www.fema.gov/library.

Your local Hazard Mitigation Plan is a valuable place to identify and prioritize possible mitigation actions. The plan includes a mitigation strategy with mitigation actions that were developed through a public and open process. You can then add to or modify those actions based on what is learned during the course of the Risk MAP project and the information provided within this FRR.

4.3 Mitigation Programs and Assistance

Not all mitigation activities require funding (e.g., local policy actions such as strengthening a flood damage prevention ordinance), and those that do are not limited to outside funding sources (e.g., inclusion in local capital improvements plan, etc.). For those mitigation actions that require assistance through funding or technical expertise, several State and Federal agencies have flood hazard mitigation grant programs and offer technical assistance. These programs may be funded at different levels over time or may be activated under special circumstances such as after a presidential disaster declaration.

Communities can link hazard mitigation plans and actions to the right FEMA grant programs to fund flood risk reduction. More information about FEMA HMA programs can be found at http://www.fema.gov/government/grant/hma/index.shtm.

4.3.1 FEMA Mitigation Programs and Assistance

FEMA awards many mitigation grants each year to states and communities to undertake mitigation projects to prevent future loss of life and property resulting from hazard impacts, including flooding. The FEMA Hazard Mitigation Assistance (HMA) programs provide grants for mitigation through the programs listed in Table 4.1 below.

Table 4-1: FEMA Hazard Mitigation Assistance Programs

Mitigation Grant Program	Authorization	Purpose
Hazard Mitigation Grant Program (HMGP)	Robert T. Stafford Disaster Relief and Emergency Assistance Act	Activated after a presidential disaster declaration; provides funds on a sliding scale formula based on a percentage of the total federal assistance for a disaster for long-term mitigation measures to reduce vulnerability to natural hazards
Flood Mitigation Assistance (FMA)	National Flood Insurance Reform Act	Reduce or eliminate claims against the NFIP
Pre-Disaster Mitigation (PDM)	Disaster Mitigation Act	National competitive program focused on mitigation project and planning activities that address multiple natural hazards
Repetitive Flood Claims (RFC)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Reduce flood claims against the NFIP through flood mitigation; properties must be currently NFIP insured and have had at least one NFIP claim
Severe Repetitive Loss (SRL)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Reduce or eliminate the long-term risk of flood damage to SRL residential structures currently insured under the NFIP

The HMGP and PDM programs offer funding for mitigation planning and project activities that address multiple natural hazard events. The FMA, RFC, and SRL programs focus funding efforts on reducing claims against the NFIP. Funding under the HMA programs is subject to availability of annual appropriations, and HMGP funding is also subject to the amount of FEMA disaster recovery assistance provided under a presidential major disaster declaration.

FEMA's HMA grants are awarded to eligible states, tribes, and territories (applicant) that, in turn, provide sub-grants to local governments and communities (sub-applicant). The applicant selects and prioritizes sub-applications developed and submitted to them by sub-applicants and submits them to FEMA for funding consideration. Prospective sub-applicants should consult the office designated as their applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers (SHMO) is available on the FEMA website (www.fema.gov).

4.3.2 Additional Mitigation Programs and Assistance

Several additional agencies including USACE, Natural Resource Conservation Service (NRCS), U.S. Geological Survey (USGS), NOAA, and others have specialists on staff and can offer further information on flood hazard mitigation. The State NFIP Coordinator and SHMO are state-level sources of information and assistance, which vary among different states.

The Silver Jackets program, active in several states, is a partnership of USACE, FEMA, and state agencies. The Silver Jackets program provides a state-based strategy for an interagency approach to planning and implementing measures for risk reduction.

5 Acronyms and Definitions

5.1 Acronyms

A

AAL	Average Annualized Loss
ALR	Annualized Loss Ratio
AoMI	Areas of Mitigation Interest

B

BCA	Benefit-Cost Analysis
BFE	Base Flood Elevation
BMP	Best Management Practices

C

CFR	Code of Federal Regulations
CHHA	Coastal High Hazard Areas
COG	Continuity of Government Plan
COOP	Continuity of Operations Plan
CRS	Community Rating System
CSLF	Changes Since Last FIRM

D

DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000

E

EOP	Emergency Operations Plan

F

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FLDWY	Floodway
FMA	Flood Mitigation Assistance
FRD	Flood Risk Database
FRM	Flood Risk Map
FRR	Flood Risk Report
FY	Fiscal Year

G

GBS	General Building Stock
GIS	Geographic Information System

H

HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program

I

IA	Individual Assistance

M

MSC	Map Service Center

N

NFHL	National Flood Hazard Layer
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service

P

PA	Public Assistance
PDM	Pre-Disaster Mitigation

R

RFC	Repetitive Flood Claims
Risk MAP	Mapping, Assessment, and Planning

S

SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SRL	Severe Repetitive Loss

U

UDF	User-Defined Facilities
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

5.2 Definitions

0.2-percent-annual-chance flood – The flood elevation that has a 0.2-percent chance of being equaled or exceeded each year. Sometimes referred to as the 500-year flood.

1-percent-annual-chance flood – The flood elevation that has a 1-percent chance of being equaled or exceeded each year. Sometimes referred to as the 100-year flood.

Annualized Loss Ratio (ALR) – Expresses the annualized loss as a fraction of the value of the local inventory (total value/annualized loss).

Average Annualized Loss (AAL) – The estimated long-term weighted average value of losses to property in any single year in a specified geographic area.

Base Flood Elevation (BFE) – Elevation of the 1-percent-annual-chance flood. This elevation is the basis of the insurance and floodplain management requirements of the NFIP.

Berm – A small levee, typically built from earth.

Cfs – Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons).

Coastal High Hazard Area (CHHA) – Portion of the floodplain subject to inundation by the 1-percent-annual or base flood and wave effects 3 feet or greater (mapped as VE Zones).

Consequence (of flood) – The estimated damages associated with a given flood occurrence.

Crest – The peak stage or elevation reached or expected to be reached by the floodwaters of a specific flood at a given location.

Dam – An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water.

Design flood event – The greater of the following two flood events: (1) the base flood, affecting those areas identified as SFHAs on a community's FIRM; or (2) the flood corresponding to the area designated as a flood hazard area on a community's flood hazard map or otherwise legally designated.

Erosion – Process by which floodwaters lower the ground surface in an area by removing upper layers of soil.

Essential facilities – Facilities that, if damaged, would present an immediate threat to life, public health, and safety. As categorized in Hazus, essential facilities include hospitals, emergency operations centers, police stations, fire stations, and schools.

Flood – A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters or (2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) – An official map of a community, on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. See also Digital Flood Insurance Rate Map.

Flood Insurance Study (FIS) Report – Contains an examination, evaluation, and determination of the flood hazards of a community, and if appropriate, the corresponding water-surface elevations.

Flood risk – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as flood vulnerability.

Flood vulnerability – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as flood risk.

Floodborne debris impact – Floodwater moving at a moderate or high velocity can carry floodborne debris that can impact buildings and damage walls and foundations.

Floodwall – A long, narrow concrete or masonry wall built to protect land from flooding.

Floodway (regulatory) – The channel of a river or other watercourse and that portion of the adjacent floodplain that must remain unobstructed to permit passage of the base flood without cumulatively increasing the water surface elevation more than a designated height (usually 1 foot).

Floodway fringe – The portion of the SFHA that is outside of the floodway.

Freeboard – A factor of safety usually expressed in feet above a flood level for purposes of flood plain management. “Freeboard” tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed (44CFR§59.1).

Hazus – 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, hurricane winds and storm surge, and earthquakes.

High velocity flow – Typically comprised of floodwaters moving faster than 5 feet per second.

Levee – A human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding. (44CFR§59.1)

Loss ratio – Expresses loss as a fraction of the value of the local inventory (total value/loss).

Mudflow – Mudslide (i.e., mudflow) describes a condition where there is a river, flow or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover, and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain. A mudslide (i.e., mudflow) may occur as a distinct phenomenon while a landslide is in progress, and will be recognized as such by the Administrator only if the mudflow, and not the landslide, is the proximate cause of damage that occurs. (44CFR§59.1)

Primary frontal dune (PFD)—A continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

Probability (of flood) – The likelihood that a flood will occur in a given area.

Risk MAP – Risk Mapping, Assessment, and Planning, a FEMA strategy to work collaboratively with state, local, and tribal entities to deliver quality flood data that increases public awareness and leads to action that reduces risk to life and property.

Riverine – Of or produced by a river. Riverine floodplains have readily identifiable channels.

Special Flood Hazard Area (SFHA) – Portion of the floodplain subject to inundation by the 1-percent-annual or base flood.

Stafford Act – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

Stillwater –Projected elevation that flood waters would assume, referenced to National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or other datum, in the absence of waves resulting from wind or seismic effects.

Stream Flow Constrictions – A point where a human-made structure constricts the flow of a river or stream.

6 Additional Resources

ASCE 7 – National design standard issued by the American Society of Civil Engineers (ASCE), *Minimum Design Loads for Buildings and Other Structures*, which gives current requirements for dead, live, soil, flood, wind, snow, rain, ice, and earthquake loads, and their combinations, suitable for inclusion in building codes and other documents.

ASCE 24-05 – National design standard issued by the ASCE, *Flood Resistant Design and Construction*, which outlines the requirements for flood resistant design and construction of structures in flood hazard areas.

ASCE, 2010. *So, You Live Behind a Levee!* Reston, VA.

FEMA

www.fema.gov

National Flood Insurance Program (NFIP), Federal Emergency Management Agency (FEMA)

www.floodsmart.gov

USGS National Assessment of Shoreline Change Project

http://coastal.er.usgs.gov/shoreline-change

FEMA Publications – available at www.fema.gov

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FEMA, 1998. *Homeowner's Guide to Retrofitting*, FEMA 312. Washington, DC, June 1998.

FEMA, 1999. *Protecting Building Utilities from Flood Damage*, FEMA 348. Washington, DC, November 1999.

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FEMA, 2003. *Interim Guidance for State and Local Officials - Increased Cost of Compliance Coverage*, FEMA 301. Washington, DC, September 2003.

FEMA, 2000. *Above the Flood: Elevating Your Floodprone House,* FEMA 347. Washington, DC, May 2000.

FEMA, 2001. *Understanding Your Risks: Identifying Hazards and Estimating Losses*, FEMA 386-2. Washington, DC, August 2001.

FEMA, 2002a. *Getting Started: Building Support for Mitigation Planning*, FEMA 386-1. Washington, DC, September 2002.

FEMA, 2002b. *Integrating Manmade Hazards into Mitigation Planning*, FEMA 386-7. Washington, DC, September 2002.

FEMA, 2003a. *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*, FEMA 386-3. Washington, DC, April 2003.

FEMA, 2003b. *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan*, FEMA 386-4. Washington, DC, August 2003.

FEMA, 2004a. *Design Guide for Improving School Safety in Earthquakes, Floods, and High Winds*, FEMA 424. Washington, DC, January 2004.

FEMA, 2004b. *Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners*, FEMA 64. Washington, DC, April 2004.

FEMA, 2005a. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning*, FEMA 386-6. Washington, DC, May 2005.

FEMA, 2006a. *Multi-Jurisdictional Mitigation Planning*, FEMA 386-8. Washington, DC, August 2006.

FEMA, 2006b. *Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects*, FEMA 386-9. Washington, DC, August 2008.

FEMA, 2006c. "*Designing for Flood Levels Above the BFE," Hurricane Katrina Recovery Advisory 8, Hurricane Katrina in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance*, FEMA 549, Appendix E. Washington, DC, July 2006.

FEMA, 2007a. *Property Acquisition Handbook for Local Communities*, FEMA 317. Washington, DC, September 2007.

FEMA, 2007b. *Public Assistance Guide*, FEMA 322. Washington, DC, June 2007.

FEMA, 2007c. *Using Benefit-Cost Review in Mitigation Planning*, FEMA 386-5. Washington, DC, May 2007.

FEMA, 2007d. *Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings*, FEMA 543. Washington, DC, January 2007.

FEMA, 2007e. *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA 551. Washington, DC, March 2007.

FEMA, 2007f. *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings,* FEMA 577. Washington, DC, June 2007.

FEMA, 2008. *Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program,* FEMA 9-0372, Third Edition. Washington, DC, December 2007.

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http://www.fema.gov/disasters

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https://portal.fema.gov/famsVuWeb/home

FEMA, 2015d. FEMA Community Rating System (CRS) Communities and their Classes, May 2015, http://www.fema.gov/media-library-data/1424450651900d381a14283db10e28ae624543a9526ad/20_crs_508_apr2015.pdf

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Salisbury, 2015. *City of Salisbury, Maryland: The Crossroads of Delmarva*, http://www.ci.salisbury.md.us/

Maryland State Archives, 2015. *WI-352 Sharptown,* http://msa.maryland.gov/megafile/msa/stagsere/se1/se5/029000/029200/029296/pdf/msa_se5_29296.pdf

Town of Mardela Springs, 2015. *History,* http://mardelasprings.org/heritage/history

Wicomico County Government, 2015. *New Residents Guide to County Government,* http://www.wicomicocounty.org/323/New-Residents-Guide-to-County-Government

U.S. Census Bureau, 2015. *State & County QuickFacts*, http://quickfacts.census.gov/

Local Government Websites

Maryland Environmental Service (MES), 2015.
259 Najoles Road, Millersville, MD 21108
http://www.menv.com

Maryland Department of the Environment (MDE), 2015.
1800 Washington Boulevard, Baltimore, MD 21230
http://www.mde.state.md.us/Pages/Home.aspx

7 Data Used to Develop Flood Risk Products

GIS base map information was acquired from the following sources:

Engineering study information was leveraged from RAMPP with coordination from FEMA Region III and the United States Army Corps of Engineers (USACE).

GIS basemap information was acquired from the DFIRM database, effective August 17, 2015. This dataset is available for download from the MSC.

https://msc.fema.gov

Additional datasets utilized in the project include the following:

- FEMA National 2010 Hazus Level 1 AAL Study
  Limited Distribution; database available upon request
- Hazus-MH Version 2.1 (2012)
  https://msc.fema.gov
- Hazus-MH Version 2.2 (2015)
  https://msc.fema.gov
- National Hydrography Dataset
  http://nhd.usgs.gov/
- U.S. Census Bureau, 2000 Hazus
  Dataset incorporated with Hazus-MH Version 2.1 software
- Maryland Department of Planning – parcel centroid dataset (as of February 2015)
  http://www.mdp.state.md.us/OurProducts/OurProducts.shtml
- Wicomico County, Maryland GIS Services – Building Footprints (Acquired April 2015)
  Limited Distribution; database available upon request

APPENDIX J: ACTIVE ASSAILANT THIRA

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Appendix K
Available Funding Sources for Mitigation Projects

The following is a list of Federal and State Grants that may assist in implementing local Hazard Mitigation Plans.

Disclaimer: This information is subject to change at anytime, contact the federal or state agency for current grant status.

Database last updated March 16, 2022

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Animals: Emergency Haying and Grazing	USDA Farm Service Agency Emergency and Non-insured Assistance Programs FSA USDA 1400 Independence Ave, SW Washington, DC 20013 202-720-4053	agriculture; Conservation Reserve Program; CRP; disaster; drought; farm; FSA; haying; grazing; livestock; natural disaster; rural; USDA	Haying and grazing on Conservation Reserve Program (CRP) acreage to provide emergency relief to livestock producers due to certain natural disasters. Emergency haying and grazing on CRP acreage to provide relief to livestock producers in areas affected by a severe drought or similar natural disaster.	No information provided	Producers must be enrolled in the USDA Farm Service Agency's Conservation Reserve Program. For more information on the program, visit: https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index	Anytime
Building Blocks for Sustainable Communities	U.S. Environmental Protection Agency (EPA) Office of Community Revitalization (MC 1807T) 1200 Pennsylvania Ave NW Washington, D.C. Abby Hall at hall.abby@epa.gov or 202-631-5915 https://www.epa.gov/smartgrowth/building-blocks-sustainable-communities	EPA; local government; nonprofits; smart growth	Applications should focus on regional projects that address a disaster risk faced by those communities. Projects should align with and support related efforts and local hazard mitigation plans. Eligible applicants: local, county, or tribal governments, nonprofit organizations.	N/A	This program provides technical assistance to communities using a variety of tools (e.g. smart growth, climate change, disaster resiliency and recovery, etc.). The EPA provides technical assistance through uses teams of experts who conduct workshops in communities related to the tools. Grant focus changes yearly.	November 20, 2020
Capital Project Financial Assistance / Water Quality Improvement Projects (Maryland Water Quality Financing Administration, MWQFA)	Maryland Department of the Environment (MDE) For assistance, please contact Elaine Dietz at elaine.dietz@maryland.gov https://mde.maryland.gov/programs/water/WQFA/Pages/index.aspx	Chesapeake Bay; drinking water; MS4; MWQFA; restoration; revolving loan; septic system; sewer extension; stormwater; wastewater; wastewater treatment; water quality	Water Quality State Revolving Loan Fund – Low interest rate loan and loan principal forgiveness (if eligible) for publicly-owned treatment works projects and publicly or privately-owned non-treatment works projects. Drinking Water State Revolving Fund – Low interest rate loan and loan principal forgiveness (if eligible) for public or privately-owned drinking water projects. Bay Restoration Fund Wastewater Program - Grant funds for · ENR upgrade at major or minor wastewater treatment plants · Improvements to existing wastewater conveyance systems · Sewer extension to connect homes on septic systems to a BNR/ENR wastewater treatment plant · Nitrogen reducing BAT upgrade at shared community septic systems · Stormwater (MS4) projects by local governments with a system of charges Water Supply Financial Assistance - Grant funds not to exceed $1.5 million for drinking projects at publicly-owned facilities,	No information provided; N/A for loans	If you previously applied for financial assistance and your project was only partially or not funded, a new/updated application is required. (Applicants with stormwater projects to meet MS4 permits may (and are strongly encouraged to) submit multiple BMP projects that will start construction within 12 – 18 months of notification of funding as a "program" of projects using a single funding application, as opposed to submitting individual BMP projects in separate applications.) Projects in construction prior to MDE's verification of competitive procurement and compliance with all programmatic requirements will not be funded. Do not submit applications for projects in construction that have not already have had these reviews completed by MDE.	TBD
Certified Local Government (CLG) Program	Maryland Historical Trust (MHT) 100 Community Place, 3rd Floor Crownsville, MD 21032 Nell Ziehl, Chief, Office of Planning, Education and Outreach, nell.ziehl@maryland.gov 410-514-7625	archaeology; archeology; CLG; certified local government; cultural resources; documentation; education; evaluation; heritage; historic; historic building; historic preservation; historic structure; nomination; NPS; National Park Service; NRHP; National Register of Historic Places; planning; preservation; preservation planning; research; studies; training	There are two grant tracks: Education and Training and Projects. Education and Training grants are available for attendance at training, workshops, and conferences. Project grants are available for research, survey, documentation, conservation, planning and educational activities involving historic, architectural, archeological or cultural resources (i.e., the tangible remains of Maryland's past). Only Certified Local Governments are eligible to apply for funding.	N/A	Education and Training Grant awards do not exceed $1,000 per Certified Local Government and Program Grants do not exceed $25,000. Individual awards for Program Grants generally range from $5,000 to $15,000. Hazard mitigation planning for cultural resources (historic structures, historic communities, archeological sites) in CLGs may be fundable under this program. Contact Program Administrator prior to submitting a hazard mitigation planning grant to verify project eligibility.	January or February

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
State Clean Water Commerce Act Grant	Maryland Department of the Environment (MDE) Walid.Saffouri walid.saffouri@maryland.gov 410-537-3757 https://mde.maryland.gov/programs/water/WQFA/Pages/index.aspx	Chesapeake Bay; Clean Water Act; environmental; nutrient reduction; sediment load reduction; sediment; sediment reduction; water quality	This bill reauthorizes and modifies the Clean Water Commerce Act (CWCA) through June 30, 2030, and requires the Maryland Department of the Environment (MDE) to transfer $20.0 million annually from the Bay Restoration Fund (BRF) Wastewater Account to the Clean Water Commerce Account (CWC Account), a new account within BRF established by the bill. The CWC Account must be used to purchase "environmental outcomes" to help the State achieve the Chesapeake Bay Total Maximum Daily Load (TMDL). The bill establishes requirements for the provision and verification of environmental outcomes, among other things. MDE may adopt implementing regulations. The bill takes effect June 1, 2021, and terminates June 30, 2030	No information provided	MDE may enter into any contract until June 30, 2030. The contract may last as long as the expected life of the environmental practice resulting from nutrient load reductions.	TBD
Community Assistance Program - State Support Services Element (CAP-SSSE)	Maryland Department of the Environment 160 South Water Street Frostburg, MD 21532 For more information contact: Kevin Wagner Community Assistance Program Coordinator kevin.wagner@maryland.gov 301-689-1495 https://www.fema.gov/community-assistance-program-state-support-services-element	flood; flooding; flood insurance; flood mitigation; flood openings; flood risk reduction; floodplain management; floodplain mapping; floodplain regulations; hazard mitigation; NFIP; technical assistance	The Maryland Department of the Environment will provide technical assistance on the National Flood Insurance Program (NFIP). Assist with questions about construction in the floodplain, flood insurance, and floodplain mapping to local governments and municipalities.	N/A	N/A	N/A
Community Development Block Grant / Disaster Recovery	U.S Department of Housing and Urban Development (HUD) Office of Block Grant Assistance 451 7th Street, SW Washington, DC 20410-7000 202-708- 1112 www.hudexchange.info/programs/cdbg-dr/	CDBG-DR; community; communities; disaster; economic revitalization; housing; HUD; infrastructure; recovery	State and local governments may apply for funding. Eligible activities include "…necessary expenses related to disaster relief, long-term recovery, and restoration of infrastructure, housing, and economic revitalization." Each activity must meet these three requirements: (1) Address a disaster-related impact (direct or indirect) in a Presidentially-declared area for the covered disaster (2) Be a CDBG eligible activity and (3) Meet a CDBG national objective	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
Community Legacy Program	Maryland Department of Housing and Community Development (DHCD) Contacts vary by region. Community Legacy Contact List available here: https://dhcd.maryland.gov/Communities/Pages/programs/CL.aspx	acquisition; business; business retention; community; community development; communities; demolition; development; DHCD; economic revitalization; improvements; open space; revitalization; Sustainable Communities; sustainable; sustainability	Projects should help the local government's implementation of their Sustainable Communities Action Plan. Typical projects/activities include (but are not limited to): mixed-use development consisting of residential, commercial and/or open space; business retention, expansion and attraction initiatives; streetscape improvements; increasing homeownership and home rehabilitation among residents; residential and commercial façade improvement programs; real estate acquisition, including land banking, and strategic demolition.	State - 100%	Projects must be located in a one of Maryland's designated Sustainable Communities. Eligible applicants are local governments, community development organizations (county councils, community development corporations, main street organizations, downtown partnerships), and groups of local governments sharing a common purpose or goal. There is a Neighborhood Intervention component of the Community Legacy program, to not exceed 15 percent of the Community Legacy fund.	Late Spring

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Comprehensive Flood Management Grant Program (FMG)	Maryland Department of the Environment (MDE) 1800 Washington Blvd Baltimore, MD 21230 For more information, please contact Cheryl Reilly at cheryl.reilly@maryland.gov	acquisition; capital projects; elevation; flood; flood control; flood damage; flood management plan; flood mitigation; MDE; mitigation; plan; planning relocation; watershed management; watershed studies; watershed	The grant funds the development of local flood management plans, studies of watersheds, and supports capital projects for flood control and watershed management. This program also provides grants to Maryland counties and municipalities after flood events to implement flood control projects, and for acquisition of flood-damaged owner-occupied dwellings. Elevation and relocation of homes are also eligible for funding. Acquired land is converted to open space in perpetuity.	When federal funds do not participate in the cost of a project, the FMG may fund up to 75% of the cost of the project and the local share would be 25%. If federal funds are participating in the project cost, the FMG can provide 50% of the match requirement and the local share would be 50%.	Only county and municipal governments are eligible to receive grants. During the 2019 Session of the Maryland General Assembly HB 428/SB 269 was passed, which requires at least $3 million in both fiscal year 2021 and fiscal year 2022, and for fiscal year 2023 at least $2 million be appropriated.	The solicitation period is typically from December 1 through January 31. Complete applications and supporting documents are due to MDE before the close of the solicitation period
Conservation Reserve Program	USDA Farm Services Administration (FSA) https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/	agriculture; conservation; CRP; erosion; habitat; habitat restoration; land conservation; open space; protection; restoration; soil erosion protection; soil erosion; USDA; water quality; wildlife habitat	For land to be eligible it must be: Cropland that has been planted or considered planted to an agricultural commodity 4 of the 6 years between 2008 and 2013; and Physically and legally capable of being planted in a normal manner to an agricultural commodity. Alfalfa or other multiyear grasses and legumes grown in a rotation, not to exceed 12 years, also may be eligible. Also, cropland must meet one of the following criteria: Have a weighted average Erodibility Index of eight, or greater; Be expiring CRP; or Be located in a national or State conservation priority area.	N/A	Contracts for land enrolled in CRP are 10-15 year in length.	The General CRP signup runs from Jan. 31, 2022 to March 11, 2022, and the Grassland CRP signup runs from April 4, 2022 to May 13, 2022. The Continuous CRP Signup is ongoing.
Continuing Authorities Program (CAP)	U.S. Army Corps of Engineers (USACE) 441 G Street, NW Washington, DC 20314 202-761-0011 https://www.nae.usace.army.mil/Missions/Public-Services/Continuing-Authorities-Program/	beaches; beach erosion; beneficial use of dredged materials; channel clearing; dredged materials; environmental; erosion; flood control; hazard mitigation; hazard protection; natural hazards; storm damage reduction; navigation improvements; mitigation; protection; public services; public works; streams; streambank; shoreline; USACE; water resources	USACE will plan, design, and implement certain types of water resources projects. Activities are section-dependent: streambank and shoreline erosion protection of public works and non-profit public services; beach erosion and hurricane and storm damage reduction; navigation improvements; shore damage prevention or mitigation caused by Federal navigation projects; beneficial uses of dredged materials; flood control; aquatic ecosystem restoration; removal of obstructions, clearing channels for flood control; project modifications for the improvement of the environment	The feasibility phase is Federally funded up to $100,000, any remaining feasibility costs are shared 50/50 with the Non-Federal sponsor. The implementation phase costs phase are shared per the authorizing legislation for that section.	A local sponsor must identify the problem and request assistance. Small flood control projects are also available. Baltimore District, USACE General Information: 1-800-434-0988	Anytime
Emergency Advance Measures for Flood Prevention	U.S. Army Corps of Engineers (USACE) 441 G Street, NW Washington, DC 20314 202-761-0011	advance measures; contamination; disaster; drought; emergency operations; emergency; water; flood control; flood response; post-flood response; preparedness; rehabilitation; response; shoreline protection; USACE	The USACE is authorized to undertake activities including disaster preparedness, Advance Measures, emergency operations (Flood Response and Post Flood Response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water due to drought or contaminated source.	No information provided	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

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Emergency Watershed Protection (EWP) Program - Recovery Assistance	Natural Resources Conservation Service (NRCS) 1400 Independence Avenue SW Washington, DC 20250 Shawn Anderson, Acting EWP Program Manager, shawn.anderson@wdc.usda.gov, 202-720-5795	debris removal; conservation; erosion protection; EWP; levee repair; NRCS; recovery; streams; streambank erosion; streambank protection; USDA; watershed	Debris removal from stream channels, roads culverts, and bridges; reshape and protect eroded streambanks; correct damaged drainage facilities; establish vegetative cover on critically eroding lands; repair levees and structures; repair conservation practices	Federal - 75% Non-Federal - 25%	Public and private landowners can apply for assistance for EWP Program – Recovery projects through a local sponsor, or a legal subdivision of state or tribal government. Eligible sponsors include cities, counties, towns, conservation districts, flood and water control districts, or any federally-recognized Native American tribe or tribal organization. Does not fund operation and maintenance work or repair private or public transportation facilities or utilities. Any work performed under this program cannot adversely affect downstream water rights and funds cannot be used to install measures not essential to the reduction of hazards.	TBD - Post disaster
Emergency Watershed Protection (EWP) Floodplain Easement Program - Floodplain Easement Option (EWPP-FPE)	Natural Resources Conservation Service (NRCS) Emergency Watershed Protection Program–Floodplain Easement (EWPP-FPE) Program Manager Jeff Williams Easement Programs Division, jeff.williams3@usda.gov 202-720-6268 Contact Local NRCS Field Office: www.nrcs.usda.gov/wps/portal/nrcs/main/md/contact/local/	acquisition; demolition; easements; EWP; EWPP-FPE; floodplain; floodplain enhancement; floodplain restoration; NRCS; open space; relocation; restoration; USDA	Permanent easements are available for eligible lands: Agricultural or open lands; lands primarily used for residential house. Individuals and communities can directly contact NRCS about this program.	N/A	A project sponsor is required for lands primarily used for residential housing and for the purchase of the remaining lot after structures are removed. NRCS may purchase EWPP-FPE permanent easements in floodplains for the following reasons: 1) The land has been damaged by flooding at least once during the previous calendar year or subject to flood damage at least twice within the previous 10 years. 2) Other lands within the floodplain may be eligible if they contribute to the restoration of floodwater storage and flow, offer a way to control erosion, or improve the practical management of the floodplain easement. 3) Lands that would be inundated or adversely impacted as a result of a dam breach. 1If FPE is being offered as recovery for a specific natural disaster, at least one instance of flooding must have occurred because of that natural disaster.	Anytime
Federal Emergency Management Agency, Flood Mitigation Assistance Program (FMA)	Maryland Emergency Management Agency (MEMA) 5401 Rue Saint Lo Drive Reisterstown, MD 21136 Contact: mitigation.mema@maryland.gov	aquifer; critical facilities; FEMA; FMA; flood; flood control; flood damage; flood mitigation; flood mitigation plan; flood protection; floodwater storage; floodwater diversion; HMA; infrastructure; MEMA; mitigation; NFIP; plan; planning; protection; recovery; repetitive loss; RL; restoration; sanitary sewer system; severe repetitive loss; streams; stream restoration; SRL; stormwater; stormwater management; water system; wetlands; wetland restoration	Infrastructure protective measures; floodwater storage and diversion; utility protective measures; stormwater management; wetland restoration/creation; aquifer storage and recovery; localized flood control project to protect critical facility; floodplain and stream restoration; water and sanitary sewer system protective measures	Federal - 75% Non-Federal - 25% RL: Federal - 90% Non-Federal - 10% SRL: Federal - 100% Non-Federal - 0% Small, Impoverished Community: Federal - 90% Non-Federal - 10% RL = Repetitive Loss Property SRL = Severe Repetitive Loss Property	Projects must be cost effective, located in a participating NFIP Community (In good standing), align with the applicable FEMA-approved hazard mitigation plan, and meet all environmental and historic preservation (EHP) requirements. Repetitive and Severe Repetitive Loss properties are a high priority. Program is nationally competitive. *Subapplicants must submit a Notice of Intent (NOI) to MEMA to apply for funding under this grant and must coordinate with MEMA prior to submission.* MEMA submits all grants for the State of Maryland (including sub-grants to local governments). Applicants (the State of Maryland) and subapplicants (local government) must have a FEMA approved hazard mitigation plan as of the application deadline and at the time of obligation of funding for project grants. Some projects may require the property be covered by a flood insurance policy for the life of the structure upon project completion.	Application Opening: Sept. 30, 2021 Application Deadline: Jan.28, 2022, 3 p.m. EST

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Federal Emergency Management Agency, Hazard Mitigation Grant Program (HGMP)	Maryland Emergency Management Agency (MEMA) 5401 Rue Saint Lo Drive Reisterstown, MD 21136 Contact: mitigation.mema@maryland.gov	acquisition; code enforcement; demolition; disaster; elevation; FEMA; flood; flood risk reduction; floodproofing; generators; hazard mitigation; hazard mitigation plan; hazard mitigation planning; hazard mitigation project; HMA; HMGP; management costs; mitigation; MEMA; NFIP; planning; plans; protection; reconstruction; relocation; retrofitting; safe rooms; soil stabilization; wildfire; wildfire mitigation; wind retrofit; 5 percent initiative	Acquisition, demolition, relocation, elevation, reconstruction, dry floodproofing, generator purchase, flood risk reduction projects, retrofitting, safe room construction, wind retrofits (1- and 2-family residences), soil stabilization, wildfire mitigation, hazard mitigation planning, management costs, post-disaster code enforcement, 5 percent initiative projects, hazard mitigation planning related planning activities	Federal - 75% Non-Federal - 25%	Projects must be cost effective, environmentally sound and solve a problem. Subapplicants must submit a Notice of Intent (NOI) to MEMA to apply for funding under this grant and must coordinate with MEMA prior to submission. *MEMA submits all grants for the State of Maryland (including sub-grants to local governments). Applicants (the State of Maryland) and subapplicants (local government) must have a FEMA approved hazard mitigation plan at the time of obligation of funding for project grants. Some projects may require the property be covered by a flood insurance policy for the life of the structure upon project completion.*	After a Presidential Disaster Declaration
Federal Emergency Management Agency, Building Resilient Infrastructure and Communities (BRIC)	Applications are processed through the FEMA GO system. To access the system, go to https://go.fema.gov/. Hard copies of the NOFO can be downloaded at Grants.gov or For a hardcopy of the full NOFO, please submit a request to: Kayed Lakhia Director, Hazard Mitigation Assistance Division, Mitigation Directorate Federal Insurance and Mitigation Administration Federal Emergency Management Agency 400 C Street, SW Washington, DC 20472	acquisition; demolition; elevation; FEMA; flood; flood risk reduction; floodproofing; generators; hazard mitigation; hazard mitigation plan; hazard mitigation planning; hazard mitigation project; HMA; management costs; mitigation; MEMA; NFIP; PDM; planning; plans; protection; reconstruction; relocation; retrofitting; safe rooms; soil stabilization; wildfire; wildfire mitigation; wind retrofit	To achieve these principles, FEMA will provide financial assistance to eligible BRIC Applicants for the following activities: (1) Capability- and Capacity-Building (C&CB) – activities which enhance the knowledge, skills, expertise, etc., of the current workforce to expand or improve the administration of mitigation assistance. This includes activities in the following sub-categories: building codes activities, partnerships, project scoping, mitigation planning and planning-related activities, and other activities; (2) Mitigation Projects – cost-effective projects designed to increase resilience and public safety; reduce injuries and loss of life; and reduce damage and destruction to property, critical services, facilities, and infrastructure; and (3) Management Costs – financial assistance to reimburse the Recipient and subrecipient for eligible and reasonable indirect costs, direct administrative costs, and other administrative expenses associated with a specific mitigation measure or project in an amount up to 15 percent of the total amount of the grant award, of which not more than 10 percent of the total award amount may be used by the Recipient and 5 percent by the subrecipient for such costs. FEMA will also provide non-financial Direct Technical Assistance to communities to build a community's capacity and capability to improve its resiliency to natural hazards and to ensure stakeholders are capable of building and sustaining successful mitigation programs, submitting high-quality applications, and implementing new and innovative projects that reduce risk from a wide range of natural hazards.	Federal - 75% Non-Federal - 25% Small Impoverished Community: Federal - 90% Non-Federal - 10% Insular Areas: For insular areas, including American Samoa, Guam, the Northern Mariana Islands, and the U.S. Virgin Islands, FEMA automatically waives the non-federal cost share for the Recipient when the non-federal cost share for the entire award is under $200,000. If the non-federal cost share for the entire award is $200,000 or greater, FEMA may waive all or part of the non-federal cost share at the request of the Recipient. The Recipient may request the waiver in its Application.	The Building Resilient Infrastructure and Communities (BRIC) program makes federal funds available to states, U.S territories, Indian tribal governments, and local communities for pre-disaster mitigation activities. The guiding principles of the program are to (1) support state and local governments, tribes, and territories through capabilityand capacity-building to enable them to identify mitigation actions and implement projects that reduce risks posed by natural hazards; (2) encourage and enable innovation while allowing flexibility, consistency, and effectiveness; (3) promote partnerships and enable high-impact investments to reduce risk from natural hazards with a focus on critical services and facilities, public infrastructure, public safety, public health, and communities; (4) provide a significant opportunity to reduce future losses and minimize impacts on the Disaster Relief Fund; and (5) support the adoption and enforcement of building codes, standards, and policies that will protect the health, safety, and generalwelfare of the public, take into account future conditions, and have long-lasting impacts on community risk reduction, including for critical services and facilities and for future disaster costs.	Application Opening: Sept. 30, 2021 Application Deadline: Jan.28, 2022, 3 p.m. ESTT

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Fire Management Assistance Program Fire Management Assistance Grant	Federal Emergency Management Agency (FEMA) FEMA Region III 615 Chestnut Street One Independence Mall, Sixth Floor Philadelphia, PA 19106-4404 215-931-5500	disaster; FEMA; fire; fire control; forests; grassland; grassland mitigation; management; mitigation; private land; public land; wildfire	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. Eligible costs may include, but are not limited to, expenses for: field camps, equipment use, equipment repair and replacement, tools, materials, supplies, and mobilization and demobilization activities.	Federal - 75% State - 25%	Prior to award, the State must demonstrate that the total eligible costs for the declared fire meet or exceed the individual fire cost threshold.	After Fire Management Assistance declaration
Oil Spill Liability Trust Fund	U.S. Coast Guard (USCG) Director, USCG National Pollution Funds Center Stop 7605 2703 Martin Luther King Jr. Avenue, SE Washington, DC 20593-7605 202-795-6000 Visit this website for more information: https://www.uscg.mil/Mariners/National-Pollution-Funds-Center/Response/	cleanup; contamination; disposal; haz mat; hazardous materials; NPFC; oil spill; Oil Spill Act; OPA; removal; USCG	Compensation may be available under the Oil Spill Act (OPA) if the claim meets the requirements and all costs and damages from the spill are documented. Funding can be used for Federal removal costs including payment to cleanup contractors, overtime for government personnel, equipment used in removal operations, testing to identify the type and source of oil, disposal of recovered oil and oily debris, and preparation of associated cost documentation.	Reimbursement for eligible activities, cost share does not apply	These agencies/organizations can access the fund: all Federal on-scene coordinators (FOSCs); Federal, State, local, and Tribal government agencies assisting the FOSC; natural resources trustees (designated by the President of the United States, state, territorial governor, or Indian tribal governing authority), claimants (individuals, corporations, and government entities) can submit claims for uncompensated removal costs and OPA damages caused by the oil spill to the USCG's National Pollution Funds Center (NPFC) if the responsible party (RP) does not satisfy their claims.	Anytime
Local Government Infrastructure Program	Maryland Department of Housing and Community Development (DHCD) Charles Day, Program Manager 7800 Harkins Road Lanham, MD 20706 301-429-7891	DHCD; equipment; facilities; infrastructure; infrastructure improvements; landscaping; loan; public services; public safety; public land; refinancing; stormwater; sidewalks; street lighting; vehicles; water treatment; water storage	Project must support an essential physical element of a municipality's public service system. Projects may include (but are not limited to): street lighting, landscaping, sidewalks, and public space improvements; public safety vehicles and equipment; water production, treatment, storage, and distribution systems; stormwater control, and sewer collection and treatment facilities; government office and meeting facilities; police, fire, transportation, education, health, recreation, maintenance, and other service related facilities; refinancing of existing debt for eligible projects as listed above.	N/A (loan) Through funding raised through tax-exempt bonds issued on behalf of counties, municipalities, and/or their instrumentalities, the State uses the bond proceeds to issue a *loan* to the local government (interest rate depends on market conditions at time of loan issuance).	All Maryland counties, municipalities and/or their agencies are eligible, provided they have legal authority necessary for: constructing, operating and maintaining the proposed project; pledging security for and repaying the proposed loan, and; pledging income tax payments and various other shared revenue from the state. Local governments must secure local legislative approval(s) to incur the debt, certify the capacity to inspect the project's construction progress, and agree to submit periodic status reports. Additionally, they must ensure adequacy and sufficiency in the project's design and construction, and they must meet credit requirements sufficient to satisfy rating agencies and secure a favorable credit rating.	Applications accepted on an ongoing basis
Maryland Business Recovery Loan Program	Maryland Department of Housing and Community Development (DHCD) Neighborhood BusinessWorks Program 7800 Harkins Road, 4th Floor Lanham, MD 20706 Colleen Cord-Malone Business Lending Programs, Manager II 301-429-7517 Toll Free: 1-800-756-0119 colleen.cord-malone@maryland.gov Aisha K. Taylor Business Lending Programs, Loan Underwriter 301-429-7721 Toll free: 1-800-756-0119 aisha.taylor@maryland.gov	DHCD; disaster; equipment; fixtures; furniture; inventory; leasing expenses; loan; lost revenue; lost operating expenses; nonprofits; recovery; renovation; repair; replacement; small business; working capital	Renovations; repairs and replacement of furniture, fixtures, and equipment; inventory replacement; loss of revenue/operating and leasing expense assistance; certain other costs associated with recovery of a small business, including working capital. Eligible businesses include: retail, manufacturing, goods and services. Business must be located in Baltimore City, Baltimore County, Frederick County, Howard County, or Washington County.	N/A (loan)	Offers assistance up to $50,000 (amount based on damage assessment) at an interest rate of zero percent (0%). Higher amounts will be considered on a case-by-case basis. Financing may be used in conjunction with other financing, insurance proceeds, etc., and the target loan term is 1-5 years, depending on loan size and affordability.	Available when activated after state declaration of emergency.

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Maryland Disaster Housing Assistance Program	Maryland Department of Housing and Community Development (DHCD) Gregory Hare Deputy Director, Multifamily Housing 7800 Harkins Road, Lanham, MD 20706 301-429-7775	assistance; DHCD; disaster; disaster assistance; emergency assistance; emergency rental assistance; housing; housing assistance; housing voucher; MDHAP; rental assistance; voucher	Eligible recipients: Families or individuals are assisted on a referral basis through referrals made by MEMA, DHR, local government human resources or emergency management offices, or other designated disaster relief agencies. Generally, all families or individuals displaced by a natural disaster are eligible and can be referred to the program.	None: State funds 100% of costs	The term of the voucher is 90 days, extensions will be considered if the home is not ready for occupancy at the end of 90 days.	Available when activated after state declaration of emergency.
Maryland Energy Administration (MEA), Resilient Maryland	Questions and feedback regarding the Resilient Maryland program should be directed to Brandon Bowser, CHP & Energy Resilience Program Manager, at BrandonW.Bowser@Maryland.gov or via phone at (443) 306-0304.	MEA; clean; efficient; affordable; energy; vulnerable populations.	At a minimum, eligible projects must: Be located within the State of Maryland; Clearly demonstrate the organizational and/or societal benefits of system implementation; Include an Applicant contribution that can be at a minimum an amount of donated work hours (excluding administrative duties related to Grant reporting); Demonstrate clean energy systems that achieve greenhouse gas reductions; and Permit showcasing of project findings and installations by MEA to the public. Applicants must be in Good Standing with the Maryland State Department of Assessments and Taxation (SDAT), when applicable.	Resilient Maryland is provided to help organizations identify potential ways to incorporate DERs into organizational energy management plans that improve resilience and sustainability, reduce energy burden, and safeguard essential infrastructure, services, and businesses from prolonged power outages. In its FY22 year, the program is seeking projects that pursue creative solutions, incorporate innovation, explore potentially replicable and scalable project models, and enhance energy equity to Maryland communities experiencing vulnerabilities and challenges.		Round 2 Program Application Deadline: 5:00 P.M. EST, Thursday, March 31, 2022
Maryland Energy Administration (MEA), Combined Heat and Power (CHP) Grant Program	Questions or comments regarding the CHP Grant Program should be directed to Brandon Bowser, CHP & Energy Resilience Program Manager. He can be reached via email at BrandonW.Bowser@Maryland.gov or via phone at (443) 306-0304.	CHP; capital costs; energy resilience; energy efficiency; renewable natural gas; RNG;	Commercial businesses, Nonprofit organizations, Critical infrastructure, Industrial and manufacturing, Chemical and pharmaceutical, Institutional (colleges, universities, etc.), Public and private education, Multifamily housing, Agricultural, Maryland State and local government	Anticipated Program Budget: $3.6 million, restrictions apply. For more information, please see the Funding Opportunity Announcement below	The FY22 CHP Grant Program is provided to further the statewide adoption of CHP technologies that bring energy efficiency, resilience, and enhanced sustainability to Maryland's businesses, supply chains, essential services, critical infrastructure, communities, and institutions. CHP technologies, when strategically implemented, produce energy for the sites they serve in the most efficient manner. This reduces the release of greenhouse gases when compared to emissions for utility-supplied energy. They also help diversify the State's electricity grid and give their implementers more energy autonomy, particularly when they are grid-interconnected and configured to operate in grid outage situations.	Program Application Deadline: Friday, February 11, 2022, 5:00 P.M. EST Accepts applications annually.

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Maryland Housing Rehabilitation Program (Single Family; 1-4 Family Rental Units)	Maryland Department of Housing and Community Development (DHCD) Special Loan Programs 7800 Harkins Road, Lanham, 3rd Floor, MD 20706 E: DHCD.SpecialLoans@maryland.gov P: (301) 429-7409 | Toll Free (Maryland Only): 1-844-369-4150 TTY 711 or 1-800-735-225	DHCD; homeowners; landlords; loan; single family; rehabilitation; rental properties	Eligible Applicants: Household income of owner-occupants of single family homes and all residents of financed rental housing cannot exceed 80 percent of the statewide or Washington, D.C. Metropolitan Statistical Area median income.	Community/Campus Microgrid	$100,000	Open and ongoing
Maryland Sea Grant (NOAA)	NOAA, Sea Grant Maryland Fredrika Moser, Director moser@mdsg.umd.edu Michael Allen, Associate Director for Research and Administration mallen@mdsg.umd.edu 301-405-7500 www.mdsg.umd.edu/funding-opportunities	aquaculture; climate change; coastal; coastal ecosystems; ecosystems; economy; economic equity; equity; estuary; fisheries; land use; natural hazards; nutrient reduction; outreach; pollution abatement; research; resiliency; resilience; resilient communities; resilient economies; resiliency; restoration; seafood safety; sediment; sediment reduction; socioeconomic equity; social equity; sustainable; sustainability; sustainable fisheries; sustainable aquaculture; watershed; water quality	Eligible activities are research proposals that provide scientific and socioeconomic information that can inform policy decisions for fisheries management and sustainable aquaculture, climate change adaptation, coastal community resilience, and ecosystem restoration in coastal systems in Maryland. Projects must demonstrate a connection between the proposed research and the focus areas and strategies (one or more) highlighted in the RFP. A proposal must demonstrate integration among its scientific approaches, research outcomes, and outreach plan. Eligible applicants: Principal Investigators (PIs) must be affiliated with an academic institution or research laboratory in Maryland or the District of Columbia. Co-Principal Investigators (Co-PIs) on projects can be from institutions outside of Maryland or the District of Columbia. Single investigators and multiple investigator research teams from different institutions are encouraged to apply. Maryland Sea Grant extension personnel are welcome to serve as Co-PIs or senior personnel but are restricted from requesting salary support.	N/A	N/A	TBD
National Estuary Program (NEP) Coastal Watersheds Grant Program	EPA & Restore America's Estuaries Suzanne Simon NEP Coastal Watersheds Grant Program Director ssimon@estuaries.org 413-695-8922 https://estuaries.org/initiatives/watershedgrants/	adaptation; aquatic; aquatic invasive species; climate adaptation; climate change; climate vulnerability; comprehensive conservation and management plan; CCMP; ecosystems; estuary; green infrastructure; habitat; invasive species; nutrient reduction; pollution reduction; restoration; TMDL; water quality; wetlands	Activities may include: protecting and restoring up to 100,000 acres of estuarine habitat; protecting and restoring estuarine water quality in NEP study areas; supporting core Clean Water Act programs; conducting vulnerability assessments and/or implementing climate adaptation strategies in over 50% of NEP study areas and collaborating with other EPA programs and with agencies like NOAA to build regional, local, and tribal coastal community resilience to impacts of climate change on coastal ecosystems, public health, and economies; building local capacity to reach out to and involve urban community residents who typically may not have had access to water bodies in NEP study areas nor have been actively engaged in urban water body protection and restoration. Eligible applicants include: state agencies; public and nonprofit agencies; institutions; organizations and individuals (Section 320(g)(l)). Profit making organizations are not eligible for grants.	Please refer to: https://estuaries.org/wp-content/uploads/2022/02/2022-CWG-RFP-FINAL-3-1-2022.pdf	RAE will select grantees through a two-step process: 1) letters of intent (LOI); and 2) full proposals by invitation only. Project funding will range between $75,000 and $250,000, resulting in roughly three to ten total subawards per funding year depending on the breakdown of the requests. Projects must occur in their entirety within the geographic areas shown below and on this interactive map, which is located at: http://arcg.is/1u19zq.	Deadlines 1. Letters of Intent: due by 5:00 p.m. PT/8:00 p.m. ET on Friday, May 27, 2022 2. Full proposals by invitation only: due by 5:00 p.m. PT/8:00 p.m. ET on Friday, September 23, 2022

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
National Flood Insurance Program (NFIP)	Maryland Department of the Environment (MDE) 1800 Washington Blvd Baltimore, MD 21230	financial protection; flood; flood insurance; floodplain; floodplain regulations; insurance; MDE; NFIP; regulations	Provides financial protection by enabling persons to purchase insurance against floods, mudslide or flood related erosion. *Anyone can purchase flood insurance. You do NOT need to be in a regulatory floodplain to purchase flood insurance.*	Community Resiliency Hub	$10,000	Anytime
National Flood Insurance Program - Increased Cost of Compliance (ICC)	Maryland Department of the Environment (MDE) 1800 Washington Blvd Baltimore, MD 21230	acquisition; compliance; demolition; elevation; flood; flood damage; flood insurance; floodplain; floodplain regulations; floodproofing; ICC; increased cost of compliance; insurance; MDE; mitigation; NFIP; regulations; relocation; repetitive loss; RL; SFHA; substantial damage	Increased Cost of Compliance (ICC) coverage is one of several resources for flood insurance policyholders who need additional help rebuilding after a flood. It provides up to $30,000 to help cover the cost of mitigation measures that will reduce flood risk. ICC coverage is a part of most standard flood insurance policies available under the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program (NFIP).	*Subject to funding availability and may be adjusted by MEA.	In addition to being insured under the NFIP, a building must meet one of two conditions to be eligible to receive ICC coverage; it must have been either 1) determined to be substantially damaged or 2) meet the criteria of a repetitive loss structure.	After a building in the SFHA is declared substantially damaged or meets the definition of a Repetitive Loss property
Neighborhood BusinessWorks Program	Maryland Department of Housing and Community Development (DHCD) Business Lending Team 7800 Harkins Road Lanham, MD 20706 dhcd.businesslending@maryland.gov 301-429-7408	acquisition; commercial; community; communities; construction; development corporations; DHCD; loan; mixed use; new construction; nonprofits; Priority Funding Areas; rehabilitation; residential; SBA; soft costs; small business; Sustainable Communities; sustainable; sustainability	Eligible projects and uses of funds include: mixed-use projects combining residential and commercial uses in the same building; new construction or rehabilitation; machinery and equipment; certain other costs associated with opening or expanding a small business; real estate acquisition; manufacturing; service providers, and; retail. Projects must be located in a designated Maryland Sustainable Community or Priority Funding Area. Priority is given to projects that strengthen neighborhood commercial districts and are part of a greater revitalization strategy. Eligible applicants include Maryland-based small businesses (as defined by the SBA), local development corporations, and nonprofit organizations.			Open and ongoing

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Historic Preservation Non-Capital Grant Program	Maryland Historical Trust (MHT) 100 Community Place, 3rd Floor Crownsville, MD 21032 Contacts: Archeology - Matt McKnight, 410-697-9572 matthew.mcknight@maryland.gov Architectural Survey - Heather Barrett, 410-697-9536 heather.barrett@maryland.gov All other projects - Karen Golder, 410-697-9550 karen.golder@maryland.gov	archaeology; archeology; architecture; conservation; cultural resources; documentation; education; historic; historic building; historic preservation; historic structure; MHT; planning; research; survey	Non-Capital grants are available for research, survey, documentation, conservation, planning and educational activities involving historic, architectural, archeological or cultural resources (i.e., the tangible remains of Maryland's past). It is strongly recommended that you contact MHT staff to discuss the project prior to submission of an application.	Entities seeking additional capital support for the equipment and installation of the planned DER system are encouraged to explore other MEA programs that provide funding for equipment and installation incentives. Information on these programs and links to their respective webpages are available in the FY22 Resilient Maryland Funding Opportunity Announcement (FOA) in the Eligibility Requirements section below.	The Historic Preservation Non-Capital Grant Program provides grants of up to $75,000 to nonprofits (state and federal government entities may apply as nonprofits) and local jurisdictions. Local jurisdictions must provide a dollar-for-dollar match in cash or in-kind contributions.	FY 22 DEADLINE June 22, 2021 – Intent to Apply Due July 30, 2021 – Completed Application Due
Small Business Administration (SBA) Predisaster Mitigation Loan Program	Small Business Administration (SBA) James Rivera, Office of Disaster Assistance 409 3rd Street, SW, STE 6050 Washington, DC 20416 202-205-6734	business; disaster; economic injury; equipment; homeowners; inventory; loan; military duty; mitigation; machinery; operating expenses; personal property; real estate; SBA	Business or home must have been affected by disaster. Eligible activities include: repairs and replacements of physical assets damaged in a declared disaster(real estate and personal property) and small business operating expenses (machinery and equipment, economic injury, inventory), and active military duty.	Grants will be awarded on a competitive basis. Award announcements for these funds are expected sometime in quarter 1 (Q1) of 2021.		After SBA disaster declaration
Strategic Demolition Fund - Statewide	Maryland Department of Housing and Community Development (DHCD) Contacts vary by region. Regional Contact List available here: https://dhcd.maryland.gov/Communities/Documents/SRP/PM-Map-ContactInfo.pdf	community; communities; demolition; DHCD; Sustainable Communities; sustainable; sustainability	Eligible projects include: demolition of derelict structures; site acquisition and assembly to create redevelopment-sized parcels for solicitation or planned development; site development, and; construction-level architectural and engineering designs.	State - 100%	Projects must be located within in a designated Maryland Sustainable Community except Baltimore City. The programs helps catalyze activities that accelerate economic development and job production in existing Maryland communities, aims to improve the economic viability of grey field development, which often faces more barriers than sprawling, green field development. The fund focuses on those projects that can have a high economic and revitalization impact in their existing communities.	Varies - once per State Fiscal Year
Strategic Demolition Fund - Project C.O.R.E.	Maryland Department of Housing and Community Development (DHCD) Contacts vary by region. Regional Contact List available here: https://dhcd.maryland.gov/Communities/Documents/SRP/PM-Map-ContactInfo.pdf	Baltimore; CORE; community; communities; DHCD; demolition; Sustainable Communities; sustainable; sustainability	Eligible projects include: demolition of derelict structures; site acquisition and assembly to create redevelopment-sized parcels for solicitation or planned development; site development, and; construction-level architectural and engineering designs. Lead applicants for Strategic Demolition Fund - Project C.O.R.E. are: Maryland Stadium Authority and nonprofit community development organizations working Baltimore City.	State - 100%	Projects must be located within Baltimore City. The programs helps catalyze activities that accelerate economic development and job production in existing Maryland communities, aims to improve the economic viability of grey field development, which often faces more barriers than sprawling, green field development. The fund focuses on those projects that can have a high economic and revitalization impact in their existing communities.	Varies - once per State Fiscal Year

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Transportation: Emergency Relief Program	Federal Highway Administration (FHA) 1200 New Jersey Avenue Washington, DC 20590 202-366-4043	bridges; critical infrastructure; damage; disaster; DOT; Federal aid roads; Federal land; FHWA; highway; infrastructure; MDOT; repair; roads; route; transportation	Repair work within the right of way along federal aid highways is generally eligible. Engineering, right of way, and indirect costs may also be eligible. Funding is intended to address immediate needs and to restore damaged facilities to pre-disaster conditions. Permanent construction can cover repairs to bring facilities to current standards and expected traffic requirements. Improvements (betterments) may be eligible if costs are justified.	Emergency Repairs conducted within 180 days of disaster: Federal - 100% Non federal - 0% Emergency Repairs conducted after 180 days of disaster: Federal - 80-90% Non federal - 20-10%	Application is submitted by the MDOT for damages to Federal-aid highway routes, and by the applicable Federal agency for damages to roads on Federal lands. Cause of damages can be due to a natural disaster or a catastrophic failure of bridges or other infrastructure due to external causes. Cost threshold: estimated Federal share for all repairs for an event should be at least $700,000 and each individual repair should be at least $5,000 to be eligible.	After serious damage to Federal-aid roads or roads on Federal lands caused by a natural disaster or by catastrophic failure.
U.S Economic Development Administration (EDA), 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	access roads; critical infrastructure; economic development; EDA; infrastructure; port improvements; rail spurs; roads; sewer; technology; water	Water and sewer, Industrial access roads, rail spurs, port improvements technological and related infrastructure	Federal - 50-70% Non-Federal - 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
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	critical facilities; economic development; EDA; improvements; public facilities; reconstruction; research	Improvements and reconstruction of public facilities after a disaster or industry closing. Research studies designed to facilitate economic development.	Federal - 50-70% Non-Federal - 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
Watershed and Flood Prevention Operations Program	Natural Resources Conservation Service (NRCS) 1400 Independence Avenue, SW Washington, DC 20250 J'Que C. Jones, Maryland State Conservation Engineer jque.jones@wdc.usda.gov 443-482-5543	conservation; erosion; erosion control; flood; flood control; flood damage; flood prevention; land management; natural hazards; natural resources protection; NRCS; protection; sediment; sediment control; sediment reduction; USDA; water quality; watershed; watershed management; watershed protection	NRCS offers financial and technical assistance for these purposes: erosion and sediment control; watershed protection; flood prevention; water quality improvements; rural, municipal, and industrial water supply, water management, fish and wildlife habitat enhancement, and hydropower sources. Federal, state, local, and tribal government entities eligible to apply.	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.	January or February
Watershed Rehabilitation	Natural Resources Conservation Service (NRCS) 1400 Independence Avenue, SW Washington, DC 20250 Jesse Wilson National Watershed Rehabilitation Program Manager jesse.wilson@wdc.usda.gov 202-720-0189	dam; dam rehabilitation; NRCS; plan; planning; rehabilitation; watershed; watershed plan; watershed rehabilitation; USACE	Rehabilitation of aging dams reaching the end of their 50-year design lives.	Cost share exists, but not quantified	Requires development of a watershed plan to address environmental impacts, costs, benefits, planned conservation practices, and responsibilities of each party to complete the rehabilitation project. NRCS provides financial and technical assistance to project sponsors and assists them with the planning, design, and construction of the project.	Anytime

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
RAISE Discretionary Grants U.S. DoT	U.S. Department of Transportation (US DOT) Office of Infrastructure Finance and Innovation Office of the Secretary of Transportation 1200 New Jersey Ave, SE Washington, DC 20590 United States Email: RAISEgrants@dot.gov Phone: 202-366-0301 https://www.transportation.gov/RAISEgrants/about	bridges; capital projects; DOT; freight rail; infrastructure; intermodal; local government; metropolitan planning organizations; MPO; passenger rail; port authorities; ports; port infrastructure; rail; roads; state government; transportation; transit agencies; Tribal government	The Rebuilding American Infrastructure with Sustainability and Equity, or RAISE Discretionary Grant program, provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grants, Congress has dedicated nearly $9.9 billion for thirteen rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact.	RAISE Grants may be used for up to 80 percent of the costs of projects located in an urban area and up to 100 percent of the costs of a project located in a rural area. For a project located in an urban area, total Federal assistance for a project receiving a RAISE grant may not exceed 80 percent. Non-Federal financial contributions can include		NOFO release: Spring Application Due: Summer
Alcoa Foundation Grant Program	Alcoa World Location Grants Coordinator 100 Bethlehem Blvd Edgemere, MD 21219 Alcoa Forgings & Extrusions Location Grants Coordinator 1954 Halethorpe Farms Rd, #800 Halethorpe, MD 21227 410-737-6980 Alcoa Concrete & Masonry Location Grants Coordinator 4908 46th Ave Hyattsville, MD 20781 301-699-9300 Alcoa Concrete & Masonry Location Grants Coordinator 786 Sunny Chapel Rd Odenton, MD 21113 301-912-3515	adaptation; Alcoa; capital projects; biodiversity; climate adaptation; climate change; emissions reduction; environmental; environmental literacy; habitat; habitat protection; habitat restoration; natural resources; nonprofits; prevention; protection; resilience; resiliency; restoration; recycling; STEM; sustainability	Promote prevention and resilience of climate change and restore and preserve biodiversity. Projects or organizations must serve communities where Alcoa has operating plants or offices: Edgemere, Halethorpe, Hyattsville, Odenton. Nonprofit-focused, local governments may apply if funds are used for charitable purposes.	N/A	Minimum grant award is $15,000. Projects must fall with Alcoa Foundation themes and subthemes.	Anytime
Chesapeake Initiative	Campbell Foundation Chesapeake Office 410 Severn Avenue, Suite #210 Annapolis, MD 21403 410-990-0900	capacity building; capital campaign; Chesapeake Bay; environmental; habitat; habitat preservation; habitat restoration; nonprofits; preservation; nutrient reduction; restoration;	Activities that promote the health of the Chesapeake Bay region. Grants may be used for general support, capacity building, capital campaigns, and more. Nonprofits only.	N/A	More information, including a list of past grantees and projects is available here: https://www.campbellfoundation.org/chesapeake-what-we-fund/	Cycle 1 - Late Winter/Early Spring Cycle 2 - Late Summer/Early Fall
Capacity Building Grant Coordination & Collaboration Grant	Climate Resilience Fund https://www.climateresiliencefund.org/	adaptation; capacity building; climate adaptation; climate change; climate resiliency; collaboration grants; coordination grants; environmental; resiliency; resilience; sustainability;	Two grant tracks: Capacity Building and Coordination & Collaboration. Climate resilience planning; policy guidance; adaptation training; funding to facilitate the use of climate service tools and resources. Nonprofits only.	N/A	View past grantees and projects here: https://www.climateresiliencefund.org/grants	No information provided, contact organization
Community Support	Coca-Cola Foundation, Inc. Learn more: https://www.coca-colacompany.com/shared-future/communities Apply here: https://coca-cola.smartsimple.com/s_Login.jsp	capital projects; clean water; environmental; gray water; nonprofits; water; water capture; water conservation; water quality; recycling; reuse	Eligible projects align with these three Priority Areas: empowering women (economic empowerment and entrepreneurship); protecting the environment (access to clean water, water conservation, and recycling); and enhancing communities (education, youth development, other community and civic initiatives). Nonprofits only.	N/A	Fundable project include, but are not limited to: access to clean water, water conservation, recycling; capital projects; nonprofits; capital projects like water capture and grey water reuse.	Anytime

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Conservation Acquisition Revolving Fund Conservation Loans Natural Capital Investment Fund Working Forest Fund	Conservation Fund, the 1655 N. Fort Myer Drive, Suite 1300 Arlington, VA 22209 703-525-6300 webmaster@conservationfund.org	acquisition; conservation; environmental; forests; forest management; loan; plans; revolving loan; stewardship	Land acquisition and conservation; development and implementation of sustainable forest management plans; transfer of forestland to private ownership.	N/A (revolving fund; loan)	Revolving Fund for land acquisition (conservation). Conservation loans. Working Forest Fund provides bridge capita for projects.	Anytime
U.S. Natural Climate Solutions Accelerator Grant	Nature Conservancy, The (TNC) www.nature.org/ncsaccelerator Contact: NCSAccelerator@TNC.org	adaptation; agriculture; carbon storage; climate change; coastal; coastal wetlands; conservation; emissions reduction; environmental; forests; grassland; greenhouse gas reduction; land management; natural climate solutions; NCS; nature based solutions; nonprofits; reforestation; restoration; soil health; wetlands	Carbon capture through natural climate solutions (NCS). Examples include, but are not limited to: improving soil health, reforestation, coastal wetlands restoration, and other management practices for natural and working lands (forests, agricultural lands, grasslands, wetlands).	N/A	Applicants may request up to $250,000 per project. Nonprofit organizations only.	Early 2020
Acres for America	National Fish & Wildlife Foundation (NFWF) Kimberly Shriner Coordinator, Conservation Programs Kimberly.Shriner@nfwf.org https://www.nfwf.org/acresforamerica/Pages/home.aspx	acquisition; conservation; open space; connecting land; connectivity; easements; forests; habitat; local economy; local government; migration; migration routes; migratory; local government; nonprofits; open space; ranching; recreation; state government; Tribal government	Land conservation of critical habitats, connecting protected lands to unify wild places and protect migration routes; provide access for people to enjoy the outdoors; ensure the future of local economies that depend upon forestry, ranching, and recreation. Project must be linked to a national or state conservation priority. Eligible applicants: nonprofits; state government agencies; local governments; municipal governments; Indian tribes, and educational institutions.	1:1 Cost share - Federal/Applicant (cash, in-kind contribution of goods and services, and/or donated land value) Federal funds may be used as a match	Competitive grant: full proposal is by invite-only. Acquired land goes into a perpetual conservation easement.	RFP Due April 13, 2021.
Atlantic Flyway Shorebird Initiative	National Fish & Wildlife Foundation (NFWF) C. Scott Hall Senior Scientist, Bird Conservation, Scott.Hall@nfwf.org https://www.nfwf.org/amoy/Pages/home.aspx	American oystercatcher; Atlantic; birds; Chesapeake Bay; beaches; coastal; business; conservation; dunes; educational institutions; habitat; habitat management; individuals; international organizations; migration; migratory; migratory birds; North Atlantic; ocean; red knot; restoration; shorebirds; whimbrel;	Focus is on conserve and restore the habitat of the American oystercatcher, red knot, and whimbrel and improve habitat management. Eligible applicants: nonprofits; state government agencies; local governments; municipal governments; Indian tribes, educational institutions, businesses, unincorporated individuals, and international organizations.	1:1 Cost share - Federal/Applicant (match - cash and/or in-kind services)	The majority of awards will range between $50,000 and $250,000.	RFP Due April 13, 2021.

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Bring Back the Native Fish	National Fish & Wildlife Foundation (NFWF) Hannah Karlan, Coordinator, Regional Programs https://www.nfwf.org/bbn/Pages/home.aspx	American shad; assessment; Chesapeake Bay; Chesapeake Bay watershed; Delaware watershed; connectivity; conservation; environmental; habitat; habitat restoration; instream habitat; instream; marine; marine resources; local government; native fish; nonprofits; restoration; riparian; riparian habitat; river herring; rivers; schools; special districts; state government; streams; Tribal government; universities; water quality; watershed	Conservation strategies for native fish of eastern U.S. rivers, especially river herring and American shad in the Chesapeake and Delaware watersheds, particularly: restoring connectivity, riparian and instream habitat, and water quality. Invasive species management; and the development of decision support tools and innovative approaches to fish conservation, including landscape-scale assessments, piloting innovative restoration techniques, and identification of key flow restoration thresholds that enhance fish habitat and water quality in low-flood systems.	1:1 Cost share - Federal/Applicant (matching - cash, in-kind donations and/or volunteer labor)	Grant awards generally range from $50,000 to $100,000.	RFP Due May 4, 2021.
Central Appalachia Habitat Stewardship Program	National Fish & Wildlife Foundation (NFWF) Amanda Bassow, Director, Northeastern Regional Office Amanda.Bassow@nfwf.org John Wright, Manager, Northeastern Regional Office John.Wright@nfwf.org https://www.nfwf.org/centralapps/Pages/home.aspx	Appalachia; assessment; cerulean warbler; connectivity; diversity; eastern brook trout; eastern hellbender; educational institutions; environmental; forests; forest management; freshwater; freshwater mussels; golden winged warbler; habitat; habitat diversity; habitat restoration; Laurel Highlands; local government; mussels; native birds; native fish; nonprofits; planning; restoration; riparian; rivers; species; state government; streams; technical assistance; Tribal government; trout; warbler; water quality; wood thrush	Restoration of forest blocks and forest management (assessment/planning - forest management decision support tools). Outreach and technical assistance to engage private landowners in adopting forest management practices. Create forest demonstration projects to accelerate adoption of forest management to improve species habitat and diversity. Eligible applicants: nonprofit organizations, state agencies, local governments, municipal governments, tribal governments, and educational institutions.	Federal/Non-Federal match: 1:1 (match - cash, contributed goods and services, volunteer hours, and/or property raised/or secured and spent for the project during the period of performance)	The program supports projects in portions of the Appalachian regions of Maryland (Garrett County - Laurel Highlands). Grants will range from $50,000 to $200,000.	RFP Due April 12, 2021.
Chesapeake Bay Stewardship Fund	National Fish & Wildlife Foundation (NFWF) Jake Reilly, Program Director, Chesapeake Bay jake.reilly@nfwf.org Stephanie Heidbreder, Manager, Chesapeake Programs stephanie.heidbreder@nfwf.org https://www.nfwf.org/chesapeake/Pages/home.aspx	Chesapeake Bay; Chesapeake Bay watershed; habitat; habitat restoration; nutrient reduction; restoration; sediment; sediment reduction; water quality; watershed	See below under Innovative Nutrient and Sediment Reduction Grants and Small Watershed Grants		There are two competitive grant programs; the Innovative Nutrient and Sediment Reduction Grant Program and the Small Watershed Grants Program. These programs benefit the communities, farms, habitats and wildlife of the Chesapeake Bay region.	

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Innovative Nutrient and Sediment Reduction Grants	National Fish & Wildlife Foundation (NFWF) https://www.nfwf.org/programs/chesapeake-bay-stewardship-fund/innovative-nutrient-and-sediment-reduction-grants	agriculture; agricultural runoff; Chesapeake Bay; Chesapeake watershed; collaboration; connectivity; conservation; educational institutions; estuary; estuarine habitat; farms; floodplain; floodplain connection; freshwater habitat; green infrastructure; habitat; habitat improvement; habitat restoration; local government; management; local government; Native American Tribal groups; nonprofits; nutrient management; nutrient reduction; partnership; planning; pollution reduction;	Through collaboration and partnership, projects that conduct watershed and habitat planning; manage upland agricultural runoff through farm-scale conservation systems and solutions; manage upland urban runoff through green stormwater infrastructure improvements; and/or restore riparian and freshwater habitats through forested buffers, estuarine and tidal habitat restoration, conservation, and management; floodplain and wetland reconnection, stream restoration, and habitat improvement. Eligible applicants include: nonprofit organizations, state government agencies, local governments, municipal governments, Indian tribes, and educational institutions.	1:1 match (Federal / Non-Federal)	This is a competitive grant focused on achieving success through collaboration and partnerships among stakeholders focused on improving water quality in the Chesapeake Bay watershed. All eligible projects must occur wholly within the Chesapeake Bay watershed (which only excludes the western half of Garrett County), and projects located within NFWF's Targeted Rivers and Watersheds will be prioritized. These locations were identified by NFWF as having significant opportunities for shared water quality improvement, habitat restoration and species recovery outcomes.	Annually awarded.
Small Watershed Grants	National Fish & Wildlife Foundation (NFWF) Jake Reilly, Program Director, Chesapeake Bay Jake.Reilly@nfwf.org Stephanie Heidbreder, Manager, Chesapeake Program, Stephanie.Heidbreder@nfwf.org https://www.nfwf.org/programs/chesapeake-bay-stewardship-fund/small-watershed-grants	American black duck; capacity building; Chesapeake; Chesapeake Bay; Chesapeake watershed; connectivity; conservation; eastern brook trout; eastern oyster; educational institutions; erosion; green infrastructure; habitat; habitat planning; habitat protection; habitat restoration; K-12; livestock exclusion; local government; marshes; marsh restoration; local government; Native American Tribal groups; nonprofits; nutrient reduction; planning; protection; oyster reefs; restoration; river herring; sediment; sediment reduction; shoreline erosion; state government; stormwater; stormwater improvements;	Projects that: manage upland agricultural runoff through farm-scale conservation systems and solutions; manage upland urban runoff through green stormwater infrastructure Improvements including the adoption of new technologies and management approaches; restore riparian and freshwater habitats through forested buffers, floodplain and wetland reconnection, and stream restoration and habitat improvements; increase habitat integrity for Eastern Brook Trout; improve riparian management through livestock exclusion; conserving high-quality riparian corridors; restore large-scale oyster reefs; restoring river herring habitat connectivity; restore and conserve wetland and tidal marsh habitat for American Black Duck; manage shoreline erosion and marsh loss; build capacity for landscape-scale watershed and habitat outcomes, and conduct watershed and habitat planning, prioritization, design, and permitting. SWG-I Eligible Applicants: nonprofit organizations, local governments, municipal governments, Indian tribes, K-12 educational institutions SWG-PTA Eligible Applicants: nonprofit organizations, state	There are no non-federal matching requirements for the 2022 SWG program, though NFWF strongly encourages applicants to describe federal and non-federal contributions to the proposed project.	There are two programs under this grant: SWG-Implementation (SWG-I) and SWG-Planning and Technical Assistance (SWG-PTA). All eligible projects must occur wholly within the Chesapeake Bay watershed. Projects located within NFWF's Targeted Rivers and Watersheds will be prioritized.	Small Watershed Grants 2022 Request for Proposals Due February 7, 2022.
Fisheries Innovation Fund	National Fish & Wildlife Foundation (NFWF) Erika Feller, Director, Marine and Coastal Conservation Erika.Feller@nfwf.org https://www.nfwf.org/fisheriesfund/Pages/home.aspx	aquaculture; business; capacity building; bycatch reduction; educational institutions; environmental; fisheries; individuals; international organizations; local government; marine; marine aquaculture; mitigation; monitoring; local government; Native American Tribal groups; nonprofits; operations; planning; protection; recreational fisheries; reporting; risk reduction; seabed; siting; state government; Tribal governments	Projects should develop or pilot innovative ideas and implement proven ideas at-scale for bycatch reduction and capacity building; address needs identified for recreational fisheries in the NOAA Fisheries National Saltwater Recreational Fisheries Policy Implementation Plan; planning projects and implementation of risk mitigation strategies that help minimize risk factors for marine aquaculture and protect the seabed; planning to improve siting of marine aquaculture operations and avoid environmental risks; and projects that implement regional-scale electronic monitoring and reporting strategies. Eligible applicants include: nonprofit organizations; state government agencies; local governments; municipal governments; Indian tribes; educational institutions; businesses; international organizations, and unincorporated individuals.	1:1 match (Federal / Non-Federal) Non-Federal can be cash and in-kind	The Fisheries Innovation Fund releases two requests for proposals (RFPs) each year to work towards sustainable fisheries in the United States: a Fisheries Innovation Fund RFP and an Electronic Monitoring and Reporting Grant Program RFP. Can be used for all commercial or recreational fisheries in the U.S., but priority is given to projects in the New England groundfish fishery, the Gulf of Mexico reef fish fishery, and the Gulf of Alaska halibut and groundfish fisheries. Marine aquaculture projects can be proposed for fisheries anywhere in the U.S., but priority is given to projects within the four priority areas: New England, Southern California, the Gulf of Mexico, and Alaska.	Fisheries Innovation Fund and Electronic Monitoring and Reporting Grant Program due July

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Fishing for Energy	National Fish & Wildlife Foundation (NFWF) Michelle Pico, Program Director Marine Conservation, Pico@nfwf.org https://www.nfwf.org/fishingforenergy/Pages/home.aspx	blue crabs; Chesapeake Bay; coastal; commercial; conservation; derelict fishing gear; derelict fishing gear removal; education and outreach; educational institutions; for-profit; habitat; habitat improvement; individuals; local government; locating derelict gear; marine; local government; Native American Tribal groups; prevention; removal; state government; Tribal governments	Identification of gear accumulation sites and species/habitat concerns for removal; removal of accumulated gear; development of prevention strategies for abandonment of gear; planning that links conservation activities with removal of derelict gear; outreach to raise awareness of the effects of derelict gear on the environment and engagement with local public and fishing communities. Eligible applicants include: nonprofit organizations; state or territorial government agencies; local government; municipal governments; Indian tribes; educational institutions; commercial (for profit) organizations, or unincorporated individuals.	Non-Federal match not required, but encouraged	This is a competitive grant, targeting coastal waters. Priority is given to projects within five focus areas, one of which is the Chesapeake Bay with targeted benefits to the blue crab. Awards generally fall within $30,000 to $300,000.	RFP Due April 13, 2021
Five Star and Urban Waters Restoration Grant Program	National Fish & Wildlife Foundation (NFWF) Carrie Clingan, Program Director, Community Stewardship and Youth Carrie.Clingan@nfwf.org Chloe Elberty, Coordinator, Community Stewardship Programs Chloe. Elberty@nfwf.org https://www.nfwf.org/fivestar/Pages/home.aspx	BMPs; best management practices; capacity building; coastal; conservation; education and outreach; educational institutions; green infrastructure; habitat; habitat restoration; invasive species; invasive species removal; livestock fencing; local government; local government; Native American Tribal groups; nonprofits; partnership; riparian; restoration; runoff; stormwater; stormwater improvements; stormwater management;	Projects must involve five or more partners (public and private entities, including the applicant). Eligible activities include, but are not limited to: restoration or creation of wetlands, coastal or riparian areas; outreach, education, and/or training involving the restoration or creation activities that advance local watershed and conservation goals. Eligible applicants include: nonprofit organizations, state government agencies, local governments, municipal governments, Indian tribes and educational institutions.	1:1 match (Federal / Non-Federal) at a minimum (in-kind staff contributions, volunteer time, work performed, materials and services donated, cash or other tangible contributions are allowed for the non-federal match)	Under this grant program, three sub-programs are applicable to areas in Maryland: US EPA Five Star Restoration Training Program - available to all communities. The Urban Waters Federal Partnership, US EPA/USDA Forest Service Funding has two eligible locations: the Anacostia Watershed and the Patapsco Watershed (Baltimore Region). The US FWS Urban Partner Funding is available to locations in Maryland within +/- 25 miles of the Service lands or nearby offices in Baltimore City and Washington, D.C. Grant awards under the entire Five Star and Urban Waters Restoration Grant Program range from $20,000 to $50,000, with roughly 40-50 grants award per year.	Proposal due January
Hurricane Sandy Coastal Resiliency Competitive Grant Program (CLOSED*)	National Fish & Wildlife Foundation (NFWF) Amanda Bassow, Director, Northeastern Regional Office Amanda.Bassow@nfwf.org Lynn Dwyer, Program Director, Northeast-Coastal Lynn.Dwyer@nfwf.org Claire Flynn, Manager, Northeastern Region Claire.Flynn@nfwf.org https://www.nfwf.org/hurricanesandy/Pages/home.aspx	coastal hazards; coastal storms; disaster; disaster funding; ecosystem protection; ecosystems; education; flood; hazard mitigation; habitat; habitat protection; mitigation; natural hazards; outreach; protection; resiliency; resilience; sea level rise; storm surge; wave velocity reduction	Reduce impacts of coastal storms, sea level rise and associated natural hazards on coastal and inland communities; strengthen ecological integrity and functionality of coastal/inland ecosystems to protect communities and enhance fish and wildlife and their associated habitats; conduct outreach/education to enhance understanding of impacts of storm events; and identify cost-effective resilience tools to mitigate the effects of future storms.	N/A	**Obviously closed, only included here to show that NWFW does occasionally offer grants for disaster assistance. Four projects were award in Maryland: two in central Maryland, one in Southern Maryland, and one on the Eastern Shore .*	N/A
Monarch Butterfly and Pollinators Conservation Fund - Habitat Improvement	National Fish & Wildlife Foundation (NFWF) Todd Hogrege, Director, Central Regional Office Todd.Hogrefe@nfwf.org Crystal Boyd, Manager, Pollinator Programs Crystal.Boyd@nfwf.org https://www.nfwf.org/monarch/Pages/home.aspx	butterfly; conservation; educational institutions; federal government; habitat; habitat conservation; habitat restoration; local government; milkweed; monarch butterfly; local government; Native American Tribal groups; native plants; nonprofits; open space; pollinators; restoration; Tribal governments	Restore or enhance monarch butterfly and pollinator habitat; increase native milkweed and native plant resources supply. Eligible applicants include: nonprofit organizations, US federal government agencies, state government agencies, local governments, municipal governments, Indian tribes and educational institutions.	1:1 match (Federal / Non-Federal) Non-Federal can be cash, in-kind contributions of staff and volunteer time, work performed, materials and services donated, or other tangible contributions to the project objectives and outcomes	Competitive grant. Project must be within the monarch butterfly range in the U.S. Priority is given to projects East of the Rockies in these states: Arkansas, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Texas, and Wisconsin. Priority is given to projects in the West located on or adjacent to working lands, important monarch butterfly overwintering sites, and US Forest Service and Bureau of Land Management lands.	RFP Due April 13, 2021

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
National Coastal Resilience Fund	National Fish & Wildlife Foundation (NFWF) Jessica Grannis, Program Director, Coastal Resilience Arielle Mion, Program Manager, Coastal Resilience https://www.nfwf.org/coastalresilience/Pages/home.aspx	assessment; barrier islands; beaches; capacity building; coastal; coastal erosion; coastal storms; commercial; connectivity; conservation; coral reefs; design; dunes; educational institutions; fish; flood; flooding; floodplain; forests; for-profit; habitat; habitat protection; instream restoration; instream; local government; marshes; marsh restoration; monitoring; local government; Native American Tribal group; natural systems; nonprofits; oyster reefs; permitting; project monitoring; protection;	Projects that create, expand, and restore natural system in areas that will both increase protection for communities from coastal storms, sea level rise, flood, and coastal erosion, while improving habitat for fish and wildlife species. The grant supports three focus areas: project preliminary design and site assessment; project final design and permitting; and project restoration and monitoring. Eligible applicants include: nonprofit organizations; state and territorial government agencies, local governments, municipal governments, Native Tribal governments, educational institutions, and commercial (for-profit) organizations.	1:1 match (Federal / Non-Federal) Non-Federal match = cash and/or in kind services	Eligible project areas include all coastal Hydrologic Unit Code (HUC) 8 watersheds that drain to the sea and any adjacent HUC 8 Watersheds that are particularly low-lying or tidally influenced. Project awards (in 2019) expected to range from $125,000 to $3,000,000.	Pre-Proposal due April Proposal due May
Emergency Coastal Resilience Fund (CLOSED*)	National Fish & Wildlife Foundation (NFWF) Jay Jensen, Director, Southern Regional Office Jay.Jensen@nfwf.org Suzanne Sessine, Program Director, Southern Coastal Programs Suzanne.Sessine@nfwf.org https://www.nfwf.org/coastalresilience/emergency/Pages/home.aspx	aquatic; aquatic connectivity; beaches; beach restoration; capacity building; coastal; coastal ecosystems; coastal plain; coastal storms; connectivity; coral reefs; debris flow; design; disaster; disaster declaration; dunes; dune restoration; ecosystems; educational institutions; fish; flood; floodplain; floodplain restoration; flooding; forests; habitat; habitat protection; habitat restoration; instream restoration; instream; local government; marshes; marsh restoration; local government; Native American Tribal group; nonprofits; oyster reef; passage improvements; planning; protection; recovery; reforestation; resiliency;	Ecosystem restoration projects, and the construction of natural, nature-based and green-gray (hybrid) infrastructure to improve community resilience and conserve natural areas. Projects may include, but are not limited to, marsh, beach and dune restoration, living shorelines, stream restoration, including aquatic connectivity projects that reduce flood risk, and innovative stormwater management. In limited instances this program may consider projects that advance community planning and technical assistance to address barriers and increase the capacity of eligible communities to implement projects where there is a demonstrated need in an affected geography. Eligible applicants include: nonprofit organizations, state and territorial government agencies, local governments, municipal governments, Native American tribal governments, and educational institutions.	N/A	**Closed. Similar program to the Hurricane Sandy Coastal Resiliency Competitive Grant Program. The ECRF was established to increase the resilience of coastal communities located within federally declared disaster areas impacted by hurricanes Florence and Michael, Typhoon Yutu and wildfires in 2018. Included on this list to show that disasters may be funded through a similar program and that potential applicants should check the NFWF website for emergency funds after a Presidential Disaster Declaration after a major disaster. The grant funds projects located in the Coastal Plain Physiographic Province in Maryland.*	N/A
Non-Tidal Wetlands Grant Program	Chesapeake Bay Trust https://cbtrust.org/grants/non-tidal-wetlands/ Non-Tidal Wetland Program Grants Manager: Sarah Koser, skoser@cbtrust.org, 410-974-2941, ext. 106	CBT; Chesapeake Bay Trust; creation; conservation; endangered species; faith-based organizations; for-profit; habitat; improvements; local government; nonprofits; nontidal; nontidal wetlands; preservation; protection; restoration; threatened species; wetlands; wetlands creation; wetlands preservation; wetlands protection; wetlands restoration	Activities include, but are not limited to: projects that create wetlands; improving the functions of existing wetlands (especially farmed wetlands, partially drained wetlands, or wetlands providing habitat for threatened or endangered species); preservation/protection of existing wetlands if part of a project that includes wetlands creation or restoration. Eligible applicants: nonprofit organizations, local government, for-profit entities, faith-based organizations "and more."	Not required, but cash or in-kind services match is strongly encouraged	Award amounts of up to $500,000. Eligible Locations: Primary watersheds - Isle of Wight Bay; Secondary watersheds - West River, Severn River, Magothy River, South River, Western Branch, Patuxent River (lower), Assawoman Bay, Sinepuxent Bay, Newport Bay; Tertiary watersheds - Youghiogheny River, Casselman River, Northeast River, Deep Creek Lake, Little Youghiogheny River, Eastern Bay, Brighton Dam, Rocky Gorge Dam, Lower Chester River, Miles River	This grant program is expected to open in Spring 2022

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Green Streets, Green Jobs, Green Towns (G3) Grant Program	Chesapeake Bay Trust https://cbtrust.org/grants/green-streets-green-jobs-green-towns/ G3 Program Grants Manager: Jeffrey Popp, jpopp@cbtrust.org, 410-974-2941, ext. 103	CBT; charrette; Chesapeake Bay; Chesapeake Bay Trust; community; communities; community associations; design; G3; green infrastructure; green streets; implementation; local government; neighborhood associations; nonprofits; planning; project design; project implementation; runoff; stormwater; stormwater runoff; urban; vacant lots; visioning; white paper	Activities include, but are not limited to: green street project design, implementation of green street projects, white papers on innovative ideas for green infrastructure, charrettes to vision/plan a green street project with key stakeholders (incl. citizens). Eligible applicants: nonprofit organizations, local governments, neighborhood/community associations	Not required, but cash or in-kind services match is strongly encouraged	Applicants applying for implementation/construction and greening of vacant lots must use the G3 Implementation Project Calculator. Grant funding can be applied anywhere in the Chesapeake Bay watershed portion of EPA Region 3. Program goals: reduce stormwater runoff, increase number and amount of green spaces in urban areas, improve the health of local streams and the Chesapeake Bay, enhance quality of life and community livability. Award amounts of up to $15,000 for conceptual plans; up to $30,000 for engineered designs, up to $100,000 for implementation projects, up to $50,000 for greening communities and urban vacant lots, up to $20,000 for white papers.	Annual - Spring.
Outreach and Restoration Grant Program	The Chesapeake Bay Trust 108 Severn Avenue Annapolis, MD 21403 (410) 974-2941 https://cbtrust.org/grants/outreach-and-restoration/	agricultural; agricultural best management practices; best management practices; BMPs; community; communities; community engagement; connectivity; engagement; floodplain; floodplain connection; forests; green infrastructure; habitat; habitat establishment; habitat improvement; invasive plant removal; invasive species; meadow; meadow habitat; native plantings; native plants; outreach; plant removal; rain barrels; rain	Activities such as community outreach and engagement increase stewardship ethic of natural resources; restoration activities that demonstrate restoration techniques and engage citizens in the restoration and protection of the Chesapeake Bay and its rivers. Eligible applicants: nonprofit organizations, community and homeowner associations, faith-based organizations, "and more"	Not required, but cash or in-kind services match is strongly encouraged	Grant sponsored in partnership with City of Baltimore Dept of Public Works, Charles Co, Harford Co, Howard Co, the City of Gaithersburg, Queen Anne's Co, and the City of Salisbury and funds projects in partner areas and throughout Maryland. Applicants can request funds from one of the following tracks. Track 1: Outreach/Knowledge Building Projects (up to $30,000) Track 2: Behavior Change Projects (up to $50,000) Track 3: Restoration Projects (up to $50,000) Track 4: Outreach and Restoration Projects (up to $75,000).	Late Summer / Early Fall
Watershed Assistance	The Chesapeake Bay Trust https://cbtrust.org/grants/watershed-assistance/ Questions & Technical Support: Emily Stransky, estransky@cbtrust.org, 410-974-2941, ext.101	action plan; agricultural; agricultural water quality best management practices; BMPs; best management practices; bioretention cells; CBT; Chesapeake Bay; Chesapeake Bay Trust; living shorelines; local government; LID; low impact development; marshes; marsh creation; nonprofits; ordinances; plan; planning; program development; rain garden; streams; stream restoration; stormwater; stormwater management; water quality; water quantity; watershed; watershed action plan; watershed	Project design for watershed restoration projects identified in WIP milestones, which may include, but are not limited to: bioretention cells, large-scale rain gardens, other low impact development stormwater techniques, environmental site designs, stream restoration, wetland and marsh creation, and agricultural water quality best management practices. Watershed Planning and Program Development projects identified in the existing programmatic milestones submitted to MDE by local governments, including, but not limited to watershed characterization, survey, and stakeholder engagement; creation of watershed action plans; policy development or enhancement to support watershed action plans (e.g. development/enhancement of ordinances or other tools); and development for new programs, enhancement of existing programs, or establishing new institutional frameworks that promote internal and external stakeholder coordination	Not required, but cash or in-kind services match is strongly encouraged	Projects must support implementation of local milestones developed to advance the Watershed Implementation Plan (WIP) strategies. Type 1: Project Design Generally, requests are up to $100,000 for design of stormwater best management practices Generally, requests are up to $150,000 for design of stream restoration practices Type 2: Watershed Planning and Program Development Generally, requests are up to $75,000	Late Summer / Early Fall

Funding Program Name	Contact Information	Key Words	Eligible Activities	Cost Share Requirements	Other Program Characteristics	Application Due Date
Exelon Grant	https://www.exeloncorp.com/community/grants	afterschool programs; arts; beautification; clean energy; conservation; education; endangered species; environmental; environmental quality; events; green infrastructure; health; human services; local government; mathematics; membership dues; neighborhoods; nonprofits; preservation; program development; program support; science; STEM; workforce skills; water quality	The grant funds programs that deliver measurable, sustainable improvements in the communities served by Exelon in four areas: education, environment, arts & culture, and neighborhood development. Funds may be used to an event, dues/membership or in-kind requests, and program support/development. Eligible applicants: 501c3 nonprofit organizations; only those organizations which do not discriminate based on age, political affiliation, national origin, ethnicity, gender, gender identity, sexual orientation, disability, HIV/AIDS status or religious belief. Grants are only available to nonprofits in the communities where Exelon has facilities. Grants are only available to organizations that have not received a grant from Exelon or its subsidiaries within the past 12 months. Although only nonprofits are called out as eligible applicants, local governments are among the list of past grant recipients.	No information provided	Education: Programs that encourage students to stay in school and develop their full potential, promote math and science, improve workforce skills, and encourage personal development through scholarships, mentoring and internships. Environment: Programs that improve the quality of our environment; promote environmental education, conservation and preservation; develop cleaner sources of energy; protect endangered species; and beautify neighborhoods. Arts & Culture: Cultural institutions with broad public exposure and programs designed to make arts and culture more accessible to a wider and more diverse audience. Neighborhood Development: The company makes a limited amount of grants to local nonprofit organizations for programs and nonprofit organizations that support a range of offerings from health and human services to after-school programming .	Anytime

City of Salisbury
Jacob R. Day, Mayor

To: City Council

From: Julia Glanz, City Administrator

Subject: Adopting the Wicomico County Hazard Mitigation and Resilience Plan

Date: August 31, 2022

Attached you will find a resolution for your consideration to officially adopt the Wicomico County Hazard Mitigation and Resilience Plan. The Hazard Mitigation and Resilience Plan must be updated and adopted every five years by all municipalities to continue funding for mitigation projects. The purpose of the plan is to identify, plan, and implement cost-effective hazard mitigation measures through a comprehensive approach known as hazard mitigation planning. Resiliency is the ability of the community to bounce back after a disaster. This is the first plan where resiliency has been included. The Department of Emergency Services staff led the effort in updating this plan, where City of Salisbury employees were represented along with 94 individuals throughout the county representing government, residents, business owners and other agencies.

Attached you will find the plan for your review. Adoption of the plan is but another avenue in which we continue to cooperate effectively with the County to ensure safety of our citizens. Wicomico County Emergency Services staff will be at the City Council Work Session to answer any questions.

Office of the Mayor
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