2022

Hazard Mitigation & Community Resilience Plan Update (DRAFT)

Talbot County, Maryland

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- Page 1 – *Section 1.1* updated to add new high hazard potential dam requirements.
- Page 2 – *Section 1.2* updated to reflect the 2017 plan, including a review of high priority action items.
- Page 3 – The core planning team and the hazard mitigation planning committee were both updated to reflect current members.
- Page 3 – Added an overview of the three major HMPC meetings that occurred during the plan update process; kick-off, mid-point, and the mitigation action item workshop.
- Page 5 – the Municipal Perspective was updated to include the municipal questionnaire that was sent to each municipality.
- Page 8 – *Section 1.4.1* was included to overview the Hazard Identification and Risk Assessment (HIRA) completed during this plan update. Full results are included in Appendix A of this plan update.
- Page 9 – *Section 1.5 Public Outreach* was added as a section to highlight the project website, the public survey, and the local and regional outreach efforts completed for this plan update.
- Page 9 – The project website, www.talbothazardplan.org was created and maintained during this plan update. The purpose of the website was to provide the public with hazard mitigation information and allow them the ability to review the previous and current plan.
- Page 10 – Public Survey results are included within Appendix G of this Plan Update. Results of the public survey were incorporated into mitigation action items.
- Page 14 – Talbot County Hazard Mitigation Planning, Training, and Outreach Initiatives table was added for reference.

CHAPTER 1: INRODUCTION

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

Mitigating future risks will enable Talbot County and its communities to withstand extreme events more effectively. The 2022 Talbot County Hazard Mitigation and Community Resilience Plan identifies various hazard types, the associated risk, and ways to address vulnerability. Hazard mitigation actions identified in the Plan that build resilience include infrastructure and environmental projects, integration of mitigation planning into existing or new County plans and regulations and targeted public education and outreach efforts to inform residents and visitors of Talbot County's hazard risks and strategies to lessen impacts.

The Hazard Mitigation Plan is Talbot County's roadmap to evaluating hazards, identifying resources and capabilities, selecting appropriate actions, and implementing mitigation measures to avoid and/or minimize future impacts from those hazards.

Resilience
Resilience is the capacity of individuals, communities, businesses, institutions, and governments to adapt to changing conditions and to prepare for, withstand, and rapidly recover from disruptions to everyday life, such as hazard events. Resilience enables communities to adapt to change so that they not only "bounce back" from a disaster, but also "bounce forward" to a safer state.

Communities can engage in mitigation efforts both before and after a disaster to become more resilient. This requires addressing not only the physical and environmental impacts of hazards, but also the economic and social impacts. Mitigation is the foundation of community resilience and touches all facets of a community: how floodplains and natural resources are managed, how a community builds, and where infrastructure and critical facilities are placed.

Talbot County is poised to further advance resilience via policy, planning, and action. To that end, Talbot County has established five Pillars to help guide the process and establish the foundation of resilience planning and implementation. The five Pillars established include: (1) Health, Safety, Welfare, (2) Economic Stability, (3) Education, (4) Infrastructure, and (5) Environmental. Referring to these pillars when creating policies, plans, and projects will ensure that our community's resilience is in the forefront of our mission.

1.1 PLANNING REQUIREMENTS

This planning effort is in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, and 44 CFR Part 201-Hazard Mitigation Planning. Presidential Policy Directives 8 & 21 have guided the resilience portion of the plan, as well.

- Disaster Mitigation Act of 2000
  DMA 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments.
- Presidential Policy Directives 8 & 21
  Presidential Policy Directive (PPD) 8: National Preparedness (2011) defines resilience as the ability to "adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies."
- Presidential Policy Directive (PPD) 21: National Preparedness (2013) defines resilience as the ability to "prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions."

In keeping with the Disaster Mitigation Act, hazard mitigation plans are required to be updated every five (5) years from the date of their initial FEMA approval. Talbot County is updating the previous hazard mitigation plan with this *2022 Talbot County Hazard Mitigation & Community Resilience Plan Update*. Regular plan updates allow for the determination of program and project effectiveness and ensures the plan utilizes the most up-to-date data available. For example – as of May 22, 2019, it became required that local hazard mitigation plans include all dam risk in accordance with the requirements set forth in the High Hazard Potential Dams (HHPD) Grant Program Notice of Funding Opportunity.

1.2 2017 HAZARD MITIGATION PLANNING

Talbot County has engaged in hazard mitigation planning for over a decade. The previous countywide hazard mitigation plan was completed in late 2016 and adopted in mid-2017. The plan covered Talbot County and its five incorporated communities.

Technical assistance was provided throughout the planning process by the (former) Maryland Emergency Management Agency (now Maryland Department of Emergency Management). The plan was reviewed and approved by the Federal Emergency Management Agency (FEMA) in 2017.

Hazards rated as "High" risk identified in the 2017 Plan included Flood and Coastal Hazards (tropical storms/hurricanes, nor'easters, shoreline erosion, and sea level rise). The 2017 Plan included 24 mitigation action items, of which six were identified as "high" priority. In total, nine (9) of the twenty-four (24) action items were identified by stakeholders as being completed. Of these nine completed action items, four were considered "high" priority" in the 2017 Plan, which are listed below in red:

- ✓ Project #7 – Open Space Preservation
- ✓ Project #8 – Flood Awareness/Public Education
- ✓ Project #9 – Public Outreach Sessions
- ✓ Project #12 – Public Education and Awareness in Hazard Prone Areas
- ✓ Project #14 – Mitigate Pump Station Risk to Overflow
- ✓ Project #16 – Repetitive Roadways Flooding Issues
- ✓ Project #19 – Establish a Business Liaison in the Emergency Operations Center for economic recovery
- ✓ Project #23 – Increase Community Rating System (CRS) Score

A detailed mitigation action item status report is included in *Appendix B* of this plan update.

1.3 ORGANIZING RESOURCES

A Core Planning Team was initially formed to help guide the development of the *Talbot County Hazard Mitigation and Resilience Plan*. The Core Planning team assisted in determining the project timeline, milestones, and helped to establish agenda items for the Hazard Mitigation Planning Committee (HMPC). The purpose of the HMPC was to inform and review plan elements as they were developed and provide insight and expertise related to mitigation action items.

1.3.1 CORE PLANNING TEAM

The Core Planning Team was established to help guide the 2022 Plan Update development process. The Core members kicked off the plan update process with a meeting on May 17, 2021.

Members of the Core Planning Team include:

- Geneva Schaffle, Emergency Services, Coordinator
- Brian LeCates, Emergency Services, Director
- Mark Cohoon, Public Works, GIS Manager
- Miguel Salinas, Planning and Zoning, Planning Officer
- Rich Williams, Health Department, Public Health Emergency Planner

1.3.2 HAZARD MITIGATION PLANNING COMMITTEE

The Hazard Mitigation Planning Committee (listed below) met throughout the plan development process on the following dates:

- May 26, 2021 (Kick-off Meeting)
- September 22, 2021 (Mitigation Action Item Status Update)
- November 19, 2021 (Mitigation Action Item Workshop)

Table 1-1. Hazard Mitigation Planning Committee (HMPC) Members

Name	Organization/Association
Greg Allis	Talbot County Planning and Zoning
Nancy Andrew	Talbot Family Network
Michael Bibb	Town of St. Michaels
Erin Braband	Town of Trappe
Maria Brophy	Town of Oxford
Mark Cohoon	Talbot County Public Works
Donnie Cooper	Talbot County Public Schools
Parker Durham	Talbot County Department of Information Technology
Marty Eichelman	Town of Queen Anne
Kia Gibbs	Easton Utilities
Tommy Haddaway	Talbot County Emergency Services
Bill Hildebrand	Maryland Department of Emergency Management
Bill Keswick	Talbot County Public Schools
Kymberly Kudla	Town of St. Michaels
Brian LeCates	Talbot County Emergency Services
Cheryl Lewis	Town of Oxford
Scott Mergenthaler	Talbot County Sheriff's Office
Mike Mertaugh	Talbot County Public Works
Paul Moffett	Easton Utilities
Brian Moore	Talbot County Facilities Maintenance
Roy Myers	Town of St. Michaels
Chase Phillips	Talbot County Planning and Zoning
Sara Ramotnik	Eastern Shore Land Conservancy
Don Richardson	Town of Easton
Rebecca Saduk	Easton Utilities
Miguel Salinas	Talbot County Planning and Zoning
Geneva Schaffle	Talbot County Emergency Services
Renee Sheehy	Delmarva Power
Martin Sokolich	Talbot County Planning and Zoning
Brennan Tarleton	Talbot County Planning and Zoning
Cassandra Vanhooser	Talbot County Economic Development and Tourism
Rich Williams	Talbot County Health Department

The HMPC first convened during the kick-off meeting held on **May 26, 2021.** The kick-off meeting included an overview of hazard mitigation and resilience, as well as the plan development process.

The second HMPC meeting was held on **September 22, 2021**. The first part of this meeting acted as a plan update progress report, highlighting changes made to the natural hazard chapters and the outreach activities completed up until that point (municipal, public, and social media). The second portion of the meeting was conducted as a workshop. Stakeholders were asked to provide their feedback on recommended mitigation action items, which were derived from needs identified within the natural hazard chapters.

Talbot County Hazard Mitigation and Community Resilience Plan Update - Natural Hazard Draft Review & Feedback Form

Name: _____
Date: _____
Department/Organization: _____

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of this Plan Update process, stakeholders are asked to review and modify information within the table. The following table provides impacts from Coastal Hazard events to Talbot County per Community Pillar.

To the best of your ability and expertise, please provide your updates in the "New Comments" column.

Hazard Impact Table

	Coastal	New Comments
Health, Safety, and Welfare	• Economic development – impacts tourism and real estate (tax income). • Environmental – impacts silt and runoff into bay. • Early warning system, evacuation, and holdouts.	
Economic Stability	• Increased threat (rise is perceived) would have a negative impact on property values and all related industries. • Destruction of infrastructure would have long-term impacts on tourism and economic development. • Damage to structures could force long-term closures and business interruptions. Lack of work/no salaries. • Limit access of emergency response to residential and business areas. • Sea-level rise will impact loan real estate values over time and limit land use. • Sea-level rise will negatively impact businesses located directly on shorelines, especially our marinas and boat builders. • Increased insurance costs for business operations.	
Education	• Renewable energy distributed locally is vital to resilience. • There is an opportunity to educate all grade levels, including college and professionals on coastal hazards. **Infrastructure (Wind & Water):** • Power failure. • Damage to facilities (over Category 1 storms). • Facilities are used as emergency shelters. • EHS: full sized generator can run 2-3 days of continuous operation (lights & A/C). **Transportation:** • TCPS might need to use buses to move residents (up to 3500 persons at a time). **Service Interruptions:** • No school on hurricane days. **Chesapeake College:** • Glass and glass structures are a concern. • Generators on approximately 2 buildings: battery back-up coming for kitchen/student center.	
Infrastructure	• Submerged roads and bridges create impacts to evacuation. • Damages to roads and bridges lead to long term closures.	

1

Figure 1-1: The front page of the Natural Hazard Review & Feedback Form. This form was provided to stakeholders for each draft natural hazard chapter.

Stakeholders were given the opportunity to provide feedback on action items while reviewing drafts of the natural hazard profiles. Draft natural hazard chapters were sent on a regular basis and each draft chapter included a review form to gather feedback. The form provided an opportunity for stakeholders to review recommended mitigation action items, suggest new action items, update the hazard impact table associated with each hazard, and provide general comments.

The third meeting of the HMPC was held on **November 19, 2021.** The meeting served as an in-person workshop with the goal of reviewing the mitigation action item project sheets (see *Chapter 12*) that were developed during the Plan Update process. Mitigation action items are created in response to the assessment of risk and vulnerability related to each natural hazard profiled in the plan update. The purpose of these mitigation action items, along with their associated goals and objectives, is to provide Talbot County a detailed blueprint for addressing and reducing risk and vulnerability, which in turn builds resiliency.

The culminating result of the meeting was the prioritization of the thirty (30) mitigation action item projects. The HMPC completed an action item prioritization exercise for each item and results from that process indicate that twelve (12) action items are considered "high" priority". Additional details regarding this process are included in *Chapter 12: Mitigation & Resilience Goals, Objectives & Action Items.*

1.3.3 MUNICIPAL PERSPECTIVE

To obtain specific information from the municipal perspective, each of the five (5) municipalities within Talbot County were invited to serve on the Hazard Mitigation Planning Committee.

In addition, municipalities were sent a "municipal questionnaire" with the goal of gathering updates related to completed and ongoing mitigation and resilience projects, as well as current capabilities (i.e., planning and regulatory, administrative and technical, financial, and education/outreach).

Information gathered from the municipal questionnaire and meetings are presented in *Chapter 12: Municipal Synopsis & Perspective*. Mapping products are included for each town, displaying important information from the towns' perspective, rather than county-wide, as is the case in other chapters of the plan. Finally, information from each municipality specific to hazards, impacts, issues, and potential mitigation and resilience action items have been included in *Chapter 12*.

1.3.4 CAPABILITY ASSESSMENT

A capability assessment matrix was created for Talbot County and its municipalities as part of the organizing resources process.

The purpose of conducting a capability assessment is to determine the ability of a jurisdiction 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 its municipalities and which should continue to be supported and enhanced via future mitigation efforts.

The capability assessment matrix is included below and includes capabilities for Talbot County and its five municipalities: Easton, Oxford, Queen Anne, St. Michaels, and Trappe. Additional municipal capabilities gathered via the municipal questionnaire are included within *Chapter 12* of this Plan Update.

Table 1-2. Talbot County Hazard Mitigation Plan – Mitigation Capability Assessment Matrix

	Talbot County	Easton	Oxford	Queen Anne	St. Michaels	Trappe
Comprehensive Plan with Hazard Mitigation	Yes, in the 2016 Plan, in Section 4 Community Services and Facilities: Hazard Mitigation.	Yes (currently updating)	Yes	Yes	Yes	No (Updated in 2020)
Land Use Plan	Yes, 2016 Comprehensive Plan	Yes	Yes	Yes	Yes	Yes, 2020
Subdivision Ordinance	Yes, 2009	Yes	Yes, Ordinance 8822 – August 9, 1988	Yes	Yes	Yes, June 27, 2006
Zoning Ordinance	Yes, 2009	Yes	Yes, Ordinance 1213 – June 14, 2017	Yes	Yes, Town Code CH. 340	Yes, June 27, 2008
Flood Mitigation Assistance Plan (FMA)	No	No	Yes, Resolution 0505 – December 14, 2004	No	No	No
Floodplain Management Ordinance	Yes	Yes (adopted 2013 updated 2016)	Yes, Ordinance 1609 – May 26, 2016	Yes	Yes, Town Code CH. 173. Amended in 2016.	No, Town not in Floodplain
Stormwater Program	Yes, MD Stormwater Regulations	Yes	Yes, Ordinance 1013 – May 25, 2011	No	Yes, Town Code CH. 281	Yes, October 2009
Building Code	Yes	Yes	IBC 2021	Yes	IBC 2021	IBC 2021

Table 1-2. Talbot County Hazard Mitigation Plan – Mitigation Capability Assessment Matrix						
	Talbot County	**Easton**	**Oxford**	**Queen Anne**	**St. Michaels**	**Trappe**
Building Official	Yes	Yes	Middle Dept. Inspection Agency	Planning Commissioner	Yes, Town Code CH. 108	Middle Dept. Inspection Agency
Inspections?	Yes	Yes	Middle Dept. Inspection Agency	Yes Middle Dept. Inspection Agency	Yes, Middle Dept. Inspection Agency	Middle Dept. Inspection Agency
Building Code Effectiveness	Adopted IBC	Adopted IBC	Adopted IBC	Adopted IBC	Adopted IBC	Adopted IBC
Grading Schedule (BCEGS) Rating	-	IBC 2018	-	Building Code	-	-
Warning-sirens?	Yes, Fire Dept. Sirens	Yes	Yes, Fire Dept. Sirens	Yes	Yes, Fire Dept. Sirens	Yes, Fire Dept. Sirens
NOAA Weather Radio?	Yes, three sites.	Yes	Yes	Yes	Yes	Yes
Cable Override?	Yes	Yes	No	No	Yes	No
Mass Notification System	Yes	Talbot County System	Talbot County System	Talbot County System	Talbot County System/"Constant Contact"	Talbot County System
Structural Projects	Yes	Yes	Yes	No	Yes	Yes
Property Protection	No	Yes	No	No	No	No
Critical Facility Protection	No	Yes	No	N/A	No	No
Natural / Cultural Resources Inventory	No	Yes	No	No	No	No
Erosion Control	Yes, Soil Conservation District	Yes	Yes	Critical Area Buffers	Yes, Town Code CH. 154	No
Sediment Control	Yes, Soil Conservation District	Yes	Yes	N/A	Yes, Town Code CH. 154	No
Public Information Program	No	Yes	Yes	No	No	No
Environmental Education Program	No	No	Yes	No	No	No

1.3.5 PLAN INTEGRATION

The Federal Emergency Management Agency (FEMA) considers plan integration the process by which communities look critically at their existing planning framework and align efforts with the goal of building a safer, smarter community. There are two primary ways to effectively accomplish plan integration:

1. Integrate natural hazard information and mitigation policies and principles into local planning mechanisms and vice versa by:
    a. Including information on natural hazards (past events, potential impacts, and vulnerabilities).
    b. Identifying hazard-prone areas throughout the community.
    c. Developing appropriate goals, objectives, policies, and projects.

2. Encourage collaborative planning and implementation and inter-agency coordination in the following ways:
    a. Involving key community officials with the authority to execute policies and programs to reduce risk.
    b. Collaborating across departments and agencies with key staff to help share knowledge and build relationships that are important to the successful implementation of mitigation activities.

Talbot County's Hazard Mitigation and Community Resilience Plan provides the necessary natural hazard

information to incorporate into existing planning documents. The data, tables, analyses, assessments, mapping, and action items within this plan are easily applicable when updating or modifying existing planning documents. Documents and other sources used as reference or to support the plan update are made available throughout the plan as sources or endnotes. The Hazard Mitigation Plan also includes Goals and Objectives categorized into 15 broad categories, including plan integration. The following goals and objectives extrapolated from *Chapter 11* relate specifically to plan integration:

Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.

14.1 Integrate hazard mitigation and resilience into areas such as land use, transportation, climate change, natural and cultural resource protection, water resources, and economic development.
14.2 Solicit participation and offer opportunities for various departments to work together on a regular basis.
14.3 Clearly define roles of, and improve, inter-governmental coordination between planners, emergency managers, engineers, and other staff, as well as municipal and regional partners in improving disaster resilience.

Additionally, each mitigation action item/project developed during the plan update considers "Ideas for Integration." Ideas for integration identify opportunities within each mitigation project for plan integration activities related to integrating hazard mitigation into planning documents, creating new partnerships, proposed changes to code, and public outreach. The following county plans, projects, and policies were identified as plan integration opportunities:

- Green Infrastructure Plan (Cleaner, Greener Talbot)
- Cold Weather Plan
- Building Codes
- Municipal Codes
- Debris Management Plan
- COVID19 After Action Report
- Eastern Shore Economic Recovery Project
- Emergency Operations Plan
- Flood Mitigation Plan
- Floodplain Ordinance
- Comprehensive Plan
- Land Use Policies
- Stormwater Management Regulations
- Countywide Strategic Planning

Integrating hazard mitigation planning and resiliency into the County's planning framework will lead to development patterns and redevelopment that decreases hazard risk and vulnerability. Local planning documents would benefit from integrating/continuing to integrate components from this hazard mitigation plan within future updates of respective plans.

For more information related to mitigation strategies and plan integration, please refer to *Chapter 11: Mitigation and Resilience Goals, Objectives, and Action Items.*

For a complete guide to plan integration, FEMA has created a step-by-step guidebook to aid local communities. The guide is called "Plan Integration: Linking Local Planning Efforts" and was published in July 2015. The guide is available at fema.gov.

1.4 PLANNING PROCESS

In March 2021, Smith Planning and Design (SP&D), was hired by Talbot County to assist in the development of the new/updated Hazard Mitigation and Community Resilience Plan. The requirements of a local hazard mitigation plan include the development of hazard identification and risk assessment, which leads to the development of a comprehensive mitigation planning strategy for reducing risks to life and property. In addition, the plan requirements include a mitigation strategy section that identifies a range of specific mitigation actions and projects that can potentially reduce the risks to new and existing buildings and infrastructure. The mitigation strategy includes an action plan describing how identified mitigation activities will be prioritized, implemented, and administered. To meet the plan requirements and integrate resilience planning within the new Plan, county staff, stakeholders, and SP&D worked closely together, meeting regularly throughout the development process.

The plan development process closely followed the planning steps outlined in FEMA's Hazard Mitigation Guidance.

Table 1-3. Mitigation Planning Tasks, 1-9

TASKS 1-3		
Discuss the process and people needed to complete the remaining mitigation planning and the best ways to document the process in the plan.	**Task 1**	Determine the Planning Area and Resources
	Task 2	Build the Planning Team
	Task 3	Create an Outreach Strategy
TASKS 4-8		
Cover the specific analyses and decisions that need to be completed and recorded in the plan.	**Task 4**	Review Community Capabilities
	Task 5	Conduct a Risk & Vulnerability
	Task 6	Assessment
	Task 7	Develop a Mitigation Strategy
	Task 8	Keep the Plan Current
TASK 9		
Provides suggestions and resources for implementing your plan and reduce risk.	**Task 9**	Create a Safe and Resilient Community

Source: FEMA Local Mitigation Planning Handbook, March 2013.

1.4.1 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The initial step in preparing new hazard mitigation strategies for Talbot County involved the identification of various hazards and their associated risks. As part of the plan update process, a Hazard Identification Risk Assessment (HIRA) was completed for Talbot County. During the first stakeholder meeting (May 26, 2021) of Talbot County's Hazard Mitigation and Community Resilience Plan Update members of the HMPC were asked to participate in an online survey as part of the hazard identification and risk assessment process. Committee members were also able to add, remove, and/or modify any of the existing hazards.

The HMPC chose to keep all existing hazards from the previous plan, add one new hazard (Emerging Infectious Diseases), and modify the ratings of two natural hazards identified in the 2017 Plan. Results from the Hazard Risk Survey completed by stakeholders have been integrated into the HIRA in *Appendix A.*

Results of the risk assessment are represented in the following table. Coastal hazards, Flood, Extreme Heat, and Emerging Infectious Diseases are all ranked as "high" risk. The results of the most recent risk

assessment are consistent with results from 2017, with minor changes to the risk ranking for Tornado (Medium>Low) and Extreme Heat (Medium-High>High).

Table 1-4. Natural Hazard Identification And Risk Assessment Ranking Results

Hazards	2017 Hazard Ranking	2022 Hazard Ranking	2021 State Ranking for Talbot County
Coastal Hazards	High	High	Medium-High
Thunderstorm	Medium-High	Medium High	Medium
Flood	High	High	Medium-High
High Wind	Medium-High	Medium-High	Medium-High
Tornado	Medium	Low	Medium-Low
Extreme Heat*	Medium-High	High	Medium-Low
Drought	Medium	Medium	Medium-High
Winter Storm	Medium-High	Medium-High	Medium-High
Emerging Infectious Diseases**	N/A	High	Medium

Notes:
* The 2021 State of Maryland Hazard Mitigation Plan identifies this hazard as "Extreme Temperatures Hazard"
** The 2021 State of Maryland Hazard Mitigation Plan identifies this hazard as "Public Health Hazard"

The hazard rankings found within the *2021 State of Maryland Hazard Mitigation Plan* for Talbot County are based, in part, on Talbot County's ranking of hazards from their 2017 hazard mitigation plan. Additionally, State rankings are assessed and calibrated against all counties in Maryland, whereas the 2022 hazard rankings for Talbot County were assessed for the county only.

1.5 PUBLIC OUTREACH

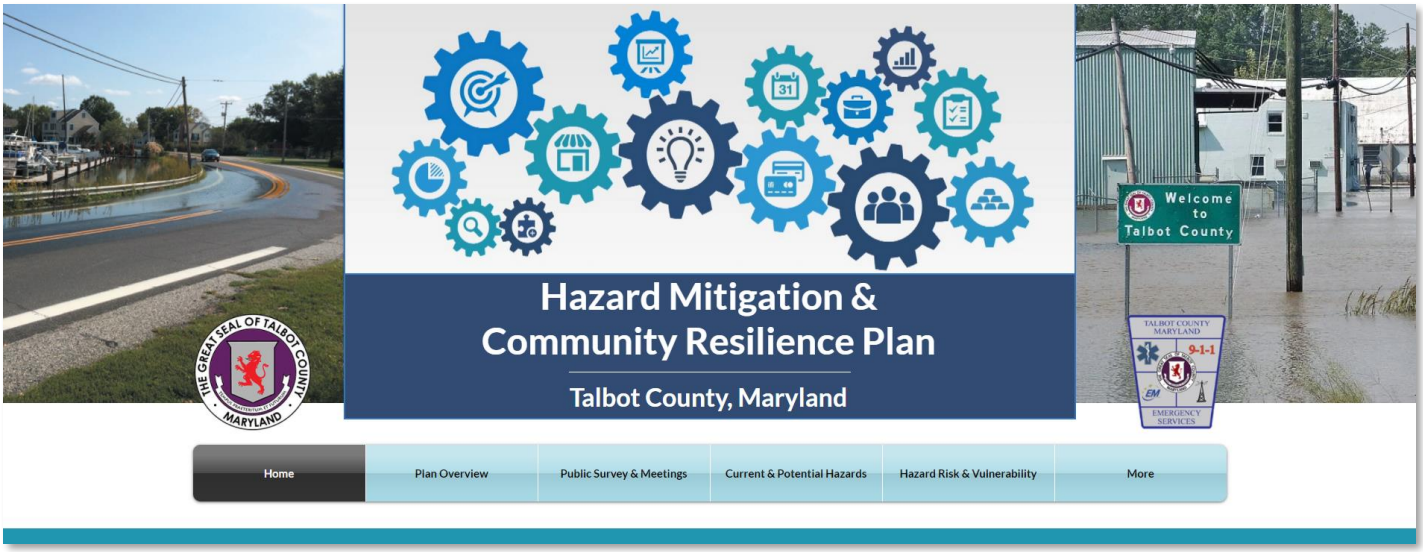
Public outreach is critical in the hazard mitigation planning process in the following ways: (1) describe issues of concern, (2) narrate hazard history, (3) prioritize proposed mitigation actions, and (4) provide ideas for ongoing public involvement. More than simply informing the public of the plan's development, a good public outreach strategy seeks to educate the public as well as motivate them to act. During this Plan Update, Talbot County created a project website, www.talbothazardplan.org, that allowed the public to learn about hazard mitigation, view the previous plan, stay up to date with the planning process, and provide important feedback. In addition, the website created an opportunity for stakeholders to provide their contact information and be added to a mailing list, as well as an area to submit questions and/or feedback. The project website proved to be critical for gathering feedback as the plan update cycle occurred during the COVID-19 global pandemic, thus severely limiting face-to-face interaction.

A full record of important meeting, training, and public outreach efforts is included at the end of this chapter. This table includes dates, intended audience, type of outreach, and other important information. This table is also available in *Appendix F: Public Outreach Documentation*.

1.5.1 PROJECT WEBSITE

Talbot County developed a project website during the plan update process: www.talbothazardplan.org. The website provided members of the public with the opportunity to review the previous plan, provide comment on the plan update, ask questions, stay up to date with meetings, and learn about hazard mitigation planning. The project website included a plan overview, public survey, meeting information, an overview of hazards included in the plan, hazard identification and risk assessment, and opportunities to provide feedback and comments.

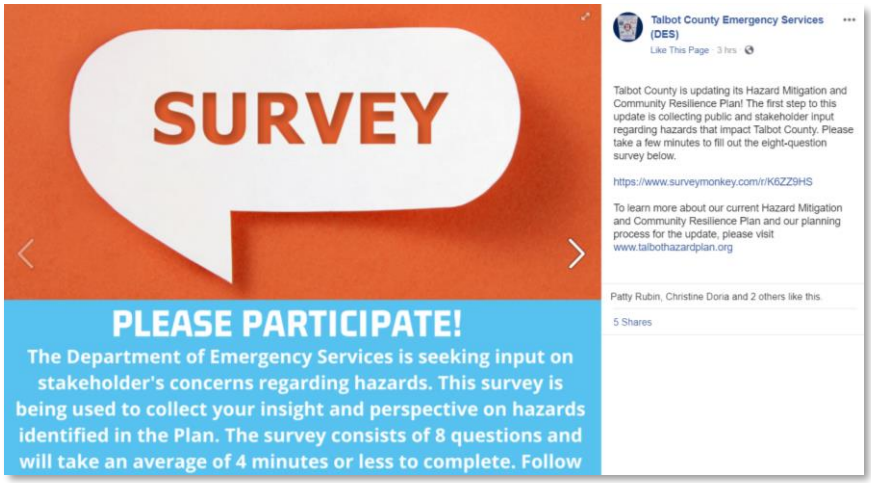
The website was updated with meeting information, hazard vulnerability and risk mapping, hazard mitigation information relevant to Talbot County, and the draft plan update, including associated feedback mechanisms. Public feedback was gathered in three ways: (1) via the project website's general contact form, (2) a public survey, and (3) a form created specifically to gather comments regarding the draft plan update. Both the public survey and the draft plan comment and review form included physical locations and/or paper options to better serve those with limited internet connectivity. The project website and the plan update process were both promoted via Talbot County's Department of Emergency Service's social media platforms. Sharing across departments and organizations was highly encouraged to increase public awareness and involvement.



1.5.2 PUBLIC SURVEY

As described in the previous section, a public survey was developed and placed on the project's website (www.talbothazardplan.org) to make it easily accessible to interested members of the public, as well as stakeholders. Additionally, survey stations were created at public locations within Talbot County to better serve all segments of the population. These stations included physical copies of the survey and a drop-off box to collect completed surveys. The public survey was promoted throughout the Plan Update process to stakeholders and via Talbot County's Department of Emergency Services social media. The survey consisted of the following eight questions/prompts:

1. Do you live in Talbot County?
2. If you live in a municipality, please indicate which community (Easton, Oxford, St. Michaels, Trappe, Queen Anne, Unincorporated).
3. Please indicate your level of concern for each hazard.
4. Please choose from the list below to indicate which hazard events you feel may particularly affect your community (check all that apply).



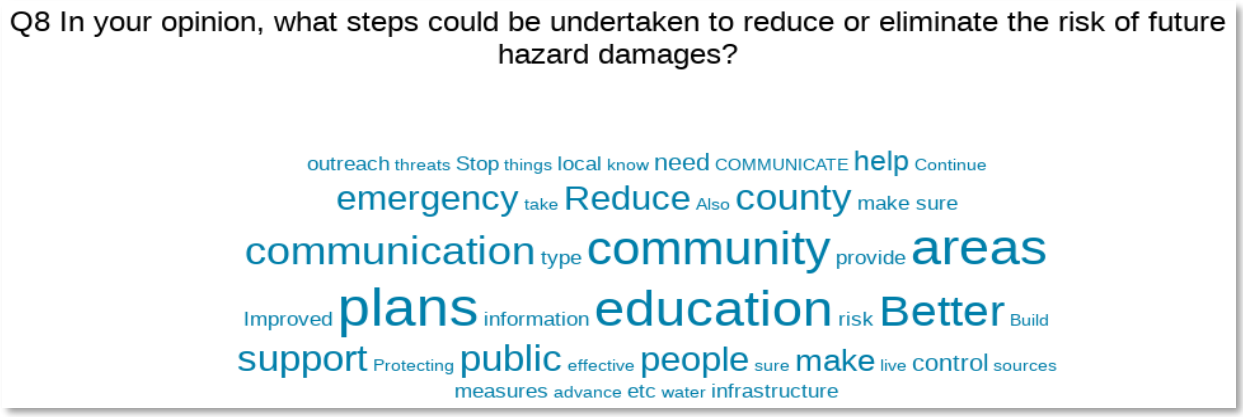
5. Are you concerned with any other hazards not identified in this survey?
6. In terms of social vulnerability, do you feel that a specific group or groups in the County are particularly at risk for or could be harmed by any of the hazard events listed in question 3? This could be due to age, location, occupation etc. This question is not intended to be limited to certain groups - we are eager to learn of any and all types and sizes of groups you think might be at particular risk.
7. Based on the group(s) you have selected in the previous question; please select which hazard events you feel may particularly affect those group? (Multiple options may be chosen.)
8. In your opinion, what steps could be undertaken to reduce or eliminate the risk of future hazard damages?

In total, 390 members of the public responded to the public survey (as of 02/23/2022). Of these responses, most (355) were from Talbot County's municipalities, including: Easton (155), Oxford (45), St. Michaels (36), Trappe (19), and Queen Anne (3). Total responses from unincorporated communities totaled 97, or 27.3% of the total responses. There were a total 26 responses from those indicating that they did not live in Talbot County.

Results from the survey were utilized in two important ways: (1) to determine public perception regarding which natural hazards impact the community the most, and (2) aiding in the creation of mitigation action items that are appropriate for Talbot County and its communities. For example, results from Question 8 of the public survey informed several mitigation action items included in *Chapter 11* of this plan update. Members of the public indicated that continued and increased communication and education efforts would help reduce or eliminate the risk from future hazard damages (see figure below). In response to public survey results, several mitigation action items were developed with the goal of improving public outreach and education. Mitigation action items (and their associated project #) with a communication and/or education component include:

- Public Outreach to Increase Support for Barrier Islands
- Winter Weather Education via Media
- Tornado Risk Public Outreach
- Promoting the construction of tornado and high-wind safe structures.
- Promoting Water Saving Practices Across Talbot County
- Emerging Infectious Diseases Community Preparedness Outreach
- Environmental Education and Resilience Opportunity
- Mass Communication Strategy
- Upgrades to Communication Infrastructure

Full results from the public survey are included in *Appendix G: Public Survey Results* of this plan update.



1.5.3 REGIONAL COLLABORATION

Talbot County and its stakeholders encouraged regional collaboration during this plan update process by attending meetings, sharing plan updates to a wider social media audience, and creating press releases in publications that serve the Eastern Shore.

The following activities occurred during the 2022 plan update process that served to educate the public regarding the plan update process and actively encouraged feedback from members of the public living in and outside Talbot County.

- LEPC Meeting – July 29, 2021 – The Hazard Mitigation Plan Update was presented at the LEPC meeting to inform and seek feedback.
- Press Release – July 30, 2021 – A press release made in The Star Democrat (a newspaper serving the Eastern Shore region) shows the plan update process, including project details and the project website. The press release encourages public participation and links to the public survey.
- Social Media Outreach – August 3, 2021 – Talbot County's Department of Emergency Services Facebook page created a post promoting the plan update, the project website, and the public survey.
- Eastern Shore Planners Meeting – August 17, 2021 – The Eastern Shore Planners Meeting discussed the Upper Eastern Shore Regional Recovery Plan and included a jurisdictional round table in which Talbot County announced that they are in the process of updating their hazard mitigation plan and solicited for strategic input regarding greater mitigation efforts on the shore.
- Social Media Outreach – September 27, 2021 – Talbot County's Department of Emergency Services Facebook page created a post promoting the plan update, the project website, and the public survey.
- Social Media Outreach – February 10, 2022 – The following post was made on Talbot County's Department of Emergency Services social media:

> "Please Share 📣 📲 📣 Talbot County is updating our Hazard Mitigation and Community Resilience Plan and we need your help!
>
> Mitigation is actions taken to reduce the risk from hazards that pose a threat to our area. Talbot County's Hazard Mitigation Plan takes into account the threats and hazards that pose risk to our area, the make-up of our county (geographically and culturally), and facets of our community that allow us to adapt and bounce back in order to create mitigation strategies for the next five years.
>
> Please take the time to visit our website and give us your feedback on our plan! https://www.talbothazardplan.org/ The entire draft plan and an insight into our planning process over the last year are available on our website. You can leave your comments directly here https://www.talbothazardplan.org/publicreviewcommentform
>
> For any questions, feel free to contact the Department of Emergency Services at 410-770-8160 or gschaffle@talbgov.org"

- Emergency Services Advisory Board – March 2, 2022 – The plan update was discussed as public feedback comments were disseminated to this group and their stakeholders. Discussion on critical facilities as it pertains to Emergency Services. Discussion on support of this plan and projects for the department in years to come. The Emergency Services Advisory Board represents municipalities and various organizations and geographic areas in the Eastern Shore.

1.6 PLAN ORGANIZATION

The first section of this plan, *Planning Area & Plan Development Process*, includes an introduction to the hazard mitigation process as well as a description of the hazard impact area (Talbot County). Section one is comprised of the following chapters:

- Chapter 1: Introduction
- Chapter 2: County and Municipal Profiles

Section two of this plan, *Hazard Identification, Profiles, Risk & Vulnerability*, describes the hazards identified by the Core Planning Team and the Hazard Mitigation Planning Committee that have impacted or have the potential to impact Talbot County. These hazards have been profiled and assessed for risk and vulnerability in the chapters that follow. This section includes the following chapters:

- Chapter 3: Hazard Identification & Risk
- Chapter 4: Coastal Hazards
- Chapter 5: Flood
- Chapter 6: Winter Storm
- Chapter 7: Tornado
- Chapter 8: High Wind & Thunderstorm
- Chapter 9: Drought & Extreme Heat
- Chapter 10: Emerging Infectious Diseases

Finally, the section three, *Mitigation Strategies, Plan Maintenance, & Implementation*, examines current municipal capabilities and identifies mitigation strategies that may be implemented to mitigate hazards and improve community resilience. These mitigation strategies will meet the goals and objectives outlined in *Chapter 11* upon implementation. This section is comprised of the following chapters:

- Chapter 11: Mitigation and Resilience Goals, Objectives, & Action Items
- Chapter 12: Municipal Synopsis & Perspective
- Chapter 13: Plan implementation & Monitoring

Table 1-5. Talbot County Hazard Mitigation Planning, Training, And Public Outreach Initiatives

Date	Meeting, Training, or Outreach Activity	Target Audience	Materials Provided	Comments/Input
05/17/21	Core Team Planning Meeting	Core Planning Team	WebEx Meeting, HMRP Planning Team/Stakeholder Listing, Handout	Discussed the update process, new content/ideas, stakeholder engagement and public outreach strategies. Identified members of the Plan Update stakeholder group.
05/26/21	HMRP Stakeholder Meeting #1	HMRPC Stakeholders	WebEx Meeting- Agenda & Meeting Notes (PDF)	The kick-off meeting highlighted the following: hazard mitigation overview, FEMA Plan requirements, project timeline, stakeholder responsibilities, the project website/social media, hazard risk survey, and development of action items and projects.
06/01/21	Stakeholder Survey	HMRPC Stakeholders	Survey Monkey Link	Stakeholders were requested to complete a survey to gather their unique perspective on hazards included in the Plan. Due June 15, 2021.
06/01/21	Mitigation Action Item Update Form	HMRPC Stakeholders	Fillable PDF Form	Stakeholders were tasked with completing a status update of existing mitigation action items from the 2017 HMRP, focusing on those items relating to their area of expertise. Due June 15, 2021
06/07/21	Email Reminder	HMRPC Stakeholders	Email	An email was sent reminding stakeholders of the deadline to complete the survey as well as the mitigation action item update form.
06/08/21	Data Request	Core Planning Team	Email	Photos of hazard events specific to Talbot County were requested for use on the project website.
06/18/21	Project Website Review Due Date	HMRPC Stakeholders, Core Planning Team	Notes and Comments from stakeholders	The project website will be updated based on stakeholder input and will be published when all changes are made.
07/01/21	Project Website Published	HMRPC Stakeholders, Public	Website Link	The project website, after stakeholder review, was published, indexed on google, and made available to the public.
7/27/2021	Small Group Meeting - Emerging Infectious Diseases	Core Team and Health Officials	Draft Emerging Infectious Diseases chapter provided as read-ahead	A small-group meeting was held with local health officials to discuss the development/draft of the newly created Emerging Infectious Disease chapter.
7/28/2021	News Submission	myeasternshoremd.com	N/A	Filled out a news submission form to have details of the HMRP Update distributed to the public via newsletter
7/28/2021	Project Website Update	Core Planning Team	N/A	Added a section called "FloodSmart: The Cost of Flooding" to the Hazard Risk and Vulnerability page. Linked to https://www.floodsmart.gov/flood-insurance-cost/calculator
7/29/2021	Regional Presentation	LEPC Members	Slideshow	Presented at Talbot's LEPC Meeting, discussed hazard mitigation and sought feedback.
7/29/2021	Social Media Material	Core Team, Planning Committee, Stakeholders	Image	Created an image meant to be shared on social media to advertise the Public Survey.
7/30/2021	Press Release	Public	Press Release, link to project website, link to public survey.	A press release in the Star Democrat (a newspaper serving the Eastern Shore region) shows the plan update process, including project details and the project website. The release encourages public participation and links to the public survey.
8/3/2021	Social Media Post	Public	Link to project website and public survey	Post on DES Facebook page promoting the project website and the public survey
8/17/2021	Regional Planning Meeting	Eastern Shore Planners	Survey, draft of the Upper Eastern Shore Regional Recovery Plan, and jurisdiction round table.	The Eastern Shore Planners Meeting discussed the Upper Eastern Shore Regional Recovery Plan and included a jurisdictional round table in which Talbot County announced that they are in the process of updating their hazard mitigation plan.

Table 1-5. Talbot County Hazard Mitigation Planning, Training, And Public Outreach Initiatives

Date	Meeting, Training, or Outreach Activity	Target Audience	Materials Provided	Comments/Input
8/18/2021	Municipal Questionnaire	Municipalities	Questionnaire/Packet	The Municipal Questionnaire was mailed to: Easton, Oxford, Queen Anne, St. Michaels, and Trappe. It included a one pager letter detailing the purpose of the questionnaire.
9/9/2021	Municipal Meeting	St. Michaels	Results of stormwater study conducted for the town	A WebEx was hosted with St. Michaels to discuss their municipal questionnaire answers and further discuss their current projects and action items.
9/9/2021	Sea Level Rise Commission – St. Michaels	St. Michaels Sea Level Rise Commission	N/A	Staff (and HMPC members) from the Town of St. Michaels updated their Sea Level Rise Commission on the hazard mitigation plan update process.
9/22/2021	HMRP Stakeholder Meeting #2	HMRPC Stakeholders	WebEx Meeting, Agenda and Meeting Notes (PDF)	Agenda: Hazard Mitigation Overview, Project Timeline, Plan Update Progress Report, Draft Natural Hazard Chapters, Outreach Activities (Municipal, Public, Social Media), Mitigation Action Items Status Update, Mitigation Action Items Workshop, Next Steps
9/24/2021	Social Media Image	Core Team, Planning Committee, Stakeholders	Image	Created an image meant to be shared on social media to advertise the Public Survey.
9/24/2021	Meeting Notes	Core Team, Planning Committee, Stakeholders	PDF	Meeting notes from the second stakeholder meeting were sent to the stakeholder group and uploaded to the project website.
9/27/2021	Social Media Post	Public	Link to project website and public survey	Post on DES Facebook page promoting the project website and the public survey
10/17/2021	Website Update	Public	Mapping Images	Shoreline Erosion, Social Vulnerability, and FEMA SFHA mapping for Talbot County was added to the website. The mapping was in relation to vulnerabilities such as structures, critical facilities, and population centers.
11/19/2021	HMRP Stakeholder Meeting #3	Core Team, Planning Committee, Stakeholders	In-person Workshop, Handouts, Agenda, PPT, Polls, Ranking Exercise	The stakeholders and HMPC met for an in-person Mitigation Action Item Workshop at the Talbot Community Center. HMPC members completed project sheets, provided feedback, and ranked action items for prioritization. Two new action items were added by Easton Utilities during this workshop.
12/16/2021	Core Team Planning Meeting THIRA	Core Team	WebEx, PowerPoint Presentation	Met with THIRA core planning team to discuss the planning process moving forward with THIRA. Set a date for the kick-off meeting at the beginning of January 2022.
12/17/2021	Website Update	Public	Mapping Images and Results	Added Culvert Inventory and Culvert Rating Maps (2) to the project's "Plan Update" section.
12/21/2021	Core Team Coordination	Geneva Schaffle	Email	Coordinated with Geneva Schaffle regarding dam safety outreach for the 4 low hazard dams located in Talbot County. Suggested that Scott Bass (Acting Director of MD Dam Safety Inspection and Compliance) be contacted for information regarding these dams and any potential concerns for Talbot County and recommendations or action items.
1/13/22	Website Update	Public	Draft Natural Hazard Chapters 4 through 10 and a Review Form	Draft Natural Hazard Chapters were uploaded to the project's website and a form one created to gather public feedback. Public comments gathered from the project's website were discussed by the HMPC for inclusion within the plan update. Updates were made as necessary based upon public feedback.
1/21/22	Website Update	Public	Draft Chapter 11: Mitigation and Resilience Goals, Objectives, and Action Items	The draft of Chapter 11: Mitigation and Resilience Goals, Objectives, and Action Items was uploaded to the project's website for public review and comment. Public comments related to mitigation strategies were review by the HMPC prior to inclusion in the HMRP. Updates based on public comment were made as necessary to Chapter 11.

Table 1-5. Talbot County Hazard Mitigation Planning, Training, And Public Outreach Initiatives				
Date	**Meeting, Training, or Outreach Activity**	**Target Audience**	**Materials Provided**	**Comments/Input**
2/2/22	Core Planning Team and Dam Safety Coordination	Core Team and County Dam Safety	Mapping of the 4 low hazard dams in Talbot County and their inundation areas.	Mapping was created for the four low hazard dams in Talbot County and updates related to dams in Talbot County were provided by Scott Bass, Acting Chief of Dam Safety Inspection and Compliance Division. Additional updates were provided by John Roche, Chief, Dam Safety Permits Division.
2/10/2021	Talbot County DES FB Page: Social Media Outreach	Public	Social media post with links to the project website and public comment form.	"Please Share 📣📲📣 Talbot County is updating our Hazard Mitigation and Community Resilience Plan and we need your help! Mitigation is actions taken to reduce the risk from hazards that pose a threat to our area. Talbot County's Hazard Mitigation Plan takes into account the threats and hazards that pose risk to our area, the make-up of our county (geographically and culturally), and facets of our community that allow us to adapt and bounce back in order to create mitigation strategies for the next five years. Please take the time to visit our website and give us your feedback on our plan! https://www.talbothazardplan.org/ The entire draft plan and an insight into our planning process over the last year are available on our website. You can leave your comments directly here https://www.talbothazardplan.org/publicreviewcommentform For any questions, feel free to contact the Department of Emergency Services at 410-770-8160 or gschaffle@talbgov.org"
2/10/2021	Public Plan Review	Public	Draft Plan	The public survey information was posted on the Town of Oxford's Facebook page in August of 2021 and was also posted within the Oxford Community News and Chat Group at the same time. The draft plan review invitation was posted on Oxford's website home page on February 10, 2022. Notices were provided.
2/10/2022	Email	Public and Stakeholders	Email (Draft Plan, project website link)	A link to the Draft Plan on the project website was sent to stakeholders, encouraging feedback and involvement in reviewing the plan update.
2/15/2022	Municipal Meeting	Town of Oxford	Critical and Public Facility Maps	The Town of Oxford discussed updates and modifications to their critical and public facilities represented within the draft plan. Updates were made to the facilities based upon feedback gathered during the call.
3/1/2022	Talbot County, Oxford, MDEM Mitigation Discussion	Talbot County, Town of Oxford, and Maryland	N/A	Meeting discussed preliminary questions from Oxford and Talbot County regarding mitigation projects to reduce risk to homeowners in flood zones within Oxford. Mitigation plan/action items were discussed along with funding sources.
3/2/2022	Emergency Services Advisory Board	Emergency Services Advisory Board and its stakeholders	N/A	The HMP was discussed as public feedback comments were disseminated to this group and their stakeholders. Discussion on critical facilities as it pertains to Emergency Services. Discussion on support of this plan and projects for the department in years to come.
3/2/2022	Email	Public and Stakeholders	Email (Draft Plan, project website link)	A link to the Draft Plan on the project website was sent to stakeholders, encouraging feedback and involvement in reviewing the plan update.

Chapter 2: County & Municipal Profiles

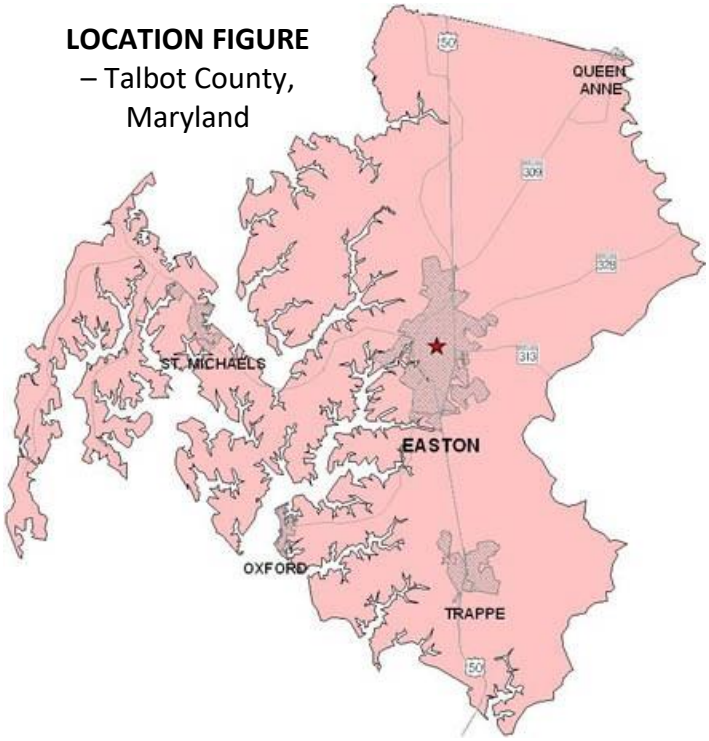
PLAN UPDATE

- All U.S. Census Bureau has been updated with 2020 data, including population, median age, median income, and other demographic data,
- Municipal overviews were updated with information from the most recent comprehensive plans and U.S. Census Data.

CHAPTER 2: COUNTY AND MUNICIPAL PROFILES

Talbot County is in Eastern Maryland on the Eastern Shore of the Chesapeake Bay. It is bordered to the north by Queen Anne's County, to the south by Dorchester County, to the west by the Chesapeake Bay, and to the east by Caroline County. The county is mostly rural but contains some higher-density development and commercial activity in the incorporated communities of Easton, Trappe, and St. Michaels. The county has 254 square miles of land area and a population of 37,782.

Some of the major industries in Talbot County include agricultural activities such as soybean, corn, and poultry farming, and maritime activities like seafood processing and harvesting, sailing, and fishing.



LOCATION FIGURE – Talbot County, Maryland

2.1 POPULATION

Talbot County's population is estimated to be among the lowest in the state, at 37,526 persons (U.S. Census, 2020). Between 1900 and 1950 Talbot County's population remained almost unchanged at under 20,000. The 1950s brought the opening of the first Chesapeake Bay Bridge marking the beginning of increased County and regional growth.

Table 2-1. Population Change 1950-2020

Census Year	Population	Change (+/-)	Percent Change	Percent of Annual Change
1950	19,428			
1960	21,578	+2,150	11.06	1.11
1970	23,682	+2,104	9.75	0.97
1980	25,605	+1,923	8.12	0.81
1990	30,541	+4,936	19.27	1.92
2000	33,812	+3,271	10.71	1.07
2010	37,782	+3,970	11.71	1.17
2020	37,526	-256	-0.68	-0.07
			Average Annual Growth 1950-2020	**0.99**

Source: U.S. Census Bureau

Between 1950 and 2010, the population increased from 19,428 to 37,782, representing an annual growth rate of 1.175 percent. The 2020 Census marks the first census to indicate a decrease in total population – a very slight decrease of 256.

Easton is considered Talbot County's population center, with a population of 17,101 persons, or 45.5 percent of the County's population, according to 2020 U.S. Census data.

Table 2-2. County & Municipal Population Distribution, 2020	
Talbot County Population	37,526
Municipalities	
Easton	17,101
Oxford	611
Queen Anne (pt.)	192
St. Michaels	1,049
Trappe	1,177
Total Municipal Population	20,130
Municipal Population Percent of County	53.6%
Source: U.S. Census Bureau	

The 2020 median age in Talbot County rose to 50.5 years, up from 47.4 in the 2010 Census. The statewide median age is 39.0 years, with just 15.9 percent of the population age 65 or older. Locally, some 10,595 persons, or about 29 percent of the County population, were reported to be age 65 or over.

Talbot County's relatively high median age is a function of a population that is aging in place, in-migration of retirees and out-migration of younger people. The U.S. Census - American Community Survey reports that just under one fifth (18.4%) of the County's population is less than 18 years of age. The total male and female population are somewhat evenly distributed through all age groups up to the age of 45, where women become a slightly larger proportion of each age group.

Information obtained from the *Maryland Food System Map* (2019) was reviewed. The county profile for Talbot County presents data compiled by the Maryland Food System Map Project, at the Johns Hopkins Center for a Livable Future. Notable information includes:

Table 2-3. Maryland Food System Food Profile – Talbot County		
Demographics	**Talbot County**	**Maryland**
Median Household Income (2013-2017 ACS Five-Year Estimate)	$65,595	$78,916
% Non-Hispanic (2013-2017 ACS Five-Year Estimate)	93.52%	90.44%
% White Alone (2013-2017 ACS Five-Year Estimate)	83.10%	56.62%
% Black or African American Alone (2013-2017 ACS Five-Year Estimate)	11.60%	29.72%
% Asian Alone (2013-2017 ACS Five-Year Estimate)	1.40%	1.53%
% Hispanic (any race) (2013-2017 Five-Year Estimate)	6.48%	9.56%
% Individuals Below 185% of Federal Poverty Level, (2013-2017 ACS Five-Year Estimate; Household of 4=$44,123)	22.62%	20.57%
% Individuals Below 200% of Federal Poverty Level (2013-2017 ACS Five-Year Estimate; Household of 4=$47,700)	24.36%	22.64%
Food Availability – Food Access	**Talbot County**	**Maryland**
% Population Living in USDA Low Income Low Access, 2010	24.00%	27.61%
% Population that is Food Insecure, 2017	9.00%	10.70%
Source: Maryland Food System Map Data Summary (up to date as of November 2019)		

USDA described households with very low food security as "food insecure with hunger" and characterized them as households in which one or more people were hungry at times during the year because they could not afford enough food. During a prolonged hazard event, those households that are classified as food insecure are especially vulnerable because they lack the capacity to maintain on-hand food supplies in the event of a disaster incident.

Food insecurity is determined by factors that are often considered in measuring social vulnerability, including (but not limited to): median household income, poverty rates, homeownership, and race and ethnicity. Social vulnerability, according to the Centers for Disease Control and Prevention (CDC), 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. Socially vulnerable populations are especially at-risk during public health emergencies because of factors like socioeconomic status, household composition, minority status, or housing type and transportation.[1]

More information related to social vulnerability in Talbot County is included in *Chapter 4: Coastal Hazards* and *Chapter 5: Flood*. Aspects of social vulnerability are included in the conclusions of natural hazard chapters throughout this plan, particularly in relation to Talbot County's "Health, Safety, and Welfare" pillar.

2.2 CLIMATE

Although Talbot County has a continental climate, temperature fluctuations over the year are moderated by the county's proximity to the Chesapeake Bay and Atlantic Ocean. Temperatures range from average of 77°F in the summer to an average of 39°F in the winter. In general, the terrain in Talbot County is flat due to its location on the Atlantic Coastal Plain.

2.3 LAND USE TRENDS

According to the 2016 Talbot County Comprehensive Plan, Talbot remains by design one of Maryland's sparsely populated rural counties, despite development pressures brought on by regional trends and a growing number of individuals, retirees and small families settling in the area. The County is projected to continue to age with little growth in its work force.

Long-standing land use policies have protected farmland and open space from development and retained the County's rural character. Agriculture remains an important and viable industry in part because fragmentation of farm landscapes has been discouraged. Talbot is a comparatively prosperous County. Though some poverty exists, incomes of most residents are adequate to meet their needs.

According to the Maryland Department of Business and Economic Development, unemployment in the County is nearly equal to the State average. Hospitality businesses, medical services, education and government are important employers.

2.4 MUNICIPAL OVERVIEWS

The following municipal overview provides perspective on the individual communities within Talbot County.

2.4.1 Town of Easton

The Town of Easton is located on the Tred Avon River in the central part of Talbot County. In 2020, the city had a population of 17,101. Easton is the largest incorporated community in Talbot County and acts as the county seat. U.S. Highway 50 is the major highway going through the town and connects it to other urban centers on Maryland's Eastern Shore. Easton has a dense and historic downtown with many shops, restaurants, government buildings, and other businesses, which makes it an important center for commercial activity and tourism in Talbot County.[2]

2.4.2 Town of Oxford

The Town of Oxford is in Southwestern Talbot County where the Tred Avon River meets the Chesapeake Bay. In 2020, Oxford had a population of 611. The primary road going through the town is State Route 333, which connects it to the Town of Easton. The town's location on the Chesapeake Bay makes it a local center for maritime activity in Talbot County, and it attracts visitors and tourists who seek a quiet and charming small town away from the larger urban centers in the region.[3]

2.4.3 Town of Queen Anne

The Town of Queen Anne is in Northeastern Talbot County on Tuckahoe Creek. In 2020, Queen Anne had a population of 192. It is a multi-county community that is split between Queen Anne's and Talbot County. The major roads going through the Queen Anne include State Routes 303, 309, and 404, which all converge near the center of town. The town of Hillsboro, in Caroline County, is located adjacent to Queen Anne on the opposite side of Tuckahoe Creek.[4]

2.4.4 Town of St. Michaels

The Town of St. Michaels is in Western Talbot County on the Miles River, which flows into the Chesapeake Bay. In 2020, St. Michaels had a population of 1,049. The primary road going through the town is State Route 33, which connects it to the Town of Easton and other urban centers on Maryland's Eastern Shore. For most of its history, the economy of St. Michaels was focused on the shipbuilding and seafood processing industries. In recent years, tourism has become a major industry in St. Michaels because of the town offers a wide variety of maritime activities for visitors and has vibrant waterfront and downtown areas. St. Michaels is also home to the Chesapeake Bay Maritime Museum.[5]

2.4.5 Town of Trappe

The Town of Trappe is in Southeastern Talbot County near La Trappe Creek. In 2020, Trappe had a population of 1,177. The primary road going through the town is U.S. Highway 50, which connects it to the City of Cambridge to the south and the Town of Easton to the north. Trappe was founded sometime between 1750 and 1760, although the Maryland General Assembly did not officially incorporate the town until 1856.[6]

2.5 COMPREHENSIVE PLANNING AND HAZARD MITIGATION

2.5.1 Talbot County Comprehensive Plan

The 2016 Talbot County Comprehensive Plan was adopted by the County Council on June 7, 2016, effective August 6, 2016.

The updated Talbot County Comprehensive Plan contains a section on Hazard Mitigation Plan on pages 4-4 thru 4-7 and integrates goals, objectives, and implementation priorities from the Hazard Mitigation Plan into the new Comprehensive Plan. Furthermore, the Plan contains information on Coastal and Climate Hazards, Sea Level Rise Projections, and Community Resilience.

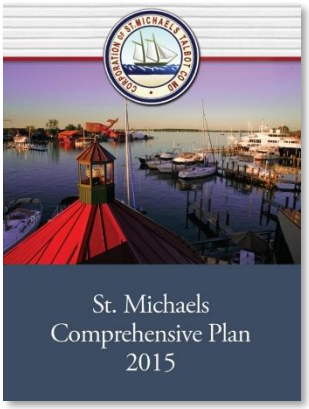
The comprehensive planning process determines community goals, aspirations, development, and preservation. The Comprehensive Plan guides public policy for many complex issues including land use, transportation, extension of utilities and public services, preservation, use, and protection of natural resources, development, tourism, and community design, among many others. The Comprehensive Plan covers the entire County and addresses a broad range of topics and long-term goals.

As declared in its Vision Statement, "The primary goal of Talbot County's Comprehensive Plan is to promote a high quality of life, to preserve the rural character of our County and to protect the health, safety and well-being of its citizens, in a resilient community."

Municipalities that exercise planning and zoning authority within Talbot County include:

- Easton
- Oxford
- St. Michaels
- Trappe

2.5.2 St. Michaels Comprehensive Plan



The St. Michaels Comprehensive Plan was adopted on October 28, 2015. The Plan includes some elements that can easily be integrated and/or displays plan integration principals such as: Environmental Resources and Sensitive Areas, Water Resources, and Climate Resilience. Excerpts from the Chapter 14: Climate Resilience states:

"The Town of St. Michaels recognizes the challenges associated with being a coastal community on the east coast with low sea-level, high-water tables and hurricane risks. The Town has experienced numerous weather-related events that have debilitated the basic functions of the Town including Hurricane Isabel and Sandy. Namely flooding associated with heavy storm events and high tides in the past, the Town has taken many preventative measures to reduce flooding including duckbills in some storm drains that terminate in areas of high tide."

St. Michaels has also adopted code requirements in the floodplain for additional freeboard venting. The Town has also partnered with Talbot County to adopt a Hazard Mitigation Plan and evacuation route for the Bay Hundred area. Vision statement from St. Michaels Comprehensive Plan, *Chapter 14: Climate Resilience:*

"St. Michaels shall evaluate vulnerabilities in the Town and look for opportunities to reduce risk associated with climate change, energy consumption and sea level rise."

2.5.3 The Town of Easton Comprehensive Plan

The 2010 Easton Comprehensive Plan establishes Town policies relative to the most desirable development patterns for Easton and environs. It identifies in both narrative and graphic form proposed areas for living and working activities and related services that are required to assure a quality environment for all residents. Implementation proposals are included as methods for coordinating public and private development activities, which together will influence Town development form and function. Attention is also given to the Towns' role in the development of Talbot County.

The Plan details impacts that contribute to changes in the Town's identity, one of which includes, impacts to public safety, especially during severe storms and catastrophic storm events. Noted within the Town's Plan:

"The extensive system of Environmental Protection regulations already in place including Easton's Critical Area Program, Forest Conservation Ordinance, Floodplain Ordinance and Storm Water Management Ordinance provide a high level of protection to several sensitive areas, including those identified by the Growth Act."

The following are discussed in detail within the Sensitive Areas Element of the Plan:

- Streams and Their Buffers
- 100-Year Floodplain
- Steep Slopes (along rivers and streams)
- Agriculture and Forest Land

Goals and objectives within the plan include directing future development away from sensitive areas and encouraging new and innovative stormwater runoff techniques.

The Town of Easton is currently in the process of updating their Comprehensive Plan – it is expected to be completed in Spring of 2023.

2.5.4 The Town of Oxford Comprehensive Plan

The 2010 Town of Oxford Comprehensive Plan includes a Sensitive Areas Element and discusses the following:

- 100-Year Floodplain
- Streams and Stream Buffers
- Nontidal Wetlands
- Critical Areas
- Waterways

According to the Oxford's Plan much of the existing Town is in the 100-year flood zone identified on the federal flood maps. Oxford is a historic waterfront town that was settled along the waterfront in the late 1600's. It has weathered its historic location for over 300 years. Significant portions of the Town experience flooding during heavy storms characterized by unusually high tides. To ameliorate flooding of low-lying areas with the 10-to-20-year storm, the Town has installed tide gates in four locations around of Town to facilitate control of tidal flooding and dewatering of excessive rainfall. The tide gates are located at Pier Street, near the U.S. Post Office on Banks Street, Mill Street, and at the Causeway. The areas of

tidal wetlands in Town adjacent to Bachelor Point Road have been protected with covenants against future development and are classified under the most restrictive critical area classification (Resource Conservation Area or RCA) and the most restrictive Town zoning classification, which is WSWC Wildlife Sanctuary/Wildlife Conservation Zoning District.

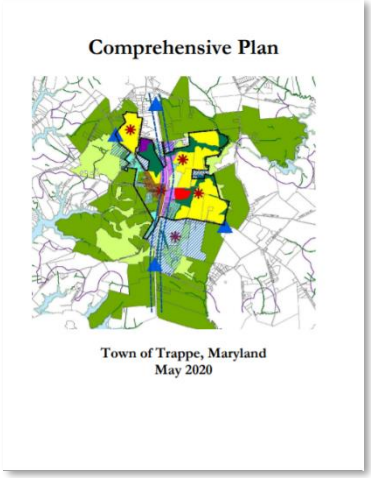
For all new commercial or residential construction, the Town has mandated compliance with federal flood elevation requirements.

2.5.5 The Town of Trappe Comprehensive Plan

The 2020 Town of Trappe Comprehensive Plan includes a Sensitive Areas Element and discusses the following:

- Streams and Stream Buffers
- Nontidal Wetlands
- Critical Areas

Storms drains and flooding issues are discussed within the Plan. The following is an excerpt from the May 2020 Plan, page 55:



"The Town will continue to work to address long-standing drainage problems in cooperation with Talbot County. The Town will develop a plan in concert with Talbot County to preserve streams and improve drainage ditches in the Town and the planning area. Our storm drains consist of roadside ditches and pipe culverts that convey stormwater runoff into streams that flow to La Trappe Creek and Miles Creek. The crossings under US 50 (Ocean Gateway) have been inadequate to handle several storms, resulting in flooding of lawns and low-lying properties. That situation improved with the cleaning of the ditch on the East side of US 50. Other areas of Town are subject to periodic flooding, notably Harrison Circle."

[1] www.atsdr.cdc.gov/placeandhealth/svi/at-a-glance_svi.html
[2] U.S. Census Bureau, 2020; Town of Easton Comprehensive Plan, 2010
[3] U.S. Census Bureau, 2020; Town of Oxford Comprehensive Plan, 2010
[4] U.S. Census Bureau, 2020
[5] U.S. Census Bureau, 2020; St. Michaels Business Association, 2016
[6] U.S. Census Bureau, 2020; Town of Trappe Comprehensive Plan, 2020

Chapter 3: Hazard Identification & Risk

PLAN UPDATE

- The 2022 Hazard Mitigation Plan Update process included a hazard identification and risk assessment (HIRA) for nine natural hazards.
- The Hazard Mitigation Planning Committee added a new natural hazard during this plan update process; Emerging Infectious Diseases.
- Four of these natural hazards were determined to be “High” risk in Talbot County because of the HIRA process.
- In addition to the natural hazards assessed during this plan update, a separate threat identification and risk assessment appendix was completed for three threats; active assailant, complex coordinated terrorist attack, and cyber-attack.
- Natural hazards have been defined within this chapter, including the newly added Emerging Infectious Diseases.

CHAPTER 3: HAZARD IDENTIFICATION & RISK

As part of the 2022 Hazard Mitigation Plan Update process for Talbot County, a Hazard Identification and Risk Assessment (HIRA) was completed. Results from both the **Hazard Risk Survey** completed by Hazard Mitigation Planning Committee Members (HMPC) and the **Public Survey** completed by members of the public have been integrated into the updated HIRA.

Nine (9) natural hazards were identified by HMPC members, and a hazard risk rating has been assigned to each. Only natural hazards were included in this assessment as these hazards lend themselves better to data collection related to geographic extent than technological and man-made hazards. A separate risk assessment (THIRA) will be conducted for the technological and man-made hazards (i.e., Complex Coordinated Terrorist Attack, Active Assailant, and Cyber Attack) that have been added for this Plan Update.

As of a result of the completed HIRA, the following nine natural hazards have been identified and ranked by Talbot County during the 2022 planning process. These hazards include:

1. Coastal Hazards
   - Tropical Cyclones
   - Storm Surge
   - Nor'easters
   - Sea Level Rise
   - Shoreline Erosion
2. Flood
   - Coastal/Tidal
   - Riverine
3. Winter Storm
   - Snow, Freezing Rain & Sleet
   - Extreme Cold
4. Tornado
5. High Wind
   - Synoptic-Scale Winds
   - Thunderstorm Winds
6. Thunderstorm
   - Hail
   - Lightning
7. Drought
8. Extreme Heat
9. Emerging Infectious Diseases

Coastal Hazards, Flood, Extreme Heat, and Emerging Infectious Diseases have been identified as Talbot County's "High Risk" hazards and are highlighted in blue.

Full results of the HIRA and the methods utilized are included in *Appendix A: Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables.*

Note: Chapters 4 through 10 within Section 2 have been organized by hazard type and include profiles, risk, and vulnerability.

3.1 HAZARDS DEFINED

The following nine identified hazards have been defined:

3.1.1 Coastal Hazards

Coastal hazards take many forms and include immediate hazards such as **tropical cyclones** (i.e., hurricanes, tropical storms, and tropical depressions) and **nor'easters** to long-term threats such as **shoreline erosion** and **sea-level rise.** Therefore, coastal hazards are to include, if applicable, **tropical**

cyclone, storm surge, nor'easter, sea-level rise, and shoreline erosion.

3.1.2 Flood

The National Weather Service defines flooding as the inundation of land areas along the coast caused by waters over and above normal tidal action that may originate from the ocean front, back bays, sounds, or other bodies of water. Flooding can be categorized as non-tidal (flash, riverine), tidal (from storm surges and tides), and coastal.

1. Flash flooding results from a combination of rainfall intensity and duration and is further influenced by local topography and the ground's capacity to hold water.

2. Riverine flooding is caused by persistent moderate or heavy rain over one or more days, sometimes combined with snowmelt, causing a river to slowly rise and overflow its banks.

3. Coastal flooding occurs when normally dry, low-lying land is flooded by seawater. The extent of coastal flooding is a function of the elevation inland floodwaters penetrate which is controlled by the topography of the coastal land exposed to flooding.

3.1.3 Winter Storm

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

3.1.4 Tornado

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

3.1.5 High Wind

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

3.1.6 Thunderstorm

Thunderstorms are generally 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.

3.1.7 Drought

Droughts are periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in precipitation or stream flow. Although maintaining water supplies for human use is an important aspect of drought management, drought can also have many other dramatic and detrimental effects on the environment and wildfire.

3.1.8 Extreme Heat

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground.

3.1.9 Emerging Infectious Diseases

The *Maryland Department of Health's Emerging Infectious Plan* defines emerging infectious diseases as the following:

a) An infectious disease that is novel or new to a geographic area;
b) An existing infectious disease that is causing a marked increase in cases or geographic spread; or,
c) A biological agent used to cause harm or death in a population (bioterrorism).

3.2 CRITICAL AND PUBLIC FACILITIES

To assess the current risk and vulnerability of the community, an inventory of critical and public facilities in the County was performed. Critical and public facilities are those facilities that warrant special attention in preparing for a disaster and/or are of vital importance in maintaining the functioning of the community.

The 2017 Critical and Public Facility Database developed for the 2017 Hazard Mitigation Plan was referenced and updated for the 2022 Plan Update. Data was obtained from the Mark Cohoon, Talbot County GIS Manager, and Maryland PropertyView to aid in the development of the 2022 Talbot County Critical and Public Facilities database. The 2022 update of the Critical and Public Facility Database included the addition of nine (9) new facilities; five (5) within the Town of Oxford and four (4) within the Town of Easton, as follows:

- Saint Peter and Paul High School (Easton)
- Calvert Pumping Station (Easton)
- Chapel East Pumping Station (Easton)
- Easton Club East Pumping Station (Easton)
- Bachelors Harbor Pumping Station (Oxford)
- Bank Street Pumping Station (Oxford)
- Bonfield Pumping Station (Oxford)

- Causeway/Oxford Road Pumping Station (Oxford)
- Wastewater Treatment Plant (101 JL Thompson Dr, Oxford)

3.3 CRITICAL AND PUBLIC FACILITIES DATA COMPILATION

The inventory of critical and public facilities for the 2022 Talbot County Hazard Mitigation and Community Resilience Plan has been compiled as listed in the table below. The detailed critical and public facility database has been included in *Appendix C: Critical and Public Facility Database*.

Table 3-1. Critical and Public Facilities Data Compilation

Facility Category	Facility Type	Total Facilities per Type	Total Facilities per Category
County Owned	Airport	1	28
	Community Center	1	
	Dock	8	
	Housing Authority	1	
	Library	2	
	Museum	3	
	Office	4	
	Parks and Recreation	6	
	Plane Hangar	2	
Education	Public	10	27
	Private	10	
	Community	3	
	Special Needs	4	
Emergency	Emergency Operations Center	1	18
	Emergency Medical Services Station	1	
	Fire Station	8	
	Police Station	8	
Medical	Assisted Living	4	90
	Hospital & Urgent Care	5	
	Nursing Home	3	
	Office	68	
	Retirement Center	3	
	Senior Housing	4	
	Special Needs	3	
Miscellaneous	Marina	19	22
	Storage Yard	3	
Municipal	Housing Authority	10	32
	Office	4	
	Parks and Recreation	3	
	Public Works	8	
	Community Center	1	
	Library	1	
	Museum	5	
Utility	Electric	9	90
	Gas	1	
	Gas & Oil	11	
	Pumping Station	14	
	Substation	6	
	Telephone	8	

Table 3-1. Critical and Public Facilities Data Compilation			
Facility Category	**Facility Type**	**Total Facilities per Type**	**Total Facilities per Category**
	Tower	23	
	Water Tower	8	
	Water Treatment Plant	3	
	Wastewater Treatment Plant	7	
	TOTALS:	307	307
Source: Appendix C: Critical and Public Facility Database.			

The number of critical facilities total 55 and those designated as public facilities total 252. Of the 307 facilities listed within the database, 40 facilities are within the special flood hazard area (i.e., 1-percent annual chance flood zone and the 0.2-percent annual chance flood zone). In addition, 56 facilities were built in or prior to 1965. This dataset was used throughout the various hazard vulnerability assessments within the Plan Update.

Chapter 4: Coastal Hazards

PLAN UPDATE

- Page 4– Text was added to Section 4.2 describing the composite scoring method utilized to measure risk for coastal hazards. The current risk score for this hazard is "High". See *Appendix A* for more information related to Hazard Identification and Risk Assessment.
- Page 5 – Updated the coastal events, tropical storm, and coastal flooding risk assessment tables with the latest data from NCEI Storm Events Database.
- Page 14 – Updated text to represent most recent report, *Sea-level Rise Projections 2018.* Added a figure with sea-level rise projections under three different scenarios in the next 100 years.
- Page 15 – Section 4.5.1 – integrated new facilities into the Critical and Public Facility Database, including the new St. Peter and Paul High School location.
- Page 16 – Added text and a figure describing the Coast Smart Climate Ready Action Boundary, which was utilized to determine critical facilities impacted by sea-level rise during this plan update.
- Page 17 – Vulnerability analysis were updated for Critical Facilities impacted by sea-level rise were updated with the newer Climate Ready Action Boundary.
- Page 20 – Added a table to section 4.6.1, depicting the Erosion Rate ranking system utilized by the Shoreline Hazard Index.
- Page 20 – Calculated the "percent of total shoreline" and added it as a column to the Talbot Shoreline Erosion Rate table.
- Page 21 – Updated the Shoreline Erosion Rates: High and Very High map with the latest available data.
- Page 23 – Added a new Social Vulnerability section to the chapter's "Health, Safety, and Welfare" conclusion.
- Page 24 – Added the Social Vulnerability and Category 3 Storm Surge map in associated with the new Social Vulnerability section.
- Page 26 – Updated Section 4.7.4 Infrastructure with new conclusions related to the benefits of green infrastructure, while highlighting Talbot County's "Cleaner, Greener, Talbot" Plan.

CHAPTER 4: COASTAL HAZARDS

Talbot County has withstood damaging coastal hazards in the past, notably Hurricane Isabel in 2003. According to the *Hurricane Isabel Rapid Response Coastal High Water Mark Collection*, the hurricane caused record-breaking tide and a storm surge, with the highest flood elevation recorded of 5.54 feet in Talbot County.[1] Peak winds reached 58 mph and 2.97 inches of rain was recorded in St. Michaels. Tropical Storm Hanna brought heavy rain, strong winds, and some tidal flooding to the Eastern Shore during the day and into the evening of the September 6, 2008. Other notable coastal storms include the 1962 and 2000 Nor'easters. The1962 Nor'easter impacted Tilghman Island and resulted in high tides that were four feet above normal flood stage; additionally winds up to 70 mph were recorded. Another Nor'easter on January 25, 2000, brought between 12 and 16 inches of snow to the county.

Coastal hazards take many forms and include immediate hazards such as **tropical cyclones** (i.e., hurricanes, tropical storms, and tropical depressions) and **nor'easters** to long-term threats such as **shoreline erosion** and **sea-level rise.** The following coastal hazards have been identified by Talbot County and assessed in this chapter.

1. **Tropical Cyclone** is a general term for tropical storms and hurricanes; these are low pressure systems that usually form over the tropics, referred to as "cyclones" due to their rotation. Hurricanes are an intense type of tropical cyclone with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. Tropical storms are organized systems of strong thunderstorms with a defined circulation and maximum sustained wind of 39 to 73 mph (34-63 knots).
2. **Storm Surge** is the rise in water level above the regular high tide caused by a severe storm such as a hurricane or nor'easter. These storms bring rain and heavy wind, which drives larger waves and can blow water up the Chesapeake Bay, thus causing the rivers to rise. Storm surges can create extensive storm damage, erosion, and inundation of low-lying coastal areas.
3. **Nor-easter** is a cyclonic storm that moves along the east coast of North America. It is called "nor'easter" because the winds over coastal areas blow from a northeasterly direction.
4. **Sea-level Rise** is an increase in the level of the world's oceans because of global warming. Burning fossil fuels is one of the causes of global warming because it releases carbon dioxide and other heat-trapping gasses into the atmosphere. The oceans then absorb most of this heat. As water becomes warmer, it expands. This results in ocean levels rising worldwide.
5. **Shoreline Erosion** is caused by many variables, such as storm surges of higher-than-normal tides, and wind driven waves; sea-level rise, which causes higher tides than in decades past; boat wake; as well as upland runoff from rainstorms. Shoreline erosion can threaten the integrity of existing structures, roads, and utilities and has adverse impacts to water quality and wildlife habitat.

"Coastal communities and the ecosystems that support them are increasingly threatened by the impacts of climate change. Without significant reductions in global greenhouse gas emissions and regional adaptation measures, many coastal regions will be transformed by the latter part of this century, with impacts affecting other regions and sectors. Even in a future with lower greenhouse gas emissions, many communities are expected to suffer financial impacts as chronic high-tide flooding leads to higher costs and lower property values."

- Fourth National Climate Assessment

4.1 COASTAL HAZARD IMPACTS

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of the Plan Update process, stakeholders were provided an opportunity to review and modify information within the table. Results were reviewed and finalized during the Hazard Mitigation Planning Committee meeting held on September 22, 2021. The following table provides impacts from coastal hazard events to Talbot County per Community Pillar.

4-1. Hazard Impact Table

Coastal Hazards	
Health, Safety, and Welfare	• Economic development – impacts tourism and real estate (tax income). • Environmental – impacts silt and runoff into bay. • Early warning system, evacuation, and holdouts.
Economic Stability	• Increased threat (rise is perceived) would have a negative impact on property values and all related industries. • Destruction of infrastructure would have long-term impacts on tourism and economic development. • Damage to structures could force long-term closures and business interruptions. Lack of work/no salaries. • Limit access of emergency response to residential and business areas. • Sea-level rise will impact loan real estate values over time and limit land use. • Sea-level rise will negatively impact businesses, homes, and farms located near shorelines, especially our marinas and boat builders. • Increased insurance costs for business operations.
Education	• Renewable energy distributed locally is vital to resilience. • There is an opportunity to educate all grade levels, including college and professionals on coastal hazards. **Infrastructure (Wind & Water):** • Power failure. • Damage to facilities (over Category 1 Storms). • Facilities are used as emergency shelters. • EHS: full sized generator can run 2-3 days of continuous operation (lights & A/C). **Transportation:** • TCPS might need to use buses to move residents (up to 3500 persons at a time). **Service Interruptions:** • No school on hurricane days. **Chesapeake College:** • Glass and glass structures are a concern. • Generators on approximately 2 buildings: battery back-up coming for kitchen/student center.
Infrastructure	• Submerged roads and bridges create impacts to evacuation. • Damages to roads and bridges lead to long term closures. • Communication – wind related O.H. impacts. • Power – wind related "overhead impacts" O.H. line impacts. • Water – by virtue of power loss. • Sewer – direct flooding impacts (Tilghman Plant) and power loss.
Environmental	• Hurricanes can cause crab populations to move to different parts of the bay impacting fisheries. • Impacts to septic systems, underground storage tank, water and soil contamination. • Loss of existing shorelines (bulkheads and living shorelines). • Loss of submerged aquatic vegetation; loss of crab/fish habitat. • Loss of land mass, edge erosion (habitat and wave protection). **Sea-level Rise:**

4-1. Hazard Impact Table	
Coastal Hazards	
	• Increased debris/marine debris. • Decreased effectiveness of stormwater management infrastructure. • Loss of agricultural working lands and forests near shoreline. • Loss of wetland habitat. • Saltwater intrusion into groundwater (irrigation sources). **Climate Change**: • Stronger Hurricanes-increased storm surge.
Source: Talbot County Hazard Mitigation & Community Resilience Stakeholder Committee	

4.1.1 PROBABILITY OF FUTURE COASTAL HAZARD EVENTS

According to the 2018 National Climate Assessment Overview regional impacts for the Northeast Region are as follows:

> "Water, energy, and transportation infrastructure are affected by snowstorms, drought, heat waves, and flooding. Cities and states throughout the region are assessing their vulnerability to climate change and making investments to increase infrastructure resilience."[2]

According to *Sea-level Rise Projections for Maryland 2018*, it is considered likely that Maryland will experience a relative rise in mean sea-level of 0.8 feet to 1.6 feet between 2000 and 2050. There is about a one-in-twenty chance it could exceed 2.0 feet and about a one-in-one hundred chance it could exceed 2.3 feet. Later this century, rates of sea-level rise increasingly depend on the future pathway of global emissions of greenhouse gases during the next sixty years. If emissions continue to grow well into the second half of the 21st century, the likely range of sea-level rise experienced in Maryland is 2.0 to 4.2 feet over this century, two to four times the sea-level rise experienced during the 20th century.[3]

Maryland's sea-level rise is higher than other parts of the world due to land subsidence (gradual sinking of the earth's surface) from postglacial rebound (the rise of land masses which were once depressed by a glacier), and groundwater extraction. Inundation of tidal waters over low-lying coastal areas is already occurring. Sea-level rise may also cause saltwater intrusion into freshwater aquifers.[4]

Climate change is causing higher storm tides, which are the cumulative flooding effect of long-term sea-level rise and the temporary storm surge caused by coastal storm. Talbot County acknowledges the likelihood of the increasing probability of future coastal hazard events.

4.2 TROPICAL CYCLONE RISK & VULNERABILITY

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

- Hurricane: maximum sustained surface wind speed exceeds 73 mph
- Tropical Storm: maximum sustained surface wind speed from 39-73 mph
- Tropical Depression: maximum sustained wind speed is less than 39 mph

Tropical cyclones, a general term for tropical storms and hurricanes, are low pressure systems that usually form over the tropics, referred to as "cyclones" due to their rotation. Tropical cyclones are

among the most powerful and destructive meteorological systems on earth. In terms of impact, high winds, heavy rain, lightning, tornados, hail, and storm surge are all associated with tropical cyclones. In addition, as tropical cyclones move inland, they can cause severe flooding, downed trees and power lines, and structural damage.

Hurricanes are rated for intensity by using the Saffir-Simpson Scale, which provides an estimate of the potential damage that a hurricane may cause. This scale is based upon both wind speed and surface pressure. Scale categories range from category one to five, with category one having winds from 74-95 mph and pressure greater than 980 mb, while a category five hurricane may have winds more than 157 mph and pressure of less than 920 mbar. The table below depicts the five categories of hurricane strength.

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

Source: National Hurricane Center, 2012

To assess coastal hazard risk, a composite score method was utilized. The composite score method was based on a blend of quantitative and qualitative factors extracted from the National Centers for Environmental Information (NCEI), a stakeholder survey, and other available data sources. These included:

- Historical impacts, in terms of human lives and property
- Geographic extent
- Historical occurrence
- Future probability
- Community perspective

Based on this method, the coastal hazard was assigned a ranking of "High" during the 2022 Plan Update. This is consistent with the hazard's ranking during the 2017 planning cycle. Detailed information is available within *Appendix A: Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables.*

The following tables represent the data that was utilized within the composite scoring method developed to assess risk for coastal hazards. Reported information from the National Center for Environmental Information (NCEI) Storm Events Database for "Coastal Hazards" included the

following NCEI categories: Tropical Storm and Coastal Flooding. The timeframes covered by the NCEI data used is from 08/11/1950 through 05/31/2021.

Table 4-3. Total Coastal Events Hazard Risk Assessment Data Table
Hazards included within this table from NCEI Data: Tropical Storm, and Coastal Flooding. There are no Tropical Depressions or Hurricanes recorded in the NCEI Database for this county.

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$250k	$0	% of County in Coastal Land Area = 98%	Total = 10 Annual Avg. = 0.39

Source(s): National Centers for Environmental Information Storm Events Database (as of May 2021) and 2016 State of Maryland Hazard Mitigation Plan.
Note: Data collected for 1950-present, no data available for this event type prior to 1996
*The data collection process does not include events related to sea-level rise and shoreline erosion, which Talbot County includes with Coastal Hazards. Including sea-level rise and shoreline erosion, it is believed that future probability is high for this hazard.

Table 4-4. Tropical Storm Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2003-2021)
0	0	$250k	$0	% of County in Coastal Land Area = 98%	Total = 4 Annual Avg. = 0.21

Note: Data collected for 1950-present, no data available for this event type prior to 2003.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Tropical Storm (Z). A tropical cyclone in which the 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph). A Tropical Storm should be included as an entry when these conditions are experienced in the WFO's (Weather Forecast Office) CWA (County Warning Area).

Table 4-5. Coastal Flooding Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$0	$0	% of County in Coastal Land Area = 98%	Total = 6 Annual Avg. = 0.23

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Coastal Flood (Z). Flooding of coastal areas due to the vertical rise above normal water level caused by strong, persistent onshore wind, high astronomical tide, and/or low atmospheric pressure, resulting in damage, erosion, flooding, fatalities, or injuries. Coastal areas are defined as those portions of coastal land zones (coastal county/parish) adjacent to the waters, bays, and estuaries of the oceans. Farther inland, the Storm Data preparer determines the boundary between coastal and inland areas, where flood events will be encoded as Flash Flood or Flood rather than Coastal Flood. Terrain (elevation) features will determine how far inland the coastal flooding extends.

Climate change causes storm surges, higher sea-levels, and more intense storms. Talbot County acknowledges the likelihood of the increasing risks and vulnerability from hurricane and tropical storm hazard events. Through the development and implementation of the *2022 Talbot County Hazard Mitigation and Community Resilience Plan*, planning consideration for both today and tomorrow are evidenced.

The following table indicates that four major tropical storm events have occurred from 2003-2021. Tropical Storm are defined by the NCEI as a "tropical cyclone in which the 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph)." An average number 0.22 hurricane and tropical storm events occur per year. Data presented on the following page was obtained from the NCEI Storm Events Database.

Table 4-6. Hurricane/Tropical Storm Event Narrative		
Date	**Event Narrative**	**Property Damage**
September 18 to September 19, 2003	Tropical Storm Isabel caused a record-breaking tide and storm surge up the Chesapeake Bay, heavy rain and strong power outage producing winds. Isabel made landfall as a hurricane near Drum Inlet, North Carolina around 100 p.m. EDT on the 18th and weakened as it tracked farther inland. At one time in its life cycle, it was a powerful Category 5 hurricane when it was north of the Leeward Islands. Isabel's track took it west of the bay and was able to funnel water into the bay. A record-breaking high tide of 7.91 feet above mean lower low water was observed at Tolchester Beach (Kent County). The surge was 5.54 feet. Tidal flooding problems began after Midnight EDT on the 19th and continued throughout the day on the 19th. The surge was so strong that it negated the normal tide cycle in the bay. Evacuations occurred near the bay. Most of the damage was caused by the tidal flooding, although four homes were damaged by fallen trees. The heavy rain did not coincide with the tidal flooding and occurred mainly from the afternoon of the 18th into the early morning of the 19th. There were no reports of stream related flooding due to the heavy rain. Because the heaviest rain with tropical systems often falls west of its storm track, the region was spared heavier rain. On the other hand, the strongest winds are often on the right side of the storm track. Winds gusted up to 58 mph in the bay and caused numerous trees, tree limbs and power lines to be knocked down. Peak wind gusts included 58 mph in Cambridge (Dorchester County), 55 mph at the Baltimore-Washington International Airport and 44 mph in Tolchester Beach. Storm totals included 3.40 inches in Federalsburg (Caroline County), 3.13 inches in Denton (Caroline County), 2.97 inches in Saint Michaels (Talbot County), 2.14 inches in Stevensville (Queen Anne's County) and 2.03 inches at the Conowingo Dam (Cecil County).	$1.0M
September 6, 2008	Tropical Storm Hanna brought heavy rain, strong winds, and some tidal flooding to the Eastern Shore during the day and into the evening of the September 6, 2008. Rain moved into the region during the morning fell heavy at times from the late morning into the afternoon and ended during the evening. The strongest winds occurred during the morning and afternoon with peak gusts as high as 56 mph. Siding was ripped from a restaurant in Tilghman (Talbot County). About 10,000 homes and businesses lost power on the Delmarva Peninsula. All power was restored by the 7th. Tidal flooding occurred during the early evening as the surge averaged two to three feet and affected mainly Talbot and Caroline Counties. Many planned activities were cancelled. The Maryland Department of Natural Resources suspended camping at all the Eastern Shore State Parks. Chesapeake College was closed. A limited state of emergency was declared because of Hanna. The persistent strong winds knocked down several weak trees and limbs. This caused scattered power outages and a few road closures. The tidal surge peaked prior to the high tide during the late afternoon and evening of the 6th. In Talbot County, in Oxford, Pier Street was flooded. The water was over the docks and bulkheads at Knapps Narrow. In St. Michaels, the tide reached into the parking lot of a restaurant off Mill Street. Patrons were ferried in and out of the restaurant by pick-up truck. Southeast of Saint Michael's, the tide covered the deck of a restaurant off Mulberry Street and totally closed North Harbour Road. In Easton, the Easton Point Marina became an island off Port Street. Peak wind gusts included 56 mph in Tilghman (Talbot County), and precipitation totals were 1.20 inches in Easton (Talbot County). The tide at Cambridge (Dorchester County) peaked at 4.36 feet above mean lower low water at 736 p.m. EDT on the 6th. Minor tidal flooding starts at 3.5 feet above mean lower low water and moderate tidal flooding starts at 4.5 feet above mean lower low water.	$1.0M
August 27 to August 28, 2011	Hurricane Irene produced heavy flooding rain, tropical storm force wind gusts and caused one wind related death across the Eastern Shore. Preliminary damage estimates were around three million dollars and approximately 85,000 homes and businesses lost power. Power was not fully restored until September 1st. The combination of heavy rain and wind closed numerous roadways across the Eastern Shore and downed thousands of trees. Some schools were unable to open on Monday August 29th. There was a temporary ban on harvesting shellfish along Chesapeake Bay because of the excessive runoff. Some tomato, corn, watermelon and cantaloupe crops were destroyed. It was estimated that 30,000 chickens were also killed by the effects of Irene. Tropical storm force wind gusts overspread the Eastern Shore during the afternoon and early evening of the 27th and persisted into the afternoon of the 28th. Peak wind gusts averaged 50 to 60 mph. The strongest winds associated with Irene occurred at two distinct times. The first surge occurred during bands of heavier rain during the evening and late night of the 27th. The second peak occurred during the late morning and early afternoon of the 28th when skies were clearing, and deeper mixing of the atmosphere brought stronger winds to the ground. The rain associated with Irene overspread the Eastern Shore between 7 a.m. EDT and Noon EDT on the 27th, fell at its heaviest from the late afternoon of the 27th into the early morning of the 28th and	$250K

Table 4-6. Hurricane/Tropical Storm Event Narrative		
Date	**Event Narrative**	**Property Damage**
	ended around Noon EDT on the 28th. Event precipitation totals averaged 6 to 12 inches and caused widespread field and roadway flooding. Because the flash flooding and flooding blended into one, all flooding related county entries were combined into one under flood events. On August 25, Maryland Governor Martin O'Malley declared a state of emergency in preparation for Irene. The Chesapeake Bay Bridge was closed to vehicular traffic. About seventy percent of all Delmarva Power customers lost power. In Kent County, multiple parts of Maryland State Routes 20 and 445 were closed. In all twenty-seven roadways were closed by downed trees. In Talbot County, debris closed Maryland State Route 662C. About 100 properties and 50 roadways and bridges were damaged by the flooding and wind.	
August 4, 2020	Tropical Storm Isaias brought high winds, heavy rain, several tornadoes, and coastal flooding to the mid-Atlantic region, becoming the most impactful tropical cyclone to impact most of the region since Sandy in 2012. Multiple observations of 40 to 50 mph sustained winds with higher gusts were received. There were several reports of downed trees and power lines.	$0K
Source: National Centers for Environmental Information – Storm Event Database.		

4.2.1 CRITICAL AND PUBLIC FACILITIES VULNERABLE TO TROPICAL CYCLONE STORM SURGE

In terms of associated impacts, high winds, heavy rain, lightning, tornados, hail, and storm surge are all associated with hurricanes. Although high winds and excessive amounts of precipitation are common and cause tremendous damage, the most serious effect of hurricanes is coastal destruction caused by wind, storm waves, or surge.

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 position. These winds move across the ocean towards the shore and form 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, 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.

The mapping does not reflect the expected storm tide flooding for every hurricane, or for any one hurricane. Instead, the data depicts an overall footprint of the area that has some risk of storm tide flooding from hurricanes, based on the MOM output dataset. Using Talbot County's 2022 Critical and Public Facility Database developed as part of this planning process, those facilities within storm surge areas, hurricane categories 1 through 4,
are displayed below.

Table 4-7. Hurricane Category 1-4 – Critical and Public Facilities Database			
Hurricane Category 1			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Dock	N/A	Point Road
County Owned	Dock	N/A	Windy Hill Road
County Owned	Dock	N/A	Matthewstown Road
County Owned	Dock	N/A	Claiborne Landing Road
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	Maritime Museum Road
Emergency	Fire Department	Oxford VFD	300 Oxford Road
Emergency	Police Station	US Coast Guard	904 S Morris Street
Medical	Assisted Living	Sunrise Assisted Living	6670 Cedar Point Road
Miscellaneous	Marina	Bates Marine Basin	106 Richardson Street
Miscellaneous	Lab/Dock	Oxford Cooperative Lab NOAA/MDE	904 S Morris Street
Miscellaneous	Marina	Campbell Town Creek Boat Yard	109 Myrtle Avenue
Miscellaneous	Marina	Cutts and Case Shipyard	306 Tilghman Street
Miscellaneous	Marina	Easton Point Marina	975 Port Street
Miscellaneous	Marina	Lowes Wharf Marina	21651 Lowes Wharf Road
Miscellaneous	Marina	Brewers Oxford Boat Yard	500 E Strand Street
Miscellaneous	Marina	Oak Creek Marina	7419 Back Street
Miscellaneous	Marina	Brewers Oxford Marina	407 Strand Street
Miscellaneous	Marina	Oxford Yacht Agency (OYA)	317 S Morris Street
Miscellaneous	Marina	Pier Street Marina	104 W Pier Street
Miscellaneous	Marina	Severn Marine Services	Chicken Point Road
Miscellaneous	Marina	Tilghman on Chesapeake	21610 Island Club Road
Miscellaneous	Marina	N/A	21764 Camper Circle
Municipal-Oxford	Community Center	Oxford Community Center	200 Oxford Road
Municipal-Oxford	Parks and Recreation	Oxford Causeway/Tennis Courts	S Morris Street & Oxford Road
Municipal – St. Michaels	Museum	Chesapeake Bay Maritime	213 N Talbot Street
Utility	Electric	Delmarva Power & Light	Canton Street
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co	956 Port Street
Utility	Pump Station	Bank Street Pump Station	Bank Street, Oxford
Utility	Pump Station	Bachelors Harbor Pump Station	Bachelors Harbor Drive, Oxford
Utility	Pump Station	Bonfield Avenue Pump Station	Bonfield Avenue, Oxford
Utility	Pump Station	Causeway/Oxford Road Pump Station	Oxford Road, Oxford
Utility	Telephone	Verizon	Oxford Road
Utility	Water Tower	Oxford Water Tower	400 Tilghman Street
Hurricane Category 2			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Parks and Recreation	Talbot County basketball court	5536 Public Landing Road
Education	School	US Naval Research Lab Tilghman	4642 Black Walnut Point Road
Emergency	Fire Department	St. Michaels VFD	1001 S Talbot Street
Medical	Hospital	Robert J. Patterson MD	800 S Talbot Street
Miscellaneous	Marina	Campbell's Boatyard Bachelor Point	26106 A Bachelors Point Road
Miscellaneous	Marina	Dickerson Harbor	3831 Trappe Landing Road
Miscellaneous	Marina	Knapps Marina	6176 Tilghman Island Road
Miscellaneous	Marina	Wye Landing	12498 Wye Landing Lane
Miscellaneous	Storage Yard	Tidewater Canvas	Talbot Street

Table 4-7. Hurricane Category 1-4 – Critical and Public Facilities Database			
Municipal-Easton	Public Works	Easton Pump Station	399 Washington Street
Municipal-Oxford	Public Works	Oxford Public Works Building	103 JL Thompson Drive
Municipal-St. Michaels	Museum	St. Mary's Square Museum	409 St Mary's Square
Municipal-St. Michaels	Office	Town of St. Michaels	300 Mill Street
Municipal-St. Michaels	Public Works	Commissioners of St. Michaels	301 Mill Street
Utility	Electric	Delmarva Power Substation	129 Grace Street
Utility	Electric	Choptank Electric	6901 Schoolhouse Lane
Utility	Electric/Pump Station	Easton Utilities Head End/North	405 Bay Street, Easton
Utility	Pumping Station	Pumping Station #2	5940 Royal Oak Road
Utility	Pumping Station	Pumping Station #3	6020 Bellevue Road
Utility	Pumping Station	Oxford Pump Station	Jacks Point Road
Utility	Pumping Station	Windmill Major Pump Station	1131 S Washington Street
Utility	Telephone	Verizon	111 E Chew Avenue
Utility	Tower	Verizon	108 Woodside Avenue
Utility	Tower	N/A	7869 Bozman Neavitt Road
Utility	Water Tower	St. Michaels Water Tower	106 Woodside Avenue
Utility	Water Tower	Town of Oxford	103 JL Thompson Drive
Utility	WWTP	Wastewater Treatment Plant	103 JL Thompson Drive
Hurricane Category 3			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Library	Talbot County Library in St. Michaels	106 Fremont Street
Education	Private School	Calhoon MEBA Engineering	27050 Saint Michaels Road
Education	Public School	St. Michaels High School	200 Seymour Avenue
Education	Public School	St. Michaels Elementary/Middle	100 Seymour Avenue
Education	Public School	Tilghman Elementary School	21374 Foster Avenue
Emergency	Fire Department	Tilghman VFD	5979 N Main Street
Emergency	Police Station	St. Michaels Police Department	100 Fremont Street
Emergency	Police Station	Oxford Police	101 Market Street
Municipal-Oxford	Library	Oxford Library	103 Market Street
Municipal-Oxford	Museum	Oxford Museum Inc.	101 S Morris Street
Municipal-St. Michaels	Housing Authority	St. Michaels Housing Authority	300 N Talbot Street
Municipal-St. Michaels	Housing Authority	St. Michaels Housing Authority	North Avenue
Municipal-St. Michaels	Housing Authority	Storage	Talbot Street
Municipal-St. Michaels	Public Works	St. Michaels Town Shop	Glory Avenue
Utility	Gas/Oil	United Shoregas	929 S. Talbot Street
Utility	Pumping Station	Pumping Station #1	25730 Royal Oak Road
Utility	Pumping Station	Peachblossom Pumping Station	7606 Oxford Road
Utility	Substation	Delmarva Power Substation	8289 Old Bloomfield Road
Utility	Substation	Delmarva Substation Bozman	23931 St Michaels Road
Utility	Telephone	Verizon	5932 Tilghman Island Road
Utility	Tower	Delmarva Power & Light	26985 St Michaels Road
Utility	Tower	Verizon	26709 Oxford Road
Utility	WWTP	St Michaels WWTP	929 Calvert Avenue
Utility	WWTP	Tilghman Island WWTP	21345 Seth Avenue
Hurricane Category 4			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Parks and Recreation	N/A	St Michaels Road

Table 4-7. Hurricane Category 1-4 – Critical and Public Facilities Database			
Education	Public School	Easton Elementary	307 Glenwood Avenue
Education	Special Needs	Benedictine School Vacation Retreat Home	9018 High Banks Terrace
Education	Private School	Nancy Cummings Riding School	27990 Oxford Road
Medical	Office	Periodontist	218 Bay Street
Medical	Retirement Center	Candle Light Cove	106 W Earle Avenue
Miscellaneous	Storage Yard	Marina Mart	12214 Ocean Gateway
Miscellaneous	Storage Yard	Talbot River Tours	846 Point Road
Municipal-Easton	Public Works	Easton Utilities Plant 1	219 N Washington Street
Utility	Electric	Easton Utilities	450 Glenwood Avenue
Municipal-Easton	Public Works	Pumping Station	South Washington Street
Utility	Gas/Oil	Southern States Petroleum	801 Port Street
Utility	Pumping Station	Pumping Station	9345 Unionville Road
Utility	Tower	Mid Atlantic Communication	9855 Wades Point Road
Utility	Water Tower	St Michaels Water Tower	N Talbot Street
Utility	WTP	Martingham Utilities Cooperative	24490 Deepwater Point Drive
Utility	WWTP	Easton Waste Treatment	30770 North Dover Road

Source: 2022 Talbot County Critical and Public Facility Database. The SLOSH Basin used for mapping was Chesapeake Bay (CP5), released in 2014. This data was prepared by the U.S. Army Corps of Engineers, Baltimore District, Planning Division in January 2016. SLOSH storm tide elevations used for the mapping were based on the Maximum of Maximums (MOM) SLOSH output dataset.

As the category of storm increases, more land will become inundated with floodwater. Immediate impacts of flood inundation can include loss of lives, damage to property, business disruption, destruction of crops, loss of livestock, failure of critical infrastructure, health-risks related to waterborne diseases, and more. Category 1 and 2 hurricanes have historically impacted Maryland. Those facilities listed under the labels Hurricane Category 1 and Hurricane Category 2 are more likely to be impacted by storm surge. Note: a category 4 storm would also impact facilities listed in categories 1 through 3.

4.2.2 TROPICAL CYCLONE WIND RISK & VULNERABILITY

The FEMA Hazus Hurricane Model was utilized to conduct an Enhanced Hazus Analysis on Hurricane Wind for Talbot County. The Hurricane Model allows practitioners to estimate the economic and social losses from 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 Talbot 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 as part of the plan update in 2017, utilized integrated user-supplied data to yield more accurate loss estimates and risk assessments.

Essential facility input parameters were updated utilizing the Critical and Public Facility Database developed during this planning process. The attribute tables attached to the shapefiles were edited to included additional and updated data to the existing tables. The additional and updated data was obtained from the 2020 Maryland Property View Database for Talbot County. Examples of data extracted from the 2020 Maryland Property View Database included: building stories, year built, structure value and square footage.

The table below illustrates the discrepancy between the Hazus default data, and the County data utilized in this Enhanced Hazus Analysis. As shown, the accuracy of results is increased by utilizing County data and running the Enhanced Hazus Analysis.

Table 4-8. Hazus Default Data versus County Data

Critical Facility Type	HAZUS Default Data	County Data Utilized for Enhanced HAZUS Analysis
Fire stations/EMS	5	7
Police Stations	4	8
Schools	12	14
EOC	0	1
Medical	1	1

Source: 2016 Talbot County Enhanced Hazus Hurricane Wind Analysis

Using the Enhanced Hazus Hurricane Wind Analysis, a historical storm analysis was initially modeled. In 2003, Hurricane Isabel impacted Maryland significantly and was declared a Presidential Disaster on September 19, 2003. Individual and public assistance was provided in Talbot County. Considering the severity of damage and impact Hurricane Isabel had on Talbot County, this storm was utilized as the base storm for the Enhanced Hazus Hurricane Wind Analysis. However, modifications to the storm track were made to increase the impact to Talbot County in the user defined storm analysis.

These modifications included: alterations to the coordinates so the hurricane track was in closer proximity to Talbot County and the severity of the storm was increased from a Tropical Storm to a Category One. Peak wind gusts for tropical storms are 55 mph, while peak gusts for the Category One storm are 95 mph. The following map depicts the modified Hurricane Isabel storm track used in the analysis and associated peak wind gusts.

In Talbot County, the current building code for wind is 110 mph. Structures built prior to this building code are most vulnerable to hurricane wind events. Results for the Enhanced Hazus Analysis determined residential structures would be affected by a hurricane storm track of this magnitude more so than other occupancy types such as commercial or industrial. Also, wood as a building material is more susceptible to damage than masonry, concrete or steel. Furthermore, the model estimates that four (4) households will be displaced due to the hurricane.

In terms of debris, the model estimates that a total of 88,264 tons of debris will be generated. If debris tonnage is converted to an estimated number of truckloads, it will require 3,530 truckloads (@25 tons/truck) to remove the debris generated by the hurricane. In addition, 11,672 tons of debris is eligible tree debris, which could be chopped and/or chipped. There are over 35,000 buildings in the County with an estimated replacement value of 11.17 billion dollars. The economic loss for this event is $13.7 million

with 98% of this loss consisting of residential occupancy loss.

Hazus Hurricane Wind estimates that approximately two (2) residential structures will be severely damaged due to wind during an event such as this and 97 moderately damaged. A total of 1,240 residential structures and 49 commercial structures are expected to experience minor building damage, refer to *Appendix D: Hazus Hurricane Wind Report* for full results. The following table details the total estimated loss specific to wind for Talbot County if a hurricane event of this magnitude occurred.

Table 4-9. Building-Related Economic Loss Estimations

Building Type	Loss Estimations	Adjusted for Inflation (2021 $)
Residential	$54,216,990	$60,509,054
Commercial	$763,580	$860,201
Industrial	$227,690	$256,501
Other	$229,570	$258,619
Total	**$55,437,830**	**$61,871,577**

Source: 2016 Talbot County Enhanced Hazus Hurricane Wind Analysis

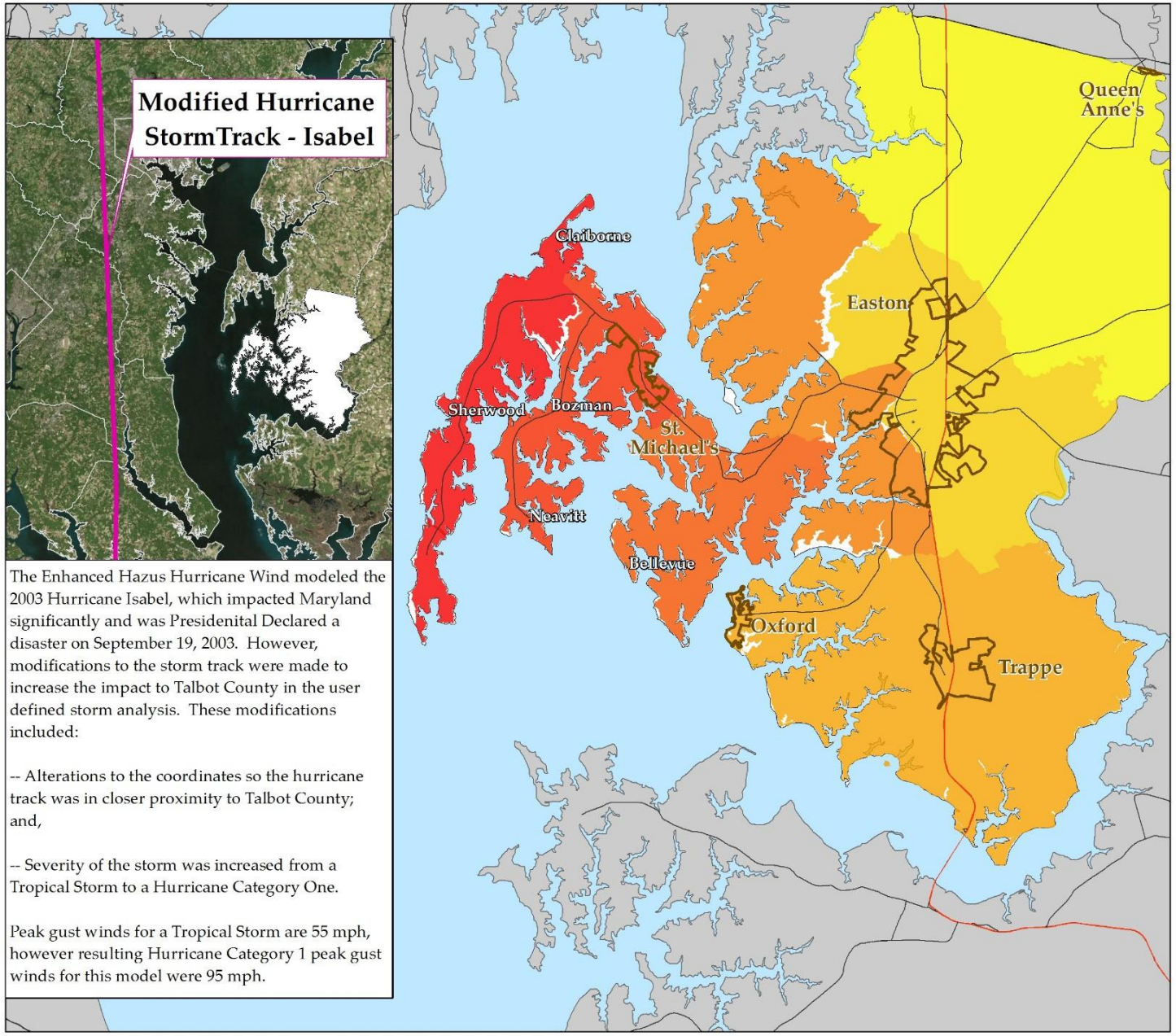
Hazus Hurricane Wind Model - 2003 Isabel Modified

The Enhanced Hazus Hurricane Wind modeled the 2003 Hurricane Isabel, which impacted Maryland significantly and was Presidenital Declared a disaster on September 19, 2003. However, modifications to the storm track were made to increase the impact to Talbot County in the user defined storm analysis. These modifications included:

-- Alterations to the coordinates so the hurricane track was in closer proximity to Talbot County; and,

-- Severity of the storm was increased from a Tropical Storm to a Hurricane Category One.

Peak gust winds for a Tropical Storm are 55 mph, however resulting Hurricane Category 1 peak gust winds for this model were 95 mph.



4.3 NOR'EASTER RISK & VULNERABILITY

According to the National Oceanic and Atmospheric Administration (NOAA), a Nor'easter is a cyclonic storm that moves along the east coast of North America. It is called "nor'easter" because the winds over coastal areas blow from a northeasterly direction.[5] Nor'easters may occur any time of the year but are most frequent and strongest between September and April. These storms usually develop between Georgia and New Jersey within 100 miles of the coastline and generally move north or northeastward.

Nor'easters typically become most intense near New England and the Canadian Maritime Provinces. In addition to heavy snow and rain, nor'easters can bring gale force winds greater than 58 miles per hour – equivalent to wind speeds during a tropical storm event. These storms can produce rough seas, coastal flooding, and shoreline erosion.

The East Coast of North America provides an ideal breeding ground for these storms. During winter, the polar jet stream transports cold Arctic air southward across the plains of Canada and the U.S., and eastward toward the Atlantic Ocean, as warm air from the Gulf of Mexico and the Atlantic tries to move northward. The warm waters of the Gulf Stream help keep the coastal waters relatively mild during the winter, which in turn helps warm the cold winter air over the water. This difference in temperature between the warm air over the water and cold Arctic air over the land is the area where Nor'easters are born.

Areas vulnerable to high wind, coastal flooding, storm surge, and shoreline erosion are also vulnerable to nor'easters. These areas include communities in the western-most shorelines of Talbot County (see *Hazus Hurricane Wind Model – 2003 Isabel Modified* map on page 4-13), particularly Tilghman Island (see *Shoreline Erosion* map, page 4-22), Sherwood, Claiborne, Neavitt, and Bozman.

4.4 SEA-LEVEL RISE RISK & VULNERABILITY

It is recommended by the *Sea-level Rise Projections for Maryland 2018* report that the State of Maryland should plan for as much as 2.3 feet of sea-level rise by 2050. Led by the University of Maryland Center for Environmental Science, the report is regularly prepared by a panel of scientific experts in response to Governor Martin O'Malley's Executive Order on Climate Change and "Coast Smart" Construction. The projections are based on an assessment of the latest climate change science and federal guidelines.

Maryland has 3,100 miles of tidal shoreline and low-lying rural and urban lands that will be impacted. The experts indicate that the "likely" range (66% probability) of the relative rise of mean sea-level expected in Maryland between 2000 and 2050 is 0.8 to 1.6 feet, with about a one-in-twenty chance it could exceed 2.0 feet and about a one-in one hundred chance it could exceed 2.3 feet. Later this century, rates of sea-level rise increasingly depend on the future pathway of global emissions of greenhouse gases during the next sixty years. If emissions continue to grow well into the second half of the 21st century, the "likely" range of sea-level rise experienced in Maryland is 2.0 to 4.2 feet over this century, two to four times the sea-level rise experienced during the 20th century.[6]

Year	Emissions Pathway	Central Estimate 50% probability SLR meets or exceeds:	Likely Range 67% probability SLR is between:	1 in 20 Chance 5% probability SLR meets or exceeds:	1 in 100 Chance 1% probability SLR meets or exceeds:
2030		0.6 ft	0.4 – 0.9 ft	1.1 ft	1.3 ft
2050		1.2 ft	0.8 – 1.6 ft	2.0 ft	2.3 ft
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

Sea-level Rise Projections for Maryland 2018. This table indicates that it is "likely" that Maryland will experience 0.8-1.6 feet of sea-level rise by 2050.

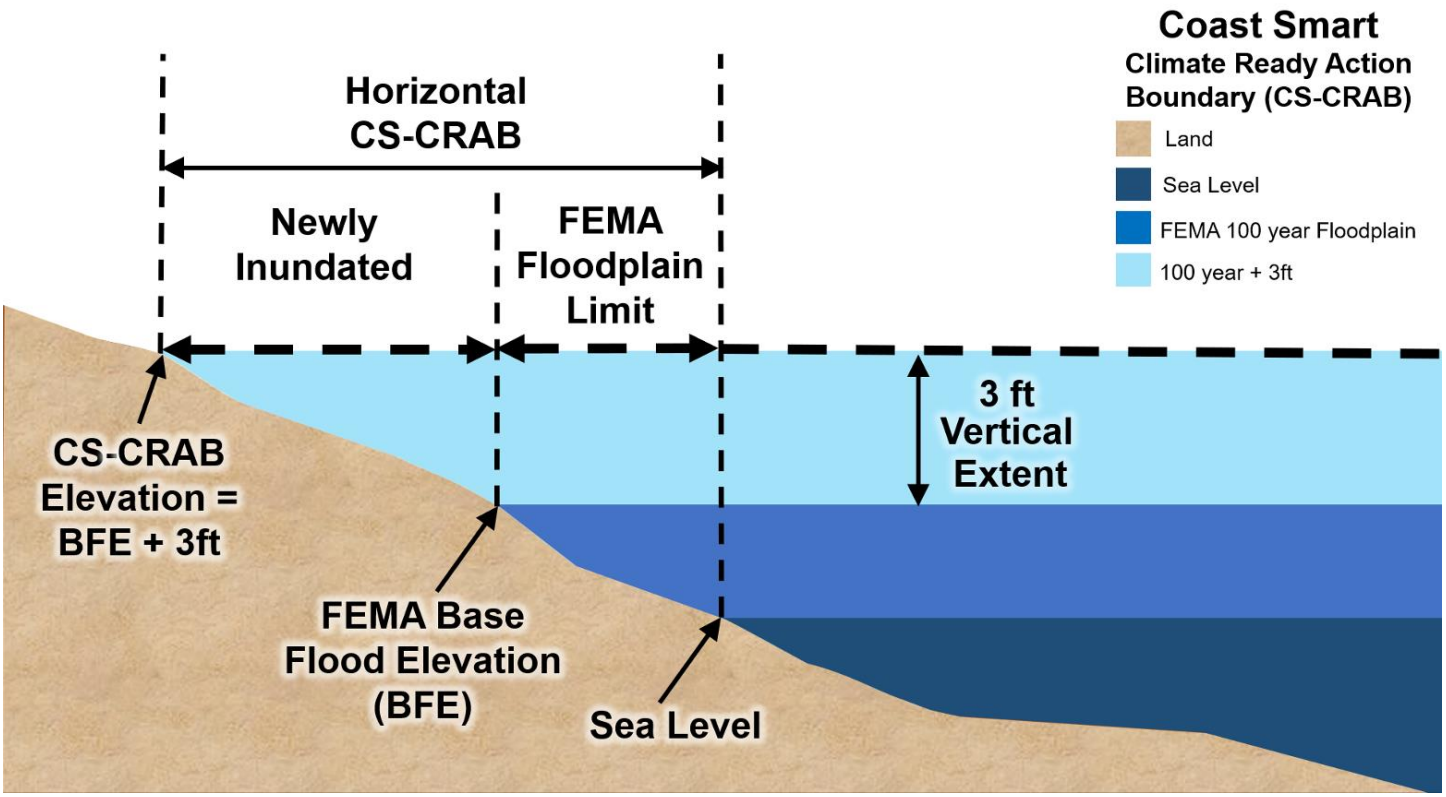
Sea-level rise map showing land inundation under current conditions (left), under 2 feet of sea-level rise (right). Updating Maryland's Sea-level Rise Projections. Special Report of the Scientific and Technical Working Group to the Maryland Climate Change Commission, 22 pp. University of Maryland Center for Environmental Science, Cambridge, MD.

4.4.1 CRITICAL AND PUBLIC FACILITIES VULNERABLE TO SEA-LEVEL RISE

To assess sea-level rise vulnerability, critical and public facilities were intersected with the 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. The model was produced by the Maryland Environmental Service (MES) in partnership with Coast Smart. The results of this analysis are included in the proceeding tables.

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 1st, 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.



The following critical and public facilities have been identified as being within one of the three (3) following CS-CRAB inundation areas: 0 to 1 foot, 1 to 2 foot, and greater than 2 foot.

Table 4-10. Critical and Public Facilities – 0 to 1 Foot CS-CRAB Inundated

Facility Type	Facility Detail	Facility Name	Address
Emergency	Fire Department	St. Michaels VFD	1001 S Talbot Street, St. Michaels
Emergency	Police Station	Oxford Police Department	101 Market Street, Oxford
Medical	Office	Robert J. Patterson MD	800 S Talbot Street, St. Michaels
Miscellaneous	Marina	Wye Landing	12498 Wye Landing Lane, Wye Mills
Municipal-Oxford	Museum	Oxford Museum Inc.	101 S Morris Street, Oxford
Municipal-St. Michaels	Museum	Chesapeake Bay Martime	103 Fremont Street, St. Michaels
Utility	Electric	Choptank Electric	6901 Schoolhouse Lane, Royal Oaks
Utility	Pumping Station	Pumping Station #1	25730 Royal Oak Road, Newcomb
Utility	Telephone	Verizon	111 E Chew Avenue, St. Michaels
Utility	Tower	N/A	7869 Bozman Neavitt Road, Bozman
Utility	WWTP	Tilghman Island WWTP	21345 Seth Avenue, Tilghman

Sources: 2022 Talbot County Critical and Public Facilities Database & Coast Smart Climate Ready Action Boundary (CS-CRAB).

Table 4-11. Critical and Public Facilities – 1 to 2 Foot CS-CRAB Inundated			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Parks and Recreation	Basketball court	5536 Public Landing Road, Royal Oak
Emergency	Fire Department	Oxford VFD	300 Oxford Road, Oxford
Emergency	Fire Department	Tilghman VFD	5979 N Main Street, Tilghman
Municipal-Oxford	Library	Oxford Library	103 Market Street, Oxford
Municipal-St. Michaels	Public Works	Commissioners of St. Michaels	301 Mill Street, St. Michaels
Utility	Electric	Delmarva Power Substation	129 Grace Street, St. Michaels
Utility	Water Tower	St. Michaels Water Tower	106 Woodside Avenue, St. Michaels
Utility	WWTP	St Michaels WWTP	929 Calvert Avenue, St. Michaels
Utility	Telephone	Verizon	5932 Tilghman Island Road, Tilghman
Utility	Tower	Verizon	108 Woodside Avenue, St. Michaels
Utility	Tower	Verizon	26709 Oxford Road, Oxford
Sources: 2022 Talbot County Critical and Public Facilities Database & Coast Smart Climate Ready Action Boundary (CS-CRAB).			

Table 4-12. Critical and Public Facilities – Greater Than 2 Foot CS-CRAB Inundated			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Dock	County Owned Dock	Claiborne Landing, Claiborne
County Owned	Dock	County Owned Dock	Matthewstown Road, Easton
County Owned	Dock	County Owned Dock	7381 Tilghman Island Road, Tilghman
County Owned	Dock	County Owned Dock	Point Road, Easton
County Owned	Dock	County Owned Dock	Port Street, Easton
County Owned	Dock	County Owned Dock	Skipton Landing Road, Cordova
County Owned	Dock	County Owned Dock	St. Michaels Road, Newcomb
County Owned	Dock	County Owned Dock	Windy Hill Road, Trappe
County Owned	Dock	County Owned Dock	Wye Landing Lane, Wye Mills
Education	School	Chesapeake Bay Maritime Museum	100 North Lane, St. Michaels
Education	School	US Naval Research Lab	4642 Black Walnut Point Road, Tilghman
Emergency	Police Station	US Coast Guard	904 S Morris Street, Oxford
Medical	Assisted Living	Sunrise Assisted Living	6670 Cedar Point Road, Oxford
Miscellaneous	Marina	Safe Harbor Oxford	402 Strand Street, Oxford
Miscellaneous	Marina	Campbell's Boatyard – Bachelor Point	26106A Bachelor Harbor Drive, Oxford
Miscellaneous	Marina	Campbell's Boatyard – Jack's Point	106 Richardson Street, Oxford
Miscellaneous	Marina	Campbell's Boatyard – Town Creek	107 Myrtle Avenue, Oxford
Miscellaneous	Marina	Cutts and Case Shipyard	Tilghman Street, Oxford
Miscellaneous	Marina	Dickerson Harbor	3831 Trappe Landing Road, Trappe
Miscellaneous	Marina	Easton Point Marina	975 Port Street, Easton
Miscellaneous	Marina	Hinckley Yacht Services	202 Bank Street, Oxford
Miscellaneous	Marina	Knapps Marina	6176 Tilghman Island Road, Tilghman
Miscellaneous	Marina	Lowes Wharf Marina	21651 Lowes Wharf Road, Sherwood
Miscellaneous	Marina	Marina	21764 Camper Circle, Tilghman
Miscellaneous	Marina	Oak Creek Marina	7419 Back Street, Newcomb
Miscellaneous	Marina	Oxford Yacht Agency	317 S Morris Street, Oxford
Miscellaneous	Marina	Pier Street Marina	104 W Pier Street, Oxford
Miscellaneous	Marina	Severn Marine Services	Chicken Point Road, Tilghman
Miscellaneous	Storage Yard	Tidewater Canvas	Talbot Street, St. Michaels
Miscellaneous	Marina	Tilghman on Chesapeake	21610 Island Club Road, Tilghman
Municipal-Oxford	Community Center	Oxford Community Center	200 Oxford Road, Oxford
Municipal-Oxford	Parks and Recreation	Oxford Causeway/Tennis Courts	Oxford Road, Oxford
Municipal-Oxford	Dock	Oxford Dock	Strand Street, Oxford
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	213 North Talbot Street, St. Michaels
Municipal-St. Michaels	Office	Town of St. Michaels Office	300 Mill Street, St. Michaels

Table 4-12. Critical and Public Facilities – Greater Than 2 Foot CS-CRAB Inundated			
Utility	Electric	Delmarva Power & Light	Canton Street, St. Michaels
Utility	Electric/Pump Station	Easton Utilities Head End/North	405 Bay Street, Easton
Utility	Pumping Station	Windmill Major Pump Station	1131 S Washington Street, Easton
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co.	956 Port Street, Easton
Municipal-Easton	Public Works	Pumping Station	S Washington Street, Easton
Utility	Pumping Station	Pumping Station #2	25940 Royal Oak Road, Royal Oaks
Utility	Pumping Station	Pumping Station #3	6020 Bellevue Road, Royal Oaks
Utility	Pumping Station	Bank Street	Bank Street, Oxford
Utility	Pumping Station	Bachelor Harbor Pumping Station	Bachelors Harbor Drive, Oxford
Utility	Pumping Station	Bonfield Pumping Station	Bonfield Avenue, Oxford
Utility	Pumping Station	Causeway/Oxford Road Pumping Station	Oxford Road, Oxford
Utility	Water Tower	Town of Oxford	103 JL Thompson Drive, Oxford
Utility	WWTP	Town of Oxford WWTP	103 JL Thompson Drive, Oxford
Utility	Tower	Tred Avon Yacht Club	102 W Strand Street, Oxford
Utility	Water Tower	Oxford Water Tower	400 Tilghman Street, Oxford
Utility	Telephone	Verizon	26709 Oxford Road, Oxford
Sources: 2022 Talbot County Critical and Public Facilities Database & Coast Smart Climate Ready Action Boundary (CS-CRAB).			

In total, 73 critical and public facilities in Talbot County are within the CS-CRAB inundation area. Most of these facilities (51) are within the "Greater Than 2 Foot" CS-CRAB inundation area.

Table 4-13. Critical and Public Facilities within CS-CRAB Inundation by Municipality	
Municipality	**Number of Impacted Critical & Public Facilities**
Easton	8
Queen Anne	0
St. Michaels	14
Trappe	2
Oxford	27
Total:	**51**
Source: 2022 Talbot County Critical and Public Facilities Database	

There are 46 critical and public facilities at-risk to sea-level rise that are located within one of Talbot County's five municipalities. The Town of Oxford and the Town of St. Michaels comprise most of these critical and public facilities. Please refer to *Chapter 13: Municipal Synopsis & Perspective* of this plan for more information related to Talbot County's municipalities and their unique needs.

4.5 SHORELINE EROSION RISK & VULNERABILITY

Shoreline erosion is caused by many variables, such as storm surges of higher-than-normal tides, and wind driven waves; sea-level rise, which causes higher tides than in decades past; boat wake; as well as upland runoff from rainstorms. Shoreline erosion can threaten the integrity of existing structures, roads and utilities and has adverse impacts to water quality and wildlife habitat.[7]

Shorelines in Tidewater Maryland have already changed significantly over the last two centuries, moving inland because of erosion and other changes. According to the Maryland Department of National Resources, erosion of the shoreline in Maryland varies from less than two to greater than eight feet per year.[8] Talbot County's most notable feature is its extensive and irregular shoreline formed by numerous rivers, creeks and coves. Principal waterways in the county include the shoreline of the Chesapeake Bay, the Choptank River, Tuckahoe River, and the Miles River. Talbot's land and waterways form a unique mixture of tidal waters, streams, farmlands and forests. The traditional lifestyle of Talbot County has long

centered on farming, seafood and maritime industries. The Chesapeake Bay Critical Area Plan adopted by the county contains strict environmental protection for shoreline areas. Approximately 38 percent of county land is designated as critical area.

Land within the Critical Area is categorized by its predominant use and the intensity of its development. This system allows local governments to focus new development toward existing developed areas and permits some infill of similar density. It also allows them to designate natural resources areas for habitat protection and for forestry, agriculture and other resource utilization activities. Each classification or category poses different challenges for land managers attempting to achieve the goals of the Critical Area Law and so the specific management programs for each differ. But the intention of each of the programs remains consistent -- to protect the Chesapeake Bay from the ill effects of human activities.

Source: Maryland Department of Natural Resources-Critical Areas Commission

The most up to date shoreline erosion data for Talbot County is provided by the U.S. Army Corps of Engineers, Baltimore District. According to the U.S. Army Corps of Engineers, Planning Division, the erosion categories have been changed and due to different mapping techniques, the measured shorelines have changed. The Virginia Institute of Marine Science produces the updated shorelines and erosion rates based on Maryland Geological Survey data. Using a series of recent shorelines (1986-1995), the Maryland Geological Survey produced a shoreline coded with erosion rates. The shoreline was updated by the Center for Coastal Resources Management, Virginia Institute of Marine Science to reflect the status (2002-2006) of shoreline protection ("protected category") and improve on the shoreline segments previously classified as "unknown" or "no data."

Table 4-14. Talbot Shoreline Erosion Rate

Talbot County	Average Erosion Rate (ft/yr)	Shoreline Length (Miles)	Percent of Total Shoreline
Accretion	0.5	34	5.7%
Protected	0	175	29.3%
No Change	0	179	30.0%
Slight	-1	195	32.7%
Low	-3	9	1.5%
Moderate	-6	4	0.7%
High	-11	1	0.1%
Unknown	0 or -1	0	-
		Total: 597	100%

Source: Army Corps of Engineers, Baltimore District, 2017.

The erosion rates depicted in the table above indicate that the majority (65%) of Talbot County's shorelines are accreting, protected, or showing no change. Of the shoreline that is exhibiting some amount of change, the majority (93.3%) is showing "slight" change (i.e., an average loss of one foot per year). The average annual rate of shoreline erosion in the state ranges from less than two feet to greater than eight feet. Most of Talbot County's eroding shorelines (32.7%) are eroding at a rate of less than one foot per year, meaning Talbot's shorelines are changing at a rate on par with the state's lower average.

4.5.1 CRITICAL & PUBLIC FACILITIES VULNERABLE TO SHORELINE EROSION

To assess the vulnerability of critical and public facilities to shoreline erosion, facilities were mapped in conjunction with "high" and "very high" shoreline erosion rate areas. These areas were extracted using the following data source:

MD iMAPS, Maryland Shoreline Hazard Index Layer Description: Each point in Coastal Resilience Assessment Shoreline Points represents a 250-meter segment of the Maryland coast, including Atlantic, Chesapeake Bay and Coastal Bay shorelines. The Natural Capital Project's Coastal Vulnerability model was used to calculate a Shoreline Hazard Index, representing the relative exposure of each segment to storm-induced erosion and flooding. Inputs to the model included 6 physical variables (geomorphology, elevation, sea-level rise, wave power, storm surge height and erosion rates) and 5 habitat types (forest, marsh, dune, oyster reef and underwater grass). Two scenarios of the model were run: one scenario incorporating the protective role of all existing coastal habitats and the other scenario simulating the complete loss of habitats. The difference between the two scenarios indicates the potential magnitude of coastal hazard reduction by habitats at each location. Model results were integrated with MD DNR's Community Flood Risk Areas (March 2016) to highlight areas where hazard reduction by habitats is most likely to benefit at-risk coastal communities.

Erosion Rate is scored on a category from "Very Low" to "Very High." The table below describes each of the five possible ranks.

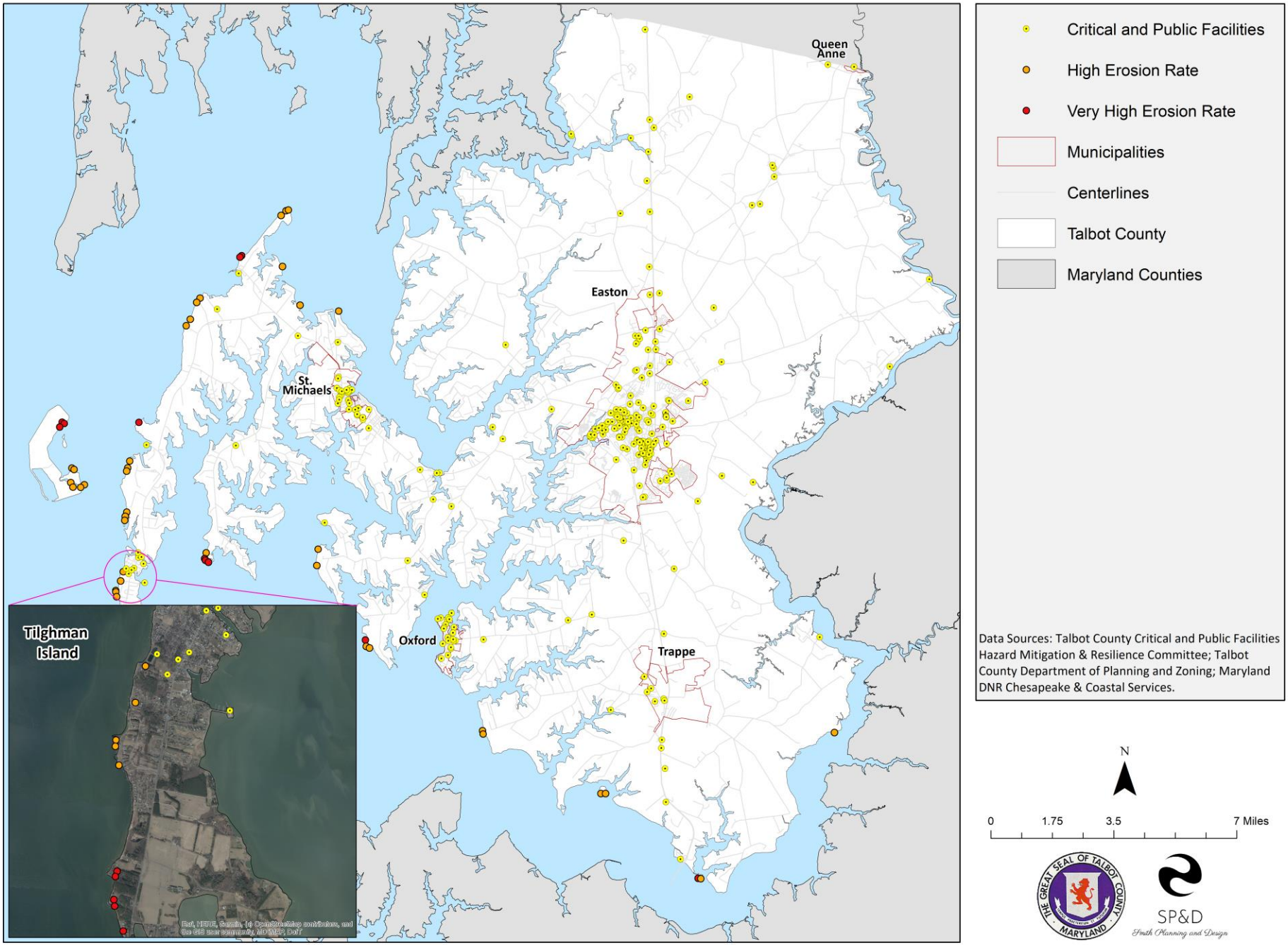
Table 4-15. Erosion Rate Ranking System

	Very Low Hazard Rank (1)	Low Hazard Rank (2)	Moderate Hazard Rank (3)	High Hazard Rank (4)	Very High Hazard Rank (5)
Erosion Rate (feet/year)	Accretion or Protected	0-2, no change or unknown	2-4	4-8	>8

As shown on the *Shoreline Erosion Rates: High and Very High* map on the following page, the Tilghman Island area has the highest concentration of "very high" and "high" erosion areas and critical and public facilities. The closest facility on Tilghman Island to a "high" erosion area is the wastewater treatment plant. Additional facilities on Tilghman Island include:

- County Owned Dock
- Tilghman Elementary School
- Tilghman Volunteer Fire Department
- Knapps Marina
- Severn Marine Services
- Tilghman on Chesapeake Marina
- Marina
- Verizon Telephone
- Tilghman Wastewater Treatment Plant

Shoreline Erosion Rate: High and Very High



4.6 COASTAL HAZARDS CONCLUSION

Through the identification and understanding of coastal risks, Talbot County has taken an important step to becoming more resilient. Communicating the hazard risk information compiled within this plan to residents, businesses, and institutional members of the community so that they fully understand is a crucial next step.

Conclusions from the five Talbot County Community Pillars have been summarized below.

4.6.1 Health, Safety, and Welfare

Essential facility types as identified by FEMA Hazus Technical Manual includes the following:

- Emergency Operations Center;
- Education;
- Fire;
- Police; and,
- Medical.

Essential facilities within coastal hazard risk areas, such as hurricane storm surge, are particularly at-risk. These facilities are essential, and their continued operations and high level of functionality are vital to the health, safety, and welfare of the community. Essential facilities within hurricane categories 1-4 are listed on the table below.

Table 4-16. Essential Facilities Within Hurricane Storm Surge Categories 1-4

Essential Facilities within Hurricane Category 1			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Emergency	Fire Department	St. Michaels VFD	1001 S Talbot Street
Medical	Office	Robert J. Patterson MD	800 S Talbot Street
Essential Facilities within Hurricane Category 2			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Education	School	US Naval Research Lab Tilghman	4642 Black Walnut Point Road
Essential Facilities within Hurricane Category 3			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Education	Private School	Calhoon MEBA Engineering	27050 Saint Michaels Road
Education	Public School	St Michaels High School	200 Seymour Avenue
Education	Public School	St. Michaels Elementary/Middle	100 Seymour Avenue
Education	Public School	Tilghman Elementary School	21374 Foster Avenue
Emergency	Fire Department	Tilghman VFD	5979 N Main Street
Emergency	Police Station	St Michaels Police Dept.	100 Fremont Street
Emergency	Police Station	Oxford Police	101 Market Street
Essential Facilities within Hurricane Category 4			
Facility Type	**Facility Type**	**Facility Type**	**Facility Type**
Education	Public School	Easton Elementary	307 Glenwood Avenue
Education	Special Needs	Benedictine School Vacation Retreat Home	9018 High Banks Terrace
Education	Private School	Nancy Cummings Riding School	27990 Oxford Road
Medical	Office	Periodontist	218 Bay Street
Medical	Retirement Center	Candle Light Cove	106 W Earle Avenue

Source: 2022 Talbot County Critical and Public Facilities Database.

The SLOSH Basin used for mapping was Chesapeake Bay (CP5), released in 2014. This data was prepared by the U.S. Army Corps of Engineers, Baltimore District, Planning Division in January 2016. SLOSH storm tide elevations used for the mapping were based on the Maximum of Maximums (MOM) SLOSH output dataset.

The results of the Enhanced Hazus Hurricane Wind Analysis (refer to *Appendix D* for full report) indicate that a total of 88,264 tons of debris will be generated. If debris tonnage is converted to an estimated number of truckloads, it will require 3,530 truckloads (@25 tons/truck) to remove the debris generated by the hurricane. In addition, 11,672 tons of debris is eligible tree debris, which could be chopped and/or chipped. This information may be used to inform the update to Talbot County's Debris Management Plan.

4.6.1.1 Social Vulnerability

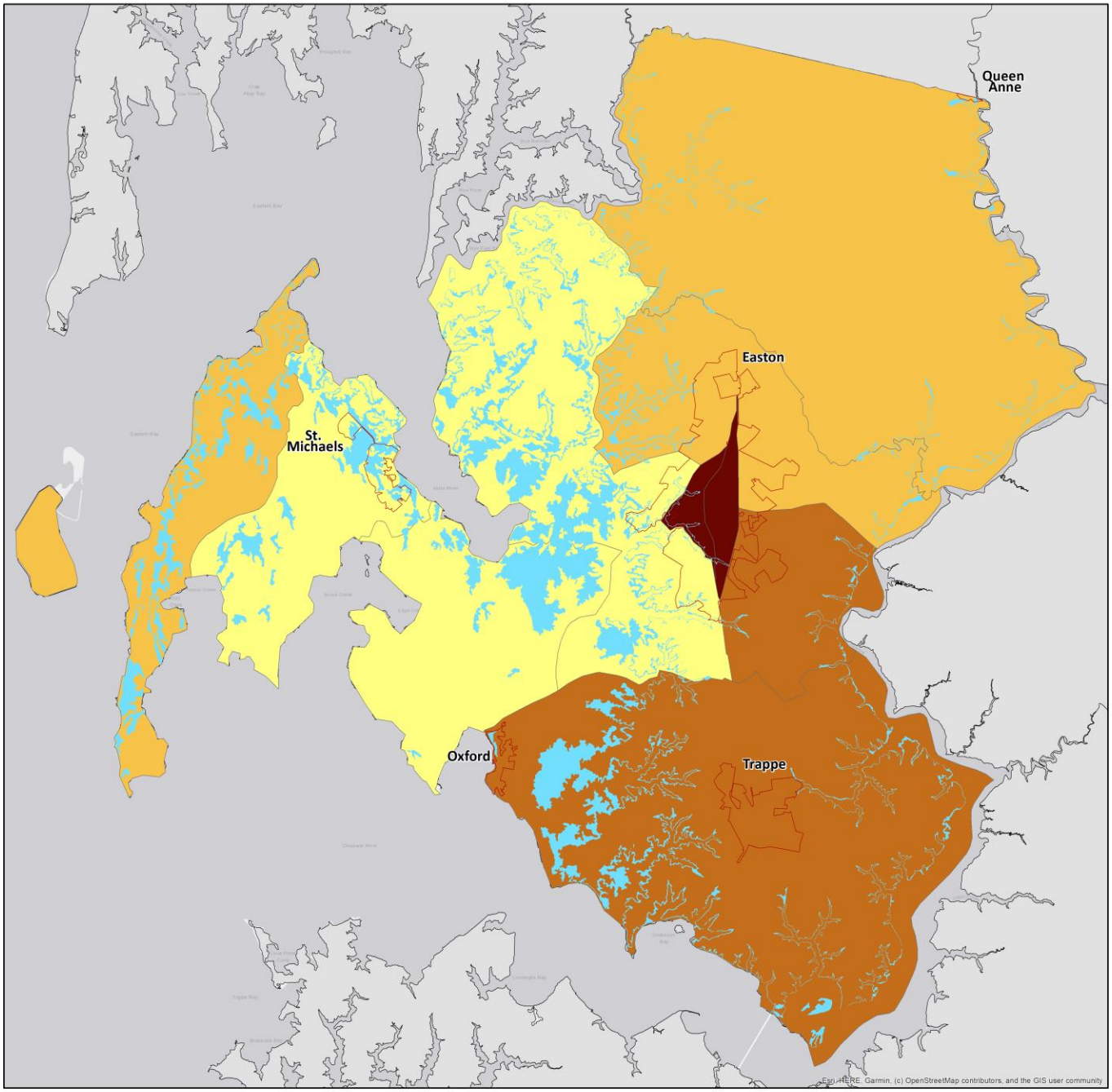
An important aspect relating to the health, safety, and welfare of Talbot County's communities is social vulnerability. Talbot County recognizes that identifying socially vulnerable populations is an important step in mitigating for natural disaster events. According to the Center for Disease Control and Prevention (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.[9]

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 Talbot 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 hurricane storm surge to aid in determining areas of concern where coastal flood mitigation activities might make the most sense due to increased vulnerability. Areas of concern are locations where high social vulnerability and extensive hurricane storm surge 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.

Social Vulnerability and Category 3 Hurricane Storm Surge



Hurricane Storm Surge

Category 3

SVI Score (2018)

- Very Low
- Low
- Medium
- High
- Municipalities
- Maryland Counties

Data Sources: SLOSH Hurricane Storm Surge, USACE & Center for Disease Control/Agency for Toxic Substances and Disease Registry (CDC/ATSDR)

N

0 1.75 3.5 7 Miles

THE GREAT SEAL OF TALBOT COUNTY MARYLAND

SP&D
Smith Planning and Design

4.6.2 Economic Stability

The increased threat of sea-level rise may have a negative impact on property values and all related industries, thereby undermining the economic stability of the community. According to the sea-level rise data and the 2022 Talbot County Critical Facilities Database, facilities impacted by a 0-1 foot and 1-2 foot of inundation from sea-level rise are minimal.

However, sea-level rise exceeding two feet impacts (46) facilities, including public utilities. For the community to remain resilient, utilities must remain and/or quickly come back on-line prior, during, and following a disaster incident. Mitigation of these facilities for sea-level rise, coastal flood, and hurricanes are of vital importance to the economic stability of Talbot County.

The following table lists those facilities at-risk to greater than 2 foot of inundation from sea-level rise.

Table 4-17. Critical and Public Facilities – Greater Than 2 Foot CS-CRAB Inundated

Facility Type	Facility Detail	Facility Name	Address
County Owned	Dock	County Owned Dock	Claiborne Landing, Claiborne
County Owned	Dock	County Owned Dock	Matthewstown Road, Easton
County Owned	Dock	County Owned Dock	7381 Tilghman Island Road, Tilghman
County Owned	Dock	County Owned Dock	Point Road, Easton
County Owned	Dock	County Owned Dock	Port Street, Easton
County Owned	Dock	County Owned Dock	Skipton Landing Road, Cordova
County Owned	Dock	County Owned Dock	St. Michaels Road, Newcomb
County Owned	Dock	County Owned Dock	Windy Hill Road, Trappe
County Owned	Dock	County Owned Dock	Wye Landing Lane, Wye Mills
Education	School	Chesapeake Bay Maritime Museum	100 North Lane, St. Michaels
Education	School	US Naval Research Lab	4642 Black Walnut Point Road, Tilghman
Emergency	Police Station	US Coast Guard	904 S Morris Street, Oxford
Medical	Assisted Living	Sunrise Assisted Living	6670 Cedar Point Road, Oxford
Miscellaneous	Marina	Safe Harbor Oxford	402 Strand Street, Oxford
Miscellaneous	Marina	Campbell's Boatyard – Bachelor Point	26106A Bachelor Harbor Drive, Oxford
Miscellaneous	Marina	Campbell's Boatyard – Jack's Point	106 Richardson Street, Oxford
Miscellaneous	Marina	Campbell's Boatyard – Town Creek	107 Myrtle Avenue, Oxford
Miscellaneous	Marina	Cutts and Case Shipyard	Tilghman Street, Oxford
Miscellaneous	Marina	Dickerson Harbor	3831 Trappe Landing Road, Trappe
Miscellaneous	Marina	Easton Point Marina	975 Port Street, Easton
Miscellaneous	Marina	Hinckley Yacht Services	202 Bank Street, Oxford
Miscellaneous	Marina	Knapps Marina	6176 Tilghman Island Road, Tilghman
Miscellaneous	Marina	Lowes Wharf Marina	21651 Lowes Wharf Road, Sherwood
Miscellaneous	Marina	Marina	21764 Camper Circle, Tilghman
Miscellaneous	Marina	Oak Creek Marina	7419 Back Street, Newcomb
Miscellaneous	Marina	Oxford Yacht Agency	317 S Morris Street, Oxford
Miscellaneous	Marina	Pier Street Marina	104 W Pier Street, Oxford
Miscellaneous	Marina	Severn Marine Services	Chicken Point Road, Tilghman
Miscellaneous	Storage Yard	Tidewater Canvas	Talbot Street, St. Michaels
Miscellaneous	Marina	Tilghman on Chesapeake	21610 Island Club Road, Tilghman
Municipal-Oxford	Community Center	Oxford Community Center	200 Oxford Road, Oxford
Municipal-Oxford	Parks and Recreation	Oxford Causeway/Tennis Courts	Oxford Road, Oxford
Municipal-Oxford	Dock	Oxford Dock	Strand Street, Oxford
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	213 North Talbot Street, St. Michaels
Municipal-St. Michaels	Office	Town of St. Michaels Office	300 Mill Street, St. Michaels
Utility	Electric	Delmarva Power & Light	Canton Street, St. Michaels
Utility	Electric/Pump Station	Easton Utilities Head End/North	405 Bay Street, Easton

Table 4-17. Critical and Public Facilities – Greater Than 2 Foot CS-CRAB Inundated			
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co.	956 Port Street, Easton
Municipal-Easton	Public Works	Pumping Station	S Washington Street, Easton
Utility	Pumping Station	Pumping Station #2	25940 Royal Oak Road, Royal Oaks
Utility	Pumping Station	Pumping Station #3	6020 Bellevue Road, Royal Oaks
Utility	Pumping Station	Windmill Major Pump Station	1131 S Washington Street
Utility	Water Tower	Town of Oxford	103 JL Thompson Drive, Oxford
Utility	WWTP	Town of Oxford WWTP	103 JL Thompson Drive, Oxford
Utility	Tower	Tred Avon Yacht Club	102 W Strand Street, Oxford
Utility	Water Tower	Oxford Water Tower	400 Tilghman Street, Oxford
Utility	Telephone	Verizon	26709 Oxford Road, Oxford
Sources: 2022 Talbot County Critical and Public Facilities Database & Coast Smart Climate Ready Action Boundary (CS-CRAB).			

4.6.3 Education

Education facilities at-risk to hurricanes are listed on the table below.

Table 4-18. Education Facilities within Hurricane Storm Surge Categories 1-4			
Education Facilities within Hurricane Category 1			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
NONE			
Education Facilities within Hurricane Category 2			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Education	School	US Naval Research Lab Tilghman	4642 Black Walnut Point Road
Education Facilities within Hurricane Category 3			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Education	Private School	Calhoon MEBA Engineering	27050 Saint Michaels Road
Education	Public School	St Michaels High School	200 Seymour Avenue
Education	Public School	St. Michaels Elementary/Middle	100 Seymour Avenue
Education	Public School	Tilghman Elementary School	21374 Foster Avenue
Education Facilities within Hurricane Category 4			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Education	Public School	Easton Elementary	307 Glenwood Avenue
Education	Special Needs	Benedictine School Vacation Retreat Home	9018 High Banks Terrace
Source: 2022 Talbot County Critical and Public Facility Database. The SLOSH Basin used for mapping was Chesapeake Bay (CP5), released in 2014. This data was prepared by the U.S. Army Corps of Engineers, Baltimore District, Planning Division in January 2016. SLOSH storm tide elevations used for the mapping were based on the Maximum of Maximums (MOM) SLOSH output dataset.			

Education facilities at-risk to sea-level rise are listed on the table below. Both facilities are at risk to sea-level inundation greater than 2 feet.

Table 4-19. Education Facilities Sea-level Rise Greater than 2 Foot Inundation			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Education	School	Chesapeake Bay Maritime Museum	100 North Lane, St. Michaels
Education	School	US Naval Research Lab	4642 Black Walnut Point Road, Tilghman

The U.S. Naval Research Lab Tilghman is at risk to both hurricane storm surge and sea-level rise.

4.6.4 Infrastructure

The continued functionality of the transportation network within any community is an essential component to community resilience and safety. Roadways in and around essential facilities are a priority. Those facilities, such as police, fire/rescue, and other emergency services must continue to be served by transportation routes in the event of a coastal hazard. Access roads to and from essential facilities are particularly vital to the continued operations of emergency services.

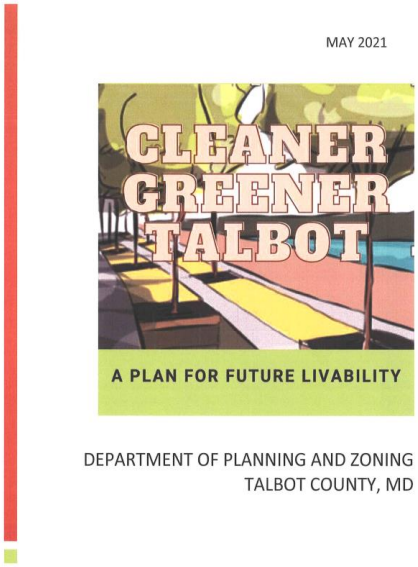
In addition, facilities that support the community, such as public utilities, should be considered for hazard mitigation and resilience as appropriate. The following table lists those facilities at-risk to Hurricane Storm Surge Categories 1-4. Finally, those facilities shaded in light blue are also within the CS-CRAB sea-level rise inundation area of greater than 2 feet.

Table 4-20. Public Works and Utilities within Hurricane Storm Surge Categories 1-4

Public Works & Utilities within Hurricane Category 1			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Utility	Electric	Delmarva Power & Light	Canton Street
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co	956 Port Street
Utility	Telephone	Verizon	Oxford Road
Utility	Water Tower	Oxford Water Tower	400 Tilghman Street
Public Works & Utilities within Hurricane Category 2			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Municipal-Easton	Public Works	Easton Pump Station	399 Washington Street
Municipal-St. Michaels	Public Works	Commissioners of St. Michaels	301 Mill Street
Utility	Electric	Delmarva Power Substation	129 Grace Street
Utility	Electric	Choptank Electric	6901 Schoolhouse Lane
Utility	Electric/Pump Station	Easton Utilities Head End/North	405 Bay Street, Easton
Utility	Pumping Station	Windmill Major Pump Station	1131 S Washington Street
Utility	Pumping Station	Pumping Station #2	25940 Royal Oak Road
Utility	Pumping Station	Pumping Station #3	6020 Bellevue Road
Utility	Telephone	Verizon	111 E Chew Avenue
Utility	Tower	Verizon	108 Woodside Avenue
Utility	Tower	N/A	7869 Bozman Neavitt Road
Utility	Water Tower	St. Michaels Water Tower	106 Woodside Avenue
Utility	Water Tower	Town of Oxford	103 JL Thompson Drive
Utility	WWTP	Town of Oxford	103 JL Thompson Drive
Public Works & Utilities within Hurricane Category 3			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Municipal-St. Michaels	Public Works	St. Michaels Town Shop	Glory Avenue
Utility	Gas/Oil	United Shoregas	929 S Talbot Street
Utility	Pumping Station	Pumping Station #1	25730 Royal Oak Road
Utility	Pumping Station	Peachblossom Pumping Station	7606 Oxford Road
Utility	Substation	Delmarva Power Substation	8289 Old Bloomfield Road
Utility	Substation	Delmarva Substation Bozman	23931 St Michaels Road
Utility	Telephone	Verizon	5932 Tilghman Island Road
Utility	Tower	Delmarva Power & Light	26985 St Michaels Road
Utility	Tower	Verizon	26709 Oxford Road
Utility	WWTP	St Michaels WWTP	929 Calvert Avenue
Utility	WWTP	Tilghman Island WWTP	21345 Seth Avenue
Utility	Telephone	Verizon	5932 Tilghman Island Road

Table 4-20. Public Works and Utilities within Hurricane Storm Surge Categories 1-4			
Essential Facilities within Hurricane Category 4			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Municipal-Easton	Public Works	Easton Utilities Plant 1	219 N Washington Street
Utility	Electric	Easton Utilities	450 Glenwood Avenue
Municipal-Easton	Public Works	Easton Pump Station	399 Washington Street
Utility	Gas/Oil	Southern States Petroleum	801 Port Street
Utility	Pumping Station	Pumping Station	9345 Unionville Road
Utility	Tower	Mid Atlantic Communication	9855 Wades Point Road
Utility	Water Tower	St Michaels Water Tower	N Talbot Street
Utility	WTP	Martingham Utilities Cooperative	24490 Deepwater Point Drive
Utility	WWTP	Easton Waste Treatment	30770 North Dover Road

Source: 2022 Talbot County Critical and Public Facility Database. The SLOSH Basin used for mapping was Chesapeake Bay (CP5), released in 2014. This data was prepared by the U.S. Army Corps of Engineers, Baltimore District, Planning Division in January 2016. SLOSH storm tide elevations used for the mapping were based on the Maximum of Maximums (MOM) SLOSH output dataset. Coast Smart Climate Ready Action Boundary (CS-CRAB).



In 2004 and in partnership with the Nature Conservancy, Talbot County developed a Green Infrastructure Plan that assessed critical resource areas such as woodlands, wildlife habitat, farmland and aquatic resources. The Plan identified high priority focus areas for land conservation efforts and growth management. The Green Infrastructure Plan has since been updated in 2020, now called "Cleaner, Greener, Talbot." The updated plan addresses stormwater flooding, storm surges, and shoreline erosion.

Green Infrastructure, as defined in 2019 by the Water Infrastructure Improvement Act, is "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to the sewer systems or to surface waters."

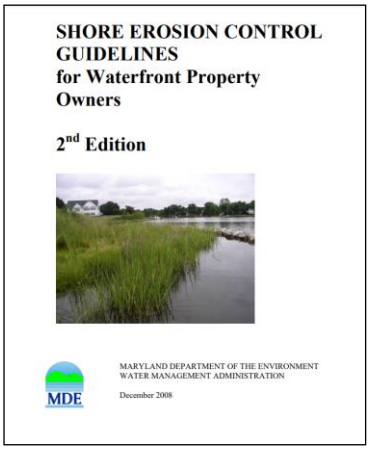
Prioritizing this type of infrastructure can help Talbot County mitigate flood, storm surge, and shoreline erosion impacts from coastal hazard events. The benefits of green infrastructure include: improvements to water quality and quantity, improvements to air quality, increased climate resiliency, habitat improvement and connectivity for wildlife, and a reduction in harm to communities.

4.6.5 Environment

Where appropriate increase the amount of shoreline miles that are protected from shoreline erosion, environmental resilience for communities will improve. Data currently indicates that 175 miles of the total 597 total miles of shoreline or 29.3% of the shoreline in Talbot County is protected.

Table 4-21. Talbot Shoreline Erosion Rate			
Talbot County	**Average Erosion Rate (ft/yr)**	**Shoreline Length (Miles)**	**Percent of Total Shoreline**
Accretion	0.5	34	5.7%
Protected	**0**	**175**	**29.3%**
No Change	0	179	30.0%
Slight	-1	195	32.7%

Table 4-21. Talbot Shoreline Erosion Rate			
Talbot County	**Average Erosion Rate (ft/yr)**	**Shoreline Length (Miles)**	**Percent of Total Shoreline**
Low	-3	9	1.5%
Moderate	-6	4	0.7%
High	-11	1	0.1%
Unknown	0 or -1	0	-
		Total: 597	**100%**
Source: Army Corps of Engineers, Baltimore District, 2017			



Information for Maryland property owners related to shoreline erosion protection and control measures is available in the following publication: Shore Erosion Control Guidelines for Waterfront Property Owners, 2nd Edition, Maryland Department Of The Environment, December 2008.

This guidebook was originally developed by the Maryland Department of Natural Resources, Water Resources Administration, Tidal Wetlands Division, to assist waterfront property owners in understanding the various methods of shore erosion control and assist them in selecting the method most appropriate for their property. The Tidal Wetlands Division is now part of the Maryland Department of the Environment, Water Management Administration. This second edition provides updated guidance on technical approaches and regulatory procedures to assist waterfront property owners. The appropriate shore erosion control method should be selected by considering the degree of erosion control needed, environmental impacts, and cost.

Common shore erosion control measures include the following non-structural and structural practices:

- Non-Structural Practices:
  - Living Shorelines
  - Beach nourishment
  - Slope grading and planting
  - Marsh establishment, with or without additional protection elements
- Sand Containment Structures
- Structural Practices:
  - Shoreline revetments
  - Offshore breakwaters
  - Jetties/Groins

These recommendations are consistent with the provisions of Maryland's Chesapeake and Coastal Bays Critical Area Protection Program which encourages the use of nonstructural shore protection measures to conserve and protect plant, fish and wildlife habitat.

[1] Hurricane Isabel Rapid Response Coastal High Water Mark Collection, FEMA-1492-DR-MD, Final Report November 19, 2003.
[2] Jay, A., D.R. Reidmiller, C.W. Avery, D. Barrie, B.J. DeAngelo, A. Dave, M. Dzaugis, M. Kolian, K.L.M. Lewis, K. Reeves, and D. Winner, 2018: Overview. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 33–71. doi: 10.7930/NCA4.2018.CH1.
[3] https://www.umces.edu/sites/default/files/Sea-Level%20Rise%20Projections%20for%20Maryland%202018_0.pdf
[4] 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.

[5] weather.gov/safety/winter-noreaster

[6] 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.

[7] dnr.maryland.gov/criticalarea/Documents/Coastal_resilience_Landowners_Factsheet.pdf

[8] dnr.maryland.gov/ccs/Publication/Shoreerostext.pdf

[9] www.atsdr.cdc.gov/placeandhealth/svi/index.html

Chapter 5: Flood

PLAN UPDATE

- Page 1 – Added a text box providing the FEMA definition of flood.
- Page 1 – Added a text box with an excerpt from the 2021 State Hazard Mitigation Plan regarding areas prone to flooding.
- Page 3 – Updated the Flood Event Narrative table and the Flash Flood Event Narrative table with the latest data from the NCEI Storm Events Database.
- Page 6 – Text was added to Section 5.2 describing the composite scoring method utilized to measure risk for flood hazard. The current risk score for this hazard is "High". See *Appendix A* for more information related to Hazard Identification and Risk Assessment.
- Page 6 - Updated the flood, flash flood, and heavy rain risk assessment tables with the latest data from NCEI Storm Events Database.
- Page 7 – Added a new section, The National Risk Assessment. Results indicate that Talbot County has the greatest growing operational risk in the state.
- Page 8 – Added Figure 5-1: Growth in Operational Risk by County.
- Page 10 – Section 5.3 has been updated with the latest NFIP and Repetitive Loss data. Full results are included in *Appendix G (Official Use Only).*
- Page 12 – Added Expected Annual Loss results from FEMA's National Risk Index to section 5.5.
- Page 13 – The latest parcel data available from Talbot County and Maryland PropertyView have been intersected in ArcMap with the 1-percent-annual-chance flood event and the 0.2-percent-annual-chance flood event. Results of this analysis have been included in section 5.6 as a form of loss estimates.
- Page 14 – Utilizing the U.S. Inflation Calculator, Loss Estimates for the County and Municipalities included within the 2016 Flood Risk Report were adjusted for inflation (2021 dollars).
- Page 16 – Updated the Critical and Public Facilities that are within the 1% and 0.2% annual chance flood zone table.
- Page 18 & 19 – Created and added two new mapping products: "FEMA Special Flood Hazard Areas" and "Critical and Public Facilities within Special Flood Hazard Areas."
- Page 20 – Added a new Dam Failure section (Section 5.7) that addresses the County's four low hazard potential dams.
- Page 25 – Added a new Social Vulnerability section to the chapter's "Health, Safety, and Welfare" conclusion.
- Page 26 – Added the Social Vulnerability and FEMA 1 Percent Annual Chance Flood Zone map in association with the new Social Vulnerability section.
- Page 31 & 32– Created and added two new mapping products: Culvert Condition Priority Rating and "High Priority Culverts."
- Page 33 – Added a conclusion identifying locations of green infrastructure potentially suitable for permanent agricultural/conservation land easements.

CHAPTER 5: FLOOD

Talbot County is crisscrossed with waterways; the county has approximately 600 miles of shoreline. Talbot County is bordered by the Chesapeake Bay to the west, the Choptank River to the east and south, and the Tuckahoe River to the east. Other major tributaries include the Wye, Miles, and Tred Avon Rivers as well as the Harris and Broad Creeks.

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."

Due to the large number of waterways in Talbot County, the county is susceptible to different types of flooding. Flooding can be categorized as non-tidal (flash, riverine), tidal (from storm surges and tides), and coastal.

1. Flash flooding results from a combination of rainfall intensity and duration and is further influenced by local topography and the ground's capacity to hold water.

2. Riverine flooding is caused by persistent moderate or heavy rain over one or more days, sometimes combined with snowmelt, causing a river to slowly rise and overflow its banks.

3. Coastal flooding occurs when normally dry, low-lying land is flooded by seawater. The extent of coastal flooding is a function of the elevation inland floodwaters penetrate which is controlled by the topography of the coastal land exposed to flooding.

This chapter will focus on riverine and flash flooding; more information can be found regarding tidal and coastal flooding in *Chapter 4: Coastal Hazards*. Additionally, flooding caused by dam failure will be profiled at the end of the chapter.

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."

5.1 FLOOD HAZARD IMPACTS

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of the Plan Update process, stakeholders were provided an opportunity to review and modify information within the table. Results were reviewed and finalized during the Hazard Mitigation Planning Committee meeting held on September 22, 2021. Table 5-1 provides impacts from flood hazard events to Talbot County per Community Pillar.

Table 5-1. Hazard Impact Table	
Flood	
Health, Safety, and Welfare	• Economic development – impacts tourism and real estate (tax income). • Environmental – impacts silt and runoff into bay. • Early warning system, evacuation, and holdouts. • Long Term Issues: Disease, contamination, health issues, economic development, and property damage. • Short Term Issues: Access to critical populations and critical facilities. • Twenty-five percent food insecure. Problems with drinking water.
Economic Stability	• Increased threat (rise is perceived) would have a negative impact on property values and all related industries. • Destruction of infrastructure would have long-term impacts on tourism and economic development. • Damage to structures could force long-term closures and business interruptions • Lack of work/no salaries. • Limit access of emergency response to residential and business areas. • Sea-level rise will impact loan real estate values over time and limit land use. • Sea-level rise will negatively impact businesses, homes, and farms located directly on shorelines, especially marinas and boat builders. • Increased insurance costs for business operations.
Education	• Renewable energy, distributed locally is vital to resilience? • Opportunity for Education – K-12, College/University, and Professional ○ can this be an economic driver? **Infrastructure (Wind & Water):** • Power failure. • Damage to facilities (over Gateway I Storms). • Facilities are used as emergency shelters. • EHS: full sized generator can run 2-3 days of continuous operation (lights & A/C). **Transportation:** • TCPS might need to use buses to move residents (up to 3500 persons at a time). **Interruptions in service:** • No school on hurricane days Chesapeake College: • Worries are: glass/structures • Generators on approximately 2 buildings: battery back-up coming for kitchen/student center.
Infrastructure	• Roads and bridges – submerged, evacuation impact. • Roads and bridges – damages create (long-term) closures. • Communication – wind related O.H. impacts. • Power – wind related “overhead impacts” O.H. line impacts. • Water – by virtue of power loss. • Sewer – direct flooding impacts (Tilghman Plant) and power loss.
Environmental	• Pollutants from fertilizers entering waterways during flood events. • Impervious surfaces exacerbate flooding. • Stormwater management and use of best practices/retrofits. • Areas for protection - flood, erosion, and habitat. • Erosion, sedimentation, nutrient inputs/transport, pollution discharge from non-Combined Sewer Overflow (CSO) communities. • Failed water systems. • Damaged storage tanks, septic systems (old/undocumented). • Saltwater inundation damages to habitat and vice versa too much fresh water in saltwater habitats. • Green infrastructure and land conservation are useful tools for flood mitigation. **Climate Change:** • Increased precipitation. • Increased stream channel erosion. • Stormwater best management practices may become inadequate. • Changes in water temperatures & salinity.
Source: Talbot County Community Resilience Stakeholder Committee	

5.1.1 PROBABILITY OF FUTURE FLOOD HAZARD EVENTS

To determine the probability of future flooding, the following types of flooding were considered from the National Centers for Environmental Information (NCEI) Storm Events Database: Flood, Flash Flood, and Heavy Rain. In total, 76 flood events have occurred in Talbot County from 1996 through 2021. Including all three event types, an average of 2.92 flood events occurs per year. The following sections describe historical occurrences of these three NCEI-defined flood events in more detail.

Flood

Table 5-2 below indicates that three (3) flood events have occurred in the last ten years (2011-2021). On average, 0.27 flood events occur per year. These events have caused an estimated $2 million in property damages. Data presented below was obtained from the NCEI Storm Events Database. The NCEI database 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."

Table 5-2. Flood Event Narrative

August 28, 2011	Flooding rains forced the closure of sections of Maryland State Routes 565A, 329, 328 and 33. The combination of flooding and tropical storm winds damaged 100 properties and 50 roadways and bridges Roadway damage alone was estimated at $750,000. Event rainfall totals included 11.50 inches in Beechwood, 10.68 inches in North Easton, 9.75 inches in Easton, 9.48 inches in Papermill Pond, 9.40 in Bellevue and 9.12 inches in Trappe. Reported property damage totaled 1 million dollars.
October 29, 2012	Post Tropical Storm Sandy caused an initial estimate of $5 million dollars in damage in the Eastern Shore of Maryland. Most of the damages were due to flooding caused by excessive rainfall, as up to 13 inches of rain were reported, and due to the high winds, which caused trees and wires to come down across the state. Delmarva Power, which serves portions of the eastern shore counties, reported over 30,000 households without power during the peak of the storm. Most residents had power returned by the morning of the 30th. Hundreds of roads were closed due to numerous downed trees and flooding. No direct deaths were reported on the Eastern Shore of Maryland due to the storm. Prior to Sandy's arrival, Governor Martin O'Malley declared a State of Emergency for Maryland. No mandatory evacuations were ordered prior to or during the storm on the Eastern Shore. The Chesapeake Bay Bridge was closed due to high winds just before 3 p.m. on the 29th and remained closed through about 9 a.m. on the 30th. The state also closed the Millard E. Tydings Memorial Bridge, where Interstate 95 crosses the Susquehanna River. Swift water rescue teams from South Carolina were on standby throughout the storm and thankfully were not utilized. The storm surge was 3 to 3.5 feet. The region was spared higher surges as Sandy made landfall in New Jersey and the winds prior to landfall pushed water down the Chesapeake Bay. Minor tidal flooding also occurred at Tolchester Beach during the subsequent afternoon high tide cycle on the 30th. Heavy rains fell across the area as Sandy approached and then moved through the region. Peak wind gusts included 60 mph in Tolchester Beach (Kent County), 59 mph in Bay City (Queen Anne's County), 55 mph in Royal Oak (Talbot County), 53 mph at the Stevensville Airport (Queen Anne's County), 48 mph at the Easton Airport (Talbot County), 47 mph in Colora (Cecil County) and 41 mph near Jumptown (Caroline County).
August 8, 2017	Thunderstorms led to minor flooding; no property damage was recorded. The Intersection of Cordova and Rabbit Hill was closed due to water.

Source: National Centers for Environmental Information-Storm Events Database

Flash Flooding

The NCEI defines flash flooding as "a life-threatening, rapid rise of water into a normally dry area beginning within minutes to multiple hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify the shorter-term flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters. Flash flooding, such as dangerous small stream or urban flooding and dam or levee failures, requires immediate action to protect life and property. Conversely, flash flooding can transition into flooding as rapidly rising waters abate."

The following table indicates flash flood events that have occurred in Talbot County with property damage

since 1996. Four (4) flash flood events have caused property damage in the county since 1996. These events have caused an estimated $4.1 million in property damages. In total, eighteen (18) flash flood events have occurred. Based on NCEI data, on average, 0.69 flash flood events occur per year since 1996. Data presented below (Table 5-3) was obtained from the National Centers for Environmental Information (NCEI) Storm Events Database.

Table 5-3: Flash Flood Event Narrative		Property Damage ($)
September 16, 1999	Hurricane Floyd battered the Maryland Eastern Shore on September 16th and brought with it torrential rains and damaging winds. The hurricane caused widespread flash flooding as storm totals averaged around ten inches, most of which fell in a twelve-hour period from the early morning through the afternoon on the 16th. The highest verifiable storm total was 14.00 inches in Chestertown (Kent County). In Talbot County, flooding forced the closure of numerous roads in Easton, St. Michael's and Oxford. At 1040 a.m. EDT, a man hanging from a branch was rescued in Easton. About 75 people went to shelters as citizens in low-lying areas were urged to evacuate. On the Talbot County side of Queen Anne, severe damage occurred to 10 homes, three businesses and 30 vehicles on Cannery Road. The water was up to 10 feet high on the 16th and there was still up to six feet of water in the streets the next day. Downed trees caused about 3,000 homes and businesses to lose power in Easton, Saint Michael's and Trappe. A wind gust to 50 mph was recorded in Royal Oak.	$3.5 million
August 26, 2012	Thunderstorms with torrential downpours caused flash flooding in and around Easton. About 16 roadways in and out of Easton were flooded and closed including U.S. Route 50. Water rescues were performed on Washington Street and Elliot Road. Most roadways were able to reopen by 10 p.m. EDT that evening. The Talbot Town Shopping Center suffered flood damage as some businesses had two feet of water within them. The Talbot County Visual Arts Center in Easton was closed because of flood damage. In Cordova, vehicles were abandoned, and rescues were performed. Maryland State Route 333 was flooded in Oxford. There were 70 flood related calls in Talbot County. Two roadways were washed out and two small bridges were also flooded. Rainfall totals included 7.37 inches in Easton.	$500,000
August 26, 2012	The combination of a decaying low-pressure system in eastern Virginia and convergence along bay breeze fronts caused thunderstorms with torrential downpours to form on the Eastern Shore. Flash flooding occurred in parts of Talbot, Queen Anne's and Caroline Counties where Doppler Radar storm total estimates reached 6 to 8 inches. Thunderstorms with torrential downpours caused flash flooding in and around Saint Michaels. Vehicles were abandoned and rescues were performed. Event precipitation totals included 6.10 inches in Saint Michaels.	$25,000
July 12, 2013	A low-pressure system that developed along a cold frontal boundary brought showers and thunderstorms with very heavy downpours to the Eastern Shore, especially during the first half of the day into the early afternoon on the 12th. This caused flash flooding in parts of Queen Anne's, Caroline and Talbot Counties and poor drainage flooding in other parts of the Eastern Shore. Doppler Radar storm total estimates reached 3 to 7 inches in sections of the latter counties. Thunderstorms with torrential downpour caused flash flooding across central and northern Talbot County during the late morning and early afternoon on the 12th. Kingston Landing Road was closed after sections of it washed away. Four other roadways were flooded and closed including Maryland State Routes 309 and 328. There were several vehicular water rescues near Easton, but no injuries were reported. Event precipitation totals were 3.36 inches in St. Michaels and 2.66 inches in Easton. Doppler Radar storm total estimates reached 4 inches in the heaviest band across the county.	$50,000
Source: National Centers for Environmental Information-Storm Events Database		

Heavy Rain

Historical occurrences of **heavy rain** events are included in determining the probability of future flood events. The NCEI defines **heavy rain** as "unusually large amount of rain which does not cause a Flash Flood or Flood event, but causes damage, e.g., roof collapse or other human/economic impact."

Fifty-five (55) heavy rain events have occurred in the county since 1996. On average, 2.16 heavy rain events occur per year.

5.2 FLOOD RISK

To assess flood hazard risk, a composite score method was utilized. The composite score method was based on a blend of quantitative and qualitative factors extracted from the National Centers for Environmental Information (NCEI), a 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.

Based on this method, the flood hazard was assigned a ranking of "High" during the 2022 Plan Update. This is consistent with the hazard's ranking during the 2017 planning cycle. Detailed information is available within *Appendix A: Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables.*

The following tables represent the data that was utilized within the composite scoring method developed to assess flood hazard risk. Reported information from the NCEI Storm Events Database for the flood hazard included the following NCEI categories: Flood, Flash Flood, and Heavy Rain. The timeframes covered by the NCEI data used is from 01/1/1996 through 05/31/2021.

Table 5-4. Total Flood Hazard Risk Assessment Data Table
Hazards included within this table from NCEI Data: Flood, Flash Flood, and Heavy Rain

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$6.075M	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 76 Annual Avg. = 2.92

Source: National Centers for Environmental Information, as of February 2021 & 2016 State of Maryland Hazard Mitigation Plan
**Note: Data collected for 1950-present, no data available for this event type prior to 1996.*

Table 5-5. Flood Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2011-2021)
0	0	$2M	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 3 Annual Avg. = 0.27

Note: Data collected for 1950-present, no data available for this event type prior to 2011.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Flood (C). 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. If the event is considered significant, it should be entered into Storm Data, even if it only affected a small area.

Table 5-6. Flash Flood Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$4.075M	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 18 Annual Avg. = 0.69

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Flash Flood (C). A life-threatening, rapid rise of water into a normally dry area beginning within minutes to

multiple hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to the shorter-term flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters. Flash flooding, such as dangerous small stream or urban flooding and dam or levee failures, requires immediate action to protect life and property. Conversely, flash flooding can transition into flooding as rapidly rising waters abate. The Storm Data preparer uses professional judgment in determining when the event is no longer characteristic of a Flash Flood and becomes a Flood.

Table 5-7. Heavy Rain Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$0	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 55 Annual Avg. = 2.16

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Heavy Rain (C). Unusually large amount of rain which does not cause a Flash Flood or Flood event, but causes damage, e.g., roof collapse or other human/economic impact. Heavy Rain will no longer be acceptable to record low-impact or isolated flood events.

5.2.1 The National Risk Assessment

According to *The 3rd National Risk Assessment*, Talbot County has the greatest growth in operational risk of any county in the State of Maryland. Operational risk denotes when a facility is flooded to the point where it can no longer function as intended or becomes unsafe. These thresholds vary depending on infrastructure type. More information is available in the methodology section of the National Risk Assessment.[1]

The following conclusions from the National Risk Assessment highlight risk in five categories: roads, residential, commercial, infrastructure, and social. Except for commercial, Talbot County has the greatest growing operational risk in all categories.

- Roads: Talbot County, 19.3%
  - Greatest growing risk to commutes and transportation with 310 additional miles of roads at risk of becoming impassable in 30 years.
- Residential: Talbot County, 15.7%
  - Greatest growing risk to property owners with 2,220 additional residential properties at risk of water reaching their building in 30 years.
- Commercial: Worcester County, 16.8%
  - Greatest growing risk to businesses with 346 additional commercial buildings at risk of water reaching their building in 30 years.
- Infrastructure: Talbot County, 17.6%
  - Greatest growing risk to critical infrastructure (utilities, emergency services, etc.) with 6 additional facilities at risk of becoming inoperable in 30 years.
- Social: Talbot County, 16.9%
  - Greatest growing risk to government, education or social facilities with 12 additional facilities at risk of becoming inoperable in 30 years.

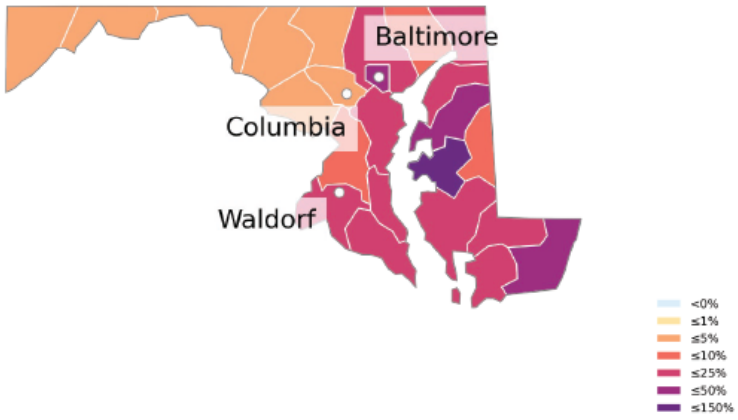
Figure 5-1: Growth in Operational Risk by County.
Source: The 3rd National Risk Assessment, 2021

Change by County
Maryland

As severity and frequency of flood events in Maryland increase over the next 30 years with a changing environment, an additional 22,849 residential properties, 1,536.0 miles of roads, 1,379 commercial properties, 73 infrastructure facilities, and 102 social facilities will be at risk of becoming inoperable.*

Change in risk over 30 years

Based on proportion and severity



*Operational risk denotes when a facility is flooded to the point where it can no longer function as intended or becomes unsafe. These thresholds vary depending on infrastructure type, see methodology for each as well as overall risk definition.
**The infrastructure category includes airports, fire stations, hospitals, police stations, ports, power stations, superfund/hazardous waste sites, water outfalls and wastewater treatment facilities.
+The social category includes government buildings, historic buildings, houses of worship, museums and schools.
Locations with fewer than 10 miles of roads, 1,000 residential properties and 5 social, commercial, and infrastructure facilities are excluded from tables.

Greatest growth in operational risk, 2021-2051

% increase in proportion with operational risk over next 30 years

Rank	County name	Residential properties	Miles of roads	Commercial properties	Infrastructure facilities**	Social facilities+
1	Talbot County	15.7%	19.3%	8.7%	17.6%	16.9%
2	Worcester County	15.6%	7.8%	16.8%	8.3%	5.6%
3	Queen Anne's County	12.8%	6.8%	11.1%	4.1%	11.4%
4	Dorchester County	5.4%	8.6%	5.9%	7.7%	3.2%
5	Somerset County	6.1%	5.8%	5.1%	5.4%	6.8%
6	Baltimore city	0.6%	2.9%	3.3%	16.3%	2.8%
7	St. Mary's County	1.6%	2.4%	0.8%	5.3%	1.8%
8	Wicomico County	1.5%	4.5%	2.2%	1.9%	1.5%
9	Charles County	0.8%	2.0%	0.7%	7.2%	0.5%
10	Cecil County	1.4%	1.3%	2.0%	3.6%	1.7%
	• State Average	1.3%	2.4%	2.2%	4.2%	1.2%

Greatest growing operational risk by category

- **Residential: Talbot County, 15.7%**
Greatest growing risk to property owners with 2,220 additional residential properties at risk of water reaching their building in 30 years.
- **Roads: Talbot County, 19.3%**
Greatest growing risk to commutes and transportation with 310 additional miles of roads at risk of becoming impassable in 30 years.
- **Commercial: Worcester County, 16.8%**
Greatest growing risk to businesses with 346 additional commercial buildings at risk of water reaching their building in 30 years.
- **Social: Talbot County, 16.9%**
Greatest growing risk to government, education or social facilities with 12 additional facilities at risk of becoming inoperable in 30 years.
- **Infrastructure: Talbot County, 17.6%**
Greatest growing risk to critical infrastructure (utilities, emergency services, etc) with 6 additional facilities at risk of becoming inoperable in 30 years.

5.2.2 Revised County Flood Insurance Rate Maps

In April of 2015 FEMA delivered preliminary Flood Insurance Rate Maps (FIRMs) to Talbot County, initiating the process of adopting new flood zone designations and base flood elevations. A successful public meeting was held on June 11, 2015, in St. Michaels; approximately 80 residents attended the meeting for purposes of viewing the new maps and asking questions. The FIRM maps were made effective on July 20, 2016. As of the 2022 Plan Update, this is the most up to date FIRM for Talbot County.

Changes Since Last FIRM

Special Flood Hazard Area (SFHA) boundaries within Talbot County were updated due to new engineering analysis performed. The updated modeling produced new flood zone areas and new base flood elevations in some areas and utilized recently developed LIDAR-based topographic data. A comparison between previous effective FIRM and new provides a summary of increases, decreases, and the net change of the SFHA's, Floodways, and Coastal High Hazard Areas (CHHAs) for the County. As of this plan update, this is still the most up-to-date SFHA.

Table 5-8. Changes Since the Last FIRM – Talbot County Unincorporated Areas

Area of Study	Total Area (square miles)	Increase (square miles)	Decrease (square miles)	Net Change (square miles)
Within SFHA	67.8	5.6	25.5	-19.9
Within Floodway	<0.1	0	<0.1	>0.1
Within CHHA (Zones VE or V)	13.0	4.7	4.9	-0.1

Source: 2016 Talbot County Flood Risk Assessment Report

5.2.3 FEMA Flood Zones

Digital Flood Insurance Rate Maps (DFIRM) contain flood inundation areas that are depicted as flood zones. Flood zones include Zones A, AE, VE, Shaded X and AO. Flood zones that have a 1-percent chance of being equaled or exceeded in any given year are called special flood hazard areas and include zones A, AE, VE, and AO (see Table 5-9 for definitions of these zones). These zones are also referred to as the base flood or 100-year flood.

Table 5-9. FEMA Designated Flood Zones

Flood Zone		Description
SFHA – High Risk Areas		
A	1% Annual Chance Flood Zone	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE		Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
VE		Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO		River or stream flood hazard area, and areas with a 1-percent or greater chance of swallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1-3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage.
Minimum Risk Areas		

Table 5-9. FEMA Designated Flood Zones		
Flood Zone		**Description**
Shaded X	0.2% Annual Chance Flood Zone	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone X is the area determined to be outside the 500- year flood and protected by levee from 100-year flood. Average flood depths derived from detailed analyses are shown within these zones.
Source: FEMA Flood Zones.		

5.3 NATIONAL FLOOD INSURANCE PROGRAM

Talbot County has undertaken several mitigation actions related to floods. The County and its incorporated municipalities all participate in the National Flood Insurance Program (NFIP). Talbot County has created several brochures to inform community members on ways to reduce flood risk and helps eligible county residents receive flood insurance premium discounts. Brochures provided on the Talbot County website include the following:

1. Flood Safety;
2. Flood FAQs;
3. Flood Insurance Program;
4. Build Responsibly; and,
5. Community Rating System.

Talbot County's unincorporated areas are currently rated as Class 7 in the National Flood Insurance Program's Community Rating System (CRS). The NFIP's CRS program encourages floodplain management activities that exceed minimum NFIP requirements in exchange for countywide reduction in flood insurance premiums. CRS is a voluntary program that provides reductions on flood insurance premiums of up to 45 percent for participating communities who go beyond minimum floodplain management requirements and provide extra protection from flooding. All qualifying flood insurance policies issued or renewed on or after October 1, 2020, for properties in Talbot County's unincorporated areas located in a special flood hazard area receive a fifteen (15) percent discount. Properties not located in the special flood hazard area receive a five (5) percent discount.

As of October 19, 2021, there were 1,405 total flood insurance policies in Talbot County as reported within FEMA's PIVOT database. Total policies in force reported in 2017 were 1,681; therefore, Talbot County has seen a decline in total policies in force of 276. According to the Insurance Information Institute, the number of policies in force across the U.S. has been declining from the high point of 5.7 million in 2009 to 4.95 million by August 2021.[2] Changes to the SFHA as identified within Table 5-8, which indicate a total decrease of 19.9 square miles to the SFHA, are the most likely explanation for the decrease in total flood insurance policies between 2017 and 2021.

Total coverage as of October 19, 2021, amounted to $459,952,600 with annual premiums totaling $1,005,074. The 15% discount saves homeowners $150,761.10 per year. This translates into $107 in savings for each policy holder in the "A" flood zones and $36 for those eligible policy holders outside the "A" zone. Talbot County policyholders have filed 399 claims totaling $7,788,587.36 since 1978.

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

FEMA defines a repetitive loss property as:

- A property for which two or more claims of more than $1,000 have been paid by the NFIP

within a ten-year period since 1978;

- 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.

As part of the plan update process, the repetitive loss listing for Talbot County was obtained from the Maryland NFIP Coordinating Office. As of October 19, 2021, there are twelve (12) repetitive loss properties located within Talbot County and its municipalities: one (1) multi-family residential, two (2) non-residential businesses, one (1) other non-residential, and eight (8) single family residential properties. There are no severe repetitive loss structures located within Talbot County.

More information related to Talbot County's capabilities related to the NFIP, CRS, and repetitive loss properties can be found in *Appendix H: NFIP & CRS (Official Use Only)* of this plan.

5.4 TALBOT COUNTY FLOOD RISK MAP APPLICATION

As a part of a proactive strategy to communicate about flood risk and engage the public, the county has invested in Geographic Information Systems (GIS) to develop an interactive web map application dedicated to flood risk. This capability enables individual property owners, local planners, developers, surveyors, insurance agents, and real estate agents to gain access to information that is typically difficult to obtain so that they may be able to evaluate and discuss flood vulnerability.

The content of the flood risk web map application includes:

- Elevation Certificates (after 2000)
- Stormwater flow patterns (both yellow and black depending on background color);
- Watersheds;
- Effective FEMA floodplains;
- Prior FEMA floodplains;
- Storm surge (from Army Corps of Engineers Evacuation Study 2006);
- Road closures due to previous storms;
- Elevation color ramps (LiDAR data 2003); and,
- Elevation spot shots.

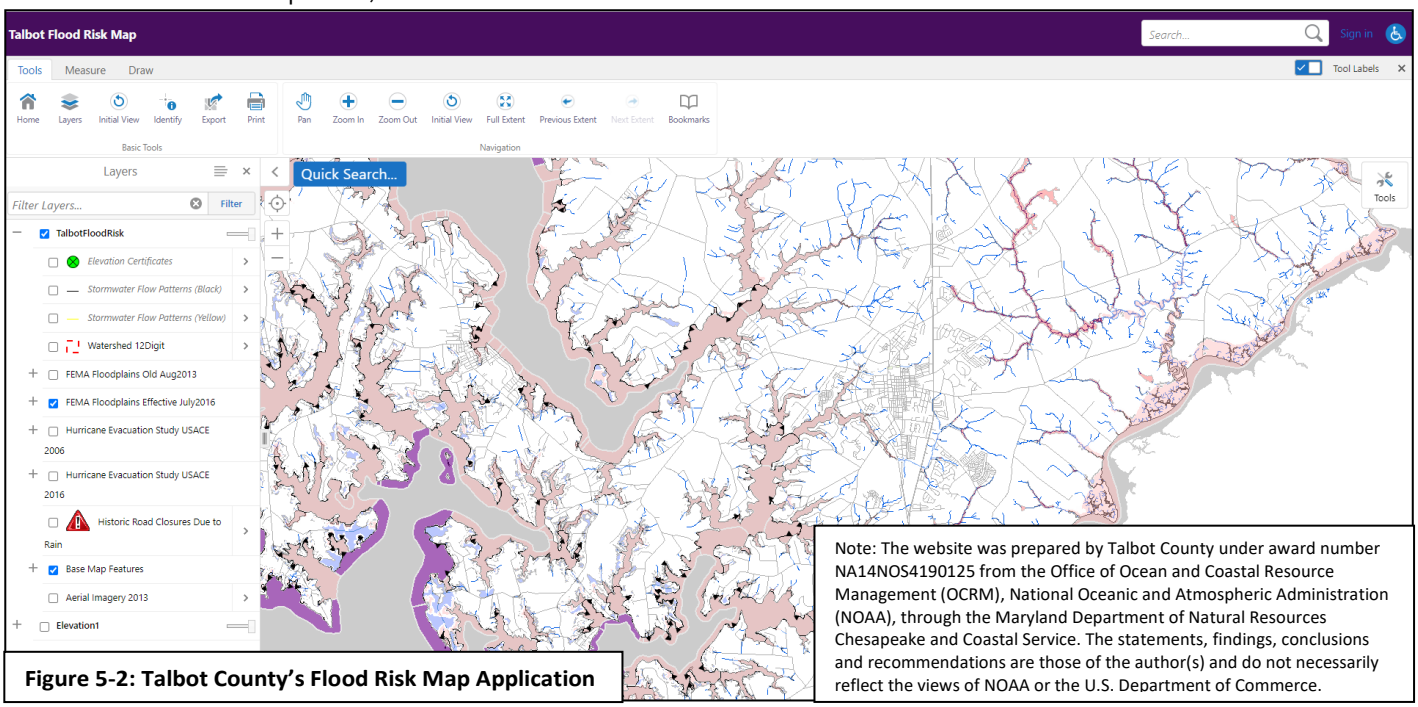


Figure 5-2: Talbot County's Flood Risk Map Application

Note: The website was prepared by Talbot County under award number NA14NOS4190125 from the Office of Ocean and Coastal Resource Management (OCRM), National Oceanic and Atmospheric Administration (NOAA), through the Maryland Department of Natural Resources Chesapeake and Coastal Service. The statements, findings, conclusions and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.

5.5 FLOOD VULNERABILITY & LOSS ESTIMATIONS

As part of their National Risk Index, FEMA has calculated the average economic loss in dollars resulting from natural hazards each year, also known as Expected Annual Loss (EAL). The EAL includes the following variables to calculate expected loss: Exposure, Annualized Frequency, and Historic Loss Ratio. An Expected Annual Loss score is calculated independently for each consequence type—buildings, population, and agriculture—for each community (county and Census tract). More details can be found at hazards.fema.gov. The National Risk Index places Talbot County's overall EAL as "Relatively Low", being slightly higher than the national average and lower than the State of Maryland's average. In comparison, 69.8% of U.S. counties had a lower EAL and 45.8% of Maryland counties have a lower EAL. Table 5-10 provides an overview of EAL for the entirety of Talbot County, including all natural hazards.

Table 5-10. Expected Annual Loss Overview for Talbot County, All Natural Hazards

Variable	Estimated Loss
Composite Expected Annual Loss	6,086,127.50
Building Value	$4,363,156.04
Population	0.10 fatalities
Population Equivalence	$723,923.33
Agriculture Value	$999,048.13

Source: FEMA National Risk Index, Expected Annual Loss (data last collected for the years 2014-2021).
Note: Full technical documentation can be found at: www.fema.gov/sites/default/files/documents/fema_national-risk-index_technical-documentation.pdf

For the flood (i.e., riverine flooding) hazard specifically, the EAL score for Talbot County is "Relatively Low." Table 5-11 provides an overview of Expected Annual Loss for riverine flooding.

Table 5-11. Expected Annual Loss Overview for Talbot County, Flood Hazard

Variable	Estimated Loss
Total Expected Annual Loss	$522,041
Building Value	$349,894
Population	0.02 fatalities
Population Equivalence	$160,649
Agriculture Value	$11,499

Source: FEMA National Risk Index, Expected Annual Loss (data last collected for the years 2014-2021).
Note: Full technical documentation can be found at: www.fema.gov/sites/default/files/documents/fema_national-risk-index_technical-documentation.pdf

Data can be utilized to identify and measure vulnerability by including local building information (e.g., parcel data and building type data) and overlaying with special flood hazard areas.

The latest parcel data available from Talbot County and Maryland PropertyView have been intersected in ArcMap with the 1-percent-annual-chance flood event (100-year) and the 0.2-percent-annual-chance flood event (500-year). Page 5-18 depicts these flood zones for the entire county. The results of this analysis are included in the following two tables. They represent parcel data for the entirety of Talbot County, including all incorporated and unincorporated areas.

Table 5-12. Talbot County – Incorporated & Unincorporated Parcels Potential Flood Losses (1% Annual Chance)

Parcel Type	Estimated Improvement Value	% of Total
Agricultural	$18,391,600	27.6%
Residential	$44,599,400	66.9%
Residential/Commercial	$415,100	0.6%
Country Club	$3,199,100	4.8%
Total:	**$66,605,200**	**100%**

Note: Includes parcels with new structures from 2016-2020.
Source: Talbot County Parcel Data & Maryland PropertyView.

Table 5-13. Talbot County – Incorporated & Unincorporated Parcels Potential Flood Losses (0.2% Annual Chance)		
Parcel Type	**Estimated Improvement Value**	**% of Total**
Agricultural	$14,453,000	47.5%
Residential	$15,548,800	51.1%
Residential/Commercial	$415,100	1.4%
Total:	**$30,416,900**	**100%**

Note: Includes parcels with new structures from 2016-2020.
Source: Talbot County Parcel Data & Maryland PropertyView.

5.5.1 Hazus Loss Estimations

In 2016, flood losses were estimated using FEMA's flood loss estimating tool called Hazus. Hazus is a nationally applicable and standardized risk assessment tool that estimates potential losses due to specific hazards. In addition to FEMA flood zones, flood depth grids were used within the analysis. The flood depth grids communicate the flood depth as a function of the difference between calculated water surface elevation and the ground. Depth grids form the basis for the refined flood risk assessment as shown on the table below and are used to calculate potential flood losses. The estimates generated by Hazus in 2016 are useful for planning purposes today. The dollar amounts have been adjusted for inflation within each table to reflect 2021-dollar amounts.

The following refined study presented herein utilized Hazus Version 3.1 to calculate flood losses for the 1-percent-annual-chance flood event. These losses are expressed in dollar amounts. Flood loss estimates include:

- Residential Asset Loss: all classes of residential structures including single family, multi-family, manufactured housing, group housing, and nursing homes.
- Commercial Asset Loss: all classes of building including retail, wholesale, repair. Professional services, banks, hospitals, entertainment, and parking facilities.
- Other Asset Losses: losses for facilities categorized as industrial, agriculture, religious, government, and educational.
- Business Disruption: this includes losses associated with the inability to operate a business due to the damaged sustained during the flood event. Losses include inventory, income, rental income, wage, and direct output losses, as well as relocation costs.

Table 5-14. Talbot County – Estimated Potential Refined Flood Losses (Total Unincorporated Area)			
Type	**Inventory Estimated Value (2021 dollars)**	**% Of Total**	**1% (100-yr) Dollar Losses (2021 dollars)**
Residential Building & Contents	$380,767,000	89%	$23,112,400
Commercial Building & Contents	$40,285,500	9%	$8,785,000
Other Building & Contents	$6,526,000	2%	$1,129,500
Total Building & Contents	$427,578,500	100%	$33,026,900
Business Disruption	N/A	N/A	$2,008,000
Total	$427,578,500	**N/A**	$35,034,900

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report

5.5.2 Town of Easton

Data provided below only includes areas in the Town of Easton. The National Average Annualized Loss (AAL) Study Data was completed using Hazus (Version 2.1) General Building Stock (GBS) inventory data (U.S. Census) and resulting losses from the National AAL Study. Dollar Amounts have been adjusted for inflation (2021 dollars). The new dollar amounts represent a 25.5% increase from previous amounts.

5-15. Town of Easton – Estimated Potential Flood Losses (National AAL Study)			
Type	**Inventory Estimated Value (2021 dollars)**	**% of Total**	**1% (100-yr) Dollar Losses (2021 dollars)**
Residential Building & Contents	$879,755,000	43%	$878,500
Commercial Building & Contents	$876,115,500	43%	$878,500
Other Building & Contents	$281,120,000	14%	$251,000
Total Building & Contents	$2,036,990,500	100%	$2,008,000
Business Disruption	N/A	N/A	$62,750
Total	$2,036,990,500	N/A	$2,070,750

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report.

5.5.3 Town of Oxford

Data provided below only includes areas in the Town of Oxford. The refined study presented herein utilized Hazus Version 3.1 to calculate coastal flood losses for the 1-percent-annual-chance flood event. These losses are expressed in dollar amounts. Dollar Amounts have been adjusted for inflation (2021 dollars). The new dollar amounts represent a 25.5% increase from previous amounts.

5-16. Town of Oxford – Estimated Potential Refined Flood Losses			
Type	**Inventory Estimated Value (2021 dollars)**	**% of Total**	**1% (100-yr) Dollar Losses (2021 dollars)**
Residential Building & Contents	$78,437,500	81%	$3,639,500
Commercial Building & Contents	$15,185,500	16%	$1,380,500
Other Building & Contents	$2,761,000	3%	$37,650
Total Building & Contents	$98,768,500	100%	$5,145,500
Business Disruption	N/A	N/A	$1,129,500
Total	$96,258,500	N/A	$6,275,000

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report.

5.5.4 Town of Queen Anne

Data provided below only includes areas in the Town of Queen Anne. The National AAL Study Data was completed using Hazus (Version 2.1) General Building Stock (GBS) inventory data (U.S. Census) and resulting losses from the FEMA National AAL Study. Dollar Amounts have been adjusted for inflation (2021 dollars). The new dollar amounts represent a 25.5% increase from previous amounts.

5-17. Town of Queen Anne – Estimated Potential Flood Losses (National AAL Study)			
Type	**Inventory Estimated Value (2021 dollars)**	**% Of Total**	**1% (100-yr) Dollar Losses (2021 dollars)**
Residential Building & Contents	$6,400,500	98%	$112,950
Commercial Building & Contents	$125,500	2%	$0
Other Building & Contents	$0	0%	$0
Total Building & Contents	$6,526,000	100%	$5,145,500
Business Disruption	N/A	N/A	$0
Total	$6,526,000	N/A	$112,950

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report.

5.5.5 Town of St. Michaels

Data provided below only includes areas in the Town of St. Michaels. The refined study presented herein utilized Hazus Version 3.1 to calculate coastal flood losses for the 1-percent-annual-chance flood event. These losses are expressed in dollar amounts. Dollar Amounts have been adjusted for inflation (2021 dollars). The new dollar amounts represent a 25.5% increase from previous amounts.

5-18. Town of St. Michaels – Estimated Potential Refined Flood Losses			
Type	**Inventory Estimated Value (2021 dollars)**	**% Of Total**	**1% (100-yr) Dollar Losses (2021 dollars)**
Residential Building & Contents	$19,076,000	49%	$1,882,500
Commercial Building & Contents	$16,566,000	42%	$6,149,500
Other Building & Contents	$3,263,000	8%	$1,129,500
Total Building & Contents	$38,905,000	100%	$9,036,000
Business Disruption	N/A	N/A	$125,500
Total	$38,905,000	**N/A**	$9,287,000

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report.

5.5.6 Town of Trappe

Data provided below only includes areas in the Town of Trappe. The National AAL Study Data was completed using Hazus (Version 2.1) General Building Stock (GBS) inventory data (U.S. Census) and resulting losses from the National AAL Study. Dollar Amounts have been adjusted for inflation (2021 dollars). The new dollar amounts represent a 25.5% increase from previous amounts.

5-19. Town of Trappe – Estimated Potential Flood Losses (National AAL Study)			
Type	**Inventory Estimated Value (2021 dollars)**	**% Of Total**	**1% (100-yr) Dollar Losses (2021 dollars)**
Residential Building & Contents	$70,907,500	71%	< $10,000
Commercial Building & Contents	$22,966,500	23%	< $10,000
Other Building & Contents	$5,647,500	6%	< $10,000
Total Building & Contents	$99,521,500	100%	< $10,000
Business Disruption	N/A	N/A	N/A
Total	$99,521,500	**N/A**	**< $10,000**

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report.

5.6 CRITICAL AND PUBLIC FACILITIES VULNERABILITY

Critical and public facilities within the 1-percent-annual-chance flood event and the 0.2-percent-annual-chance flood hazard areas have been identified and categorized in Table 5-20 below; results of this assessment are mapped on page 5-19. There are thirty-six (36) critical and public facilities within the 1-percent flood zone and three (3) within the 0.2 percent flood zone.

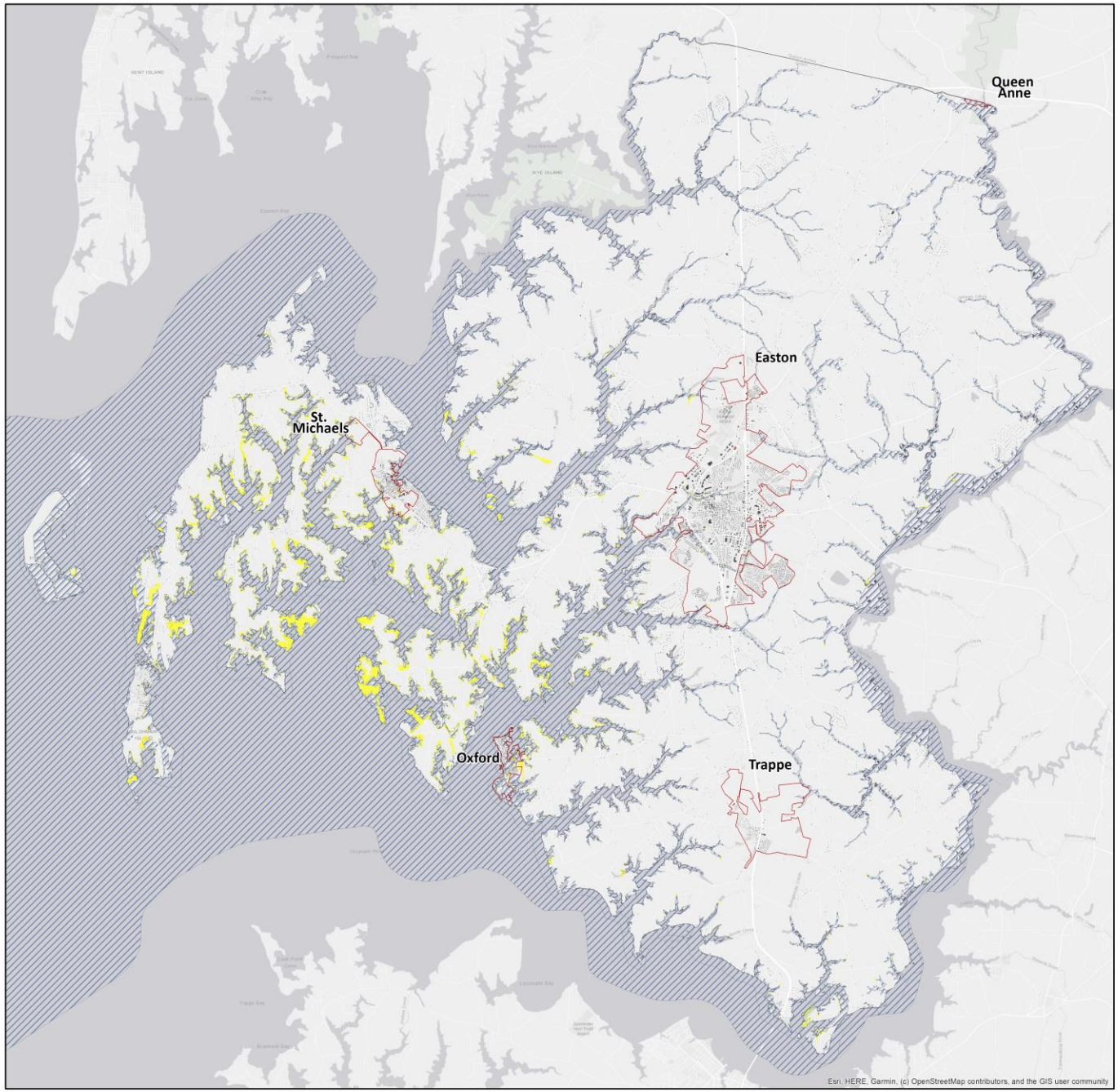
5-20. Critical And Public Facilities Within FEMA Special Flood Hazard Areas				
0.2-Percent-Annual-Chance Flood Hazard Area				
Facility Type	**Facility Detail**	**Facility Name**	**Address**	**Flood Depth (feet)**
Education	School	U.S. Naval Research Lab - Tilghman	4642 Black Walnut Point Road, Tilghman	-
Utility	Gas/Oil	Delmarva Oil Inc.	900 Port Street, Easton	-
Utility	Electric	Delmarva Power and Light	Canton Street, St. Michaels	-
1-Percent-Annual-Chance Flood Hazard Area				
Facility Type	**Facility Detail**	**Facility Name**	**Address**	**Flood Depth (feet)**
County Owned	Dock	County Owned Dock	7381 Tilghman Island Road, Tilghman	1.7
County Owned	Dock	County Owned Dock	Claiborne Landing, Claiborne	3.5
County Owned	Dock	County Owned Dock	Point Road, Easton	2.3
County Owned	Dock	County Owned Dock	Windy Hill Road, Trappe	3.7
County Owned	Dock	County Owned Dock	Skipton Landing Road, Cordova	4.4
County Owned	Dock	County Owned Dock	Matthewstown Road, Easton	3.7

5-20. Critical And Public Facilities Within FEMA Special Flood Hazard Areas				
County Owned	Dock	County Owned Dock	Wye Landing Lane, Wye Mills	2.5
Education	Community School	Chesapeake Bay Maritime	100 North Lane, St Michaels	2.8
Medical	Assisted Living	Sunrise Assisted Living	6670 Cedar Point Road	1.0
Miscellaneous	Marina	Marina	21764 Camper Circle, Tilghman	0.5
Miscellaneous	Marina	Bates Marine Basin	106 Richardson Street, Oxford	0.5
Miscellaneous	Marina	Campbell Town Creek Boat Yard	107 Myrtle Avenue, Oxford	1.3
Miscellaneous	Marina	Easton Point Marina	975 Port Street, Easton	1.8
Miscellaneous	Marina	Higgins Yacht Yard	Carpenter Street, St. Michaels	3.3
Miscellaneous	Marina	Hinckley Yacht Services	202 Bank Street, Oxford	1.5
Miscellaneous	Marina	Lowes Wharf Marina	21651 Lowes Wharf Road, Sherwood	0.5
Miscellaneous	Marina	Oxford Boatyard Yacht Sales	407 Strand Street, Oxford	0.5
Miscellaneous	Marina	Oxford Yacht Agency	317 S Morris Street, Oxford	0.6
Miscellaneous	Marina	Pier Street Marina	104 W Pier Street, Oxford	3.0
Miscellaneous	Marina	Severn Marine Services	Chicken Point Road, Tilghman	1.0
Municipal-Easton	Public Works	Pump Station	S Washington Street, Easton	0.5
Municipal-Oxford	Parks and Recreation	Oxford - tennis courts	Oxford Road, Oxford	1.5
Municipal-Oxford	Dock	Oxford Dock	Strand Street, Oxford	2.7
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	213 North Talbot Street, St. Michaels	3.8
Utility	Electric	Easton Utilities Cable	405 Bay Street, Easton	0.5
Utility	Gas/Oil	McMahan Oil Company	930 Port Street, Easton	0.5
Utility	Gas/Oil	Pep Up Inc./Russ Oil Company	956 Port Street, Easton	1.1
Utility	Pumping Station	Chapel East Pump Station	9076 Chapel Road, Easton	-
Utility	Pumping Station	Bachelors Harbor Pump Station	Bachelors Harbor Drive, Oxford	3.7
Utility	Pumping Station	Bank Street Pump Station	Bank Street, Oxford	0.9
Utility	Pumping Station	Bonfield Avenue Pump Station	Bonfield Avenue, Oxford	0.5
Utility	Pumping Station	Causeway/Oxford Road Pump Station	Oxford Road, Oxford	1.0
Utility	Telephone	Verizon	Oxford Road, Oxford	0.5
Utility	Tower	Gateway Marina and Ship's Store	1606 Marina Drive, Trappe	5.0
Utility	Tower	Tred Avon Yacht Club	102 W Strand Street, Oxford	0.5
Utility	Water Tower	Oxford Water Tower	400 Tilghman Street, Oxford	0.5
Source: 2022 Talbot County Critical & Public Facility Database and Effective DFIRM.				

All critical and public facilities within the SFHA should be prioritized for mitigation activity. Those facilities with a higher measured flood depth at the lowest adjacent grade should be prioritized first. Facilities with particularly high depth of flooding (3.0 feet or greater) are highlighted in Table 5-20 and listed below.

- Dock, County-Owned Dock, Claiborne Landing, Claiborne, 3.5 ft
- Dock, County-Owned Dock, Windy Hill Road, Trappe, 3.7 ft
- Dock, County-Owned Dock, Skipton Landing Road, Cordova, 4.4 ft
- Dock, County-Owned Dock, Matthewstown Road, Easton, 3.7 ft
- Marina, Higgins Yacht Yard, Carpenter Street, St. Michaels, 3.3 ft
- Marina, Pier Street Marina, 104 W Pier Street, Oxford, 3.0 ft
- Museum, Chesapeake Bay Maritime, 213 North Talbot Street, St. Michaels, 3.8 ft
- Pumping Station, Bachelors Harbor Drive, Oxford, 3.7 ft

FEMA Special Flood Hazard Areas (1 Percent and 0.2 Percent)



1-Percent Annual Chance Flood Zone

0.2-Percent Annual Chance Flood Zone

Structures

Municipalities

Talbot County

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

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works.

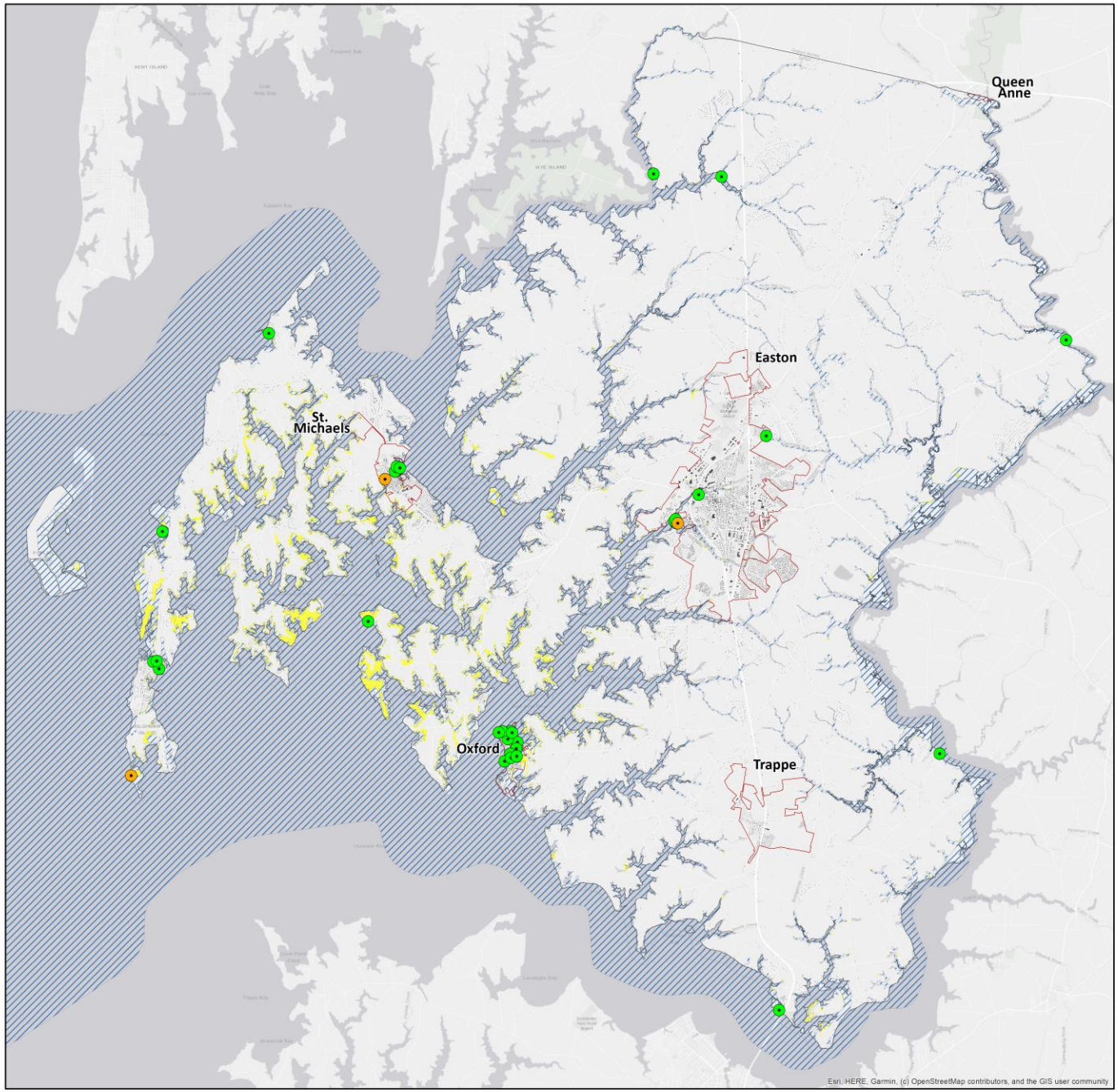
N

0 1.75 3.5 7 Miles

THE GREAT SEAL OF TALBOT COUNTY MARYLAND

SP&D
Smith Planning and Design

Critical and Public Facilities within Special Flood Hazard Areas



CF and PF within the 1-Percent Zone

CF and PF within the 0.2-Percent Zone

Structures

1-Percent Annual Chance Flood Zone

0.2-Percent Annual Chance Flood Zone

Municipalities

Talbot County

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

In total, 32 critical and public facilities are within the 1-percent annual chance flood zone. Areas with the greatest amount of critical and public facilities within the 1-percent annual chance flood zone include: Town of Easton (10), Town of Oxford (8), and the Town of St. Michaels (5). These facilities are identified within Table 5-20.

Three facilities are within the 0.2-percent annual chance flood zone. These facilities are identified within Table 5-20.

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.

N

0 1.75 3.5 7 Miles

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5.7 DAM FAILURE

Dams present risks but they also provide many benefits, including irrigation, flood control, and recreation. Dams have been identified as a key resource of our national infrastructure that is vulnerable to terrorist attack. States have the primary responsibility for protecting their populations from dam failure. Of the approximately 94,400 dams in the United States, State governments regulate about 70 percent. About 27,000 dams throughout the U.S. could incur damage or fail, resulting in significant property damage, lifeline disruption (utilities), business disruption, displacement of families from their homes, and environmental damage.[3]

According to FEMA, 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.[4] 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 after overtopping, or undergo component malfunction or misoperation, 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.

Talbot County has no high hazard potential dams (HHPD) but may be affected by the failure of four (4) low hazard potential dams. These dams are identified in the table, below.

Table 5-21. Dams Within Talbot County. Maryland

Dam Name	Dam Type	Primary Purpose	Emergency Action Plan	Owner Name	Hazard Potential Classification
Boyd Farm Pond	Earth	Recreation	Not Required	Wye Mills Farm Partnership	Low
Talbot County Club Pond (Country Club Drive)	Earth	Fish and Wildlife Pond	Not Required	Talbot Country Club	Low
Easton Primary Sewage Lagoon	Earth	Fish and Wildlife Pond	Not Required	Town of Easton	Low
Easton Secondary Sewage Lagoon	Earth	Irrigation	Not Required	Town of Easton	Low

Source: National Inventory of Dams, https://nid.sec.usace.army.mil/#/

Talbot County's point of contact for dam safety is Scott Bass, Acting Chief of Dam Safety Inspection and Compliance Division. This position coordinates with Maryland's Dam Safety Inspection and Compliance

Division and the Dam Safety Permits Division. During this plan update process, Talbot County's point of contact for dam safety reviewed this section and provided input related to this section's content. The following updates and information were shared during this plan update:

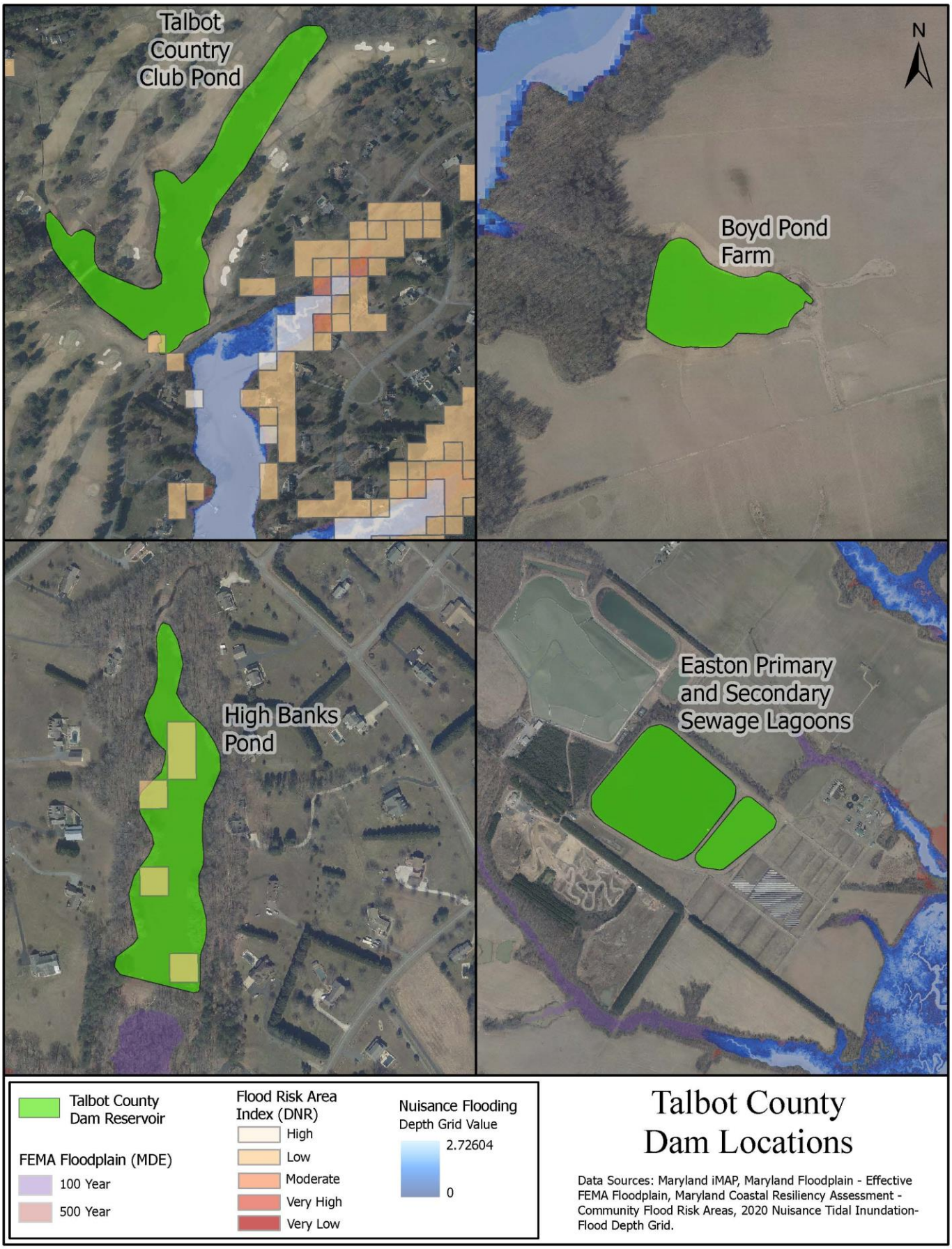
- All dams in Talbot County are classified as low hazard potential.
- All dams, except for Boyd Farm Pond, are listed as being in "good condition".
    - Boyd Farm Pond is listed in "poor" condition, but it is overdue for an inspection.
- Possible mitigation actions for Talbot's dams include: (1) independent assessments by an engineer and (2) removal of all trees from the dams.
- According to John Roche, Chief Dam Safety Permits Division, as development changes in Talbot County even low hazard potential dams could become a public safety concern and need to be reclassified.
    - Talbot County is working on a mapping program with FEMA hazard mitigation funds to identify dams outside of the County which could have impacts to Talbot County. Expected release date is October 2022.

The locations of Talbot County's four low hazard potential dams were mapped (page 5-22) and include the following information:

1. Dam Reservoir Extent
2. FEMA Floodplain (MDE)
3. Flood Risk Area Index (DNR)
4. Nuisance Flooding Depth Grid

If one of these four dams were to fail, no critical or public facilities are expected to be impacted. In fact, these dams are largely in rural parts of Talbot County, and as such, minimal impacts to people or development are expected.

Additional information regarding Talbot County's dams, as well as all dams across Maryland and the United States, may be accessed by members of the community and business owner via the National Inventory of Dams. This is an online resource that can aid in determining the location of dams, and includes important information such as such as hazard classification, owner, and Emergency Action Plan (EAP) status.


Talbot Country Club Pond
N
Boyd Pond Farm
High Banks Pond
Easton Primary and Secondary Sewage Lagoons
Talbot County Dam Reservoir
FEMA Floodplain (MDE)
100 Year
500 Year
Flood Risk Area Index (DNR)
High
Low
Moderate
Very High
Very Low
Nuisance Flooding Depth Grid Value
2.72604
0
Talbot County Dam Locations
Data Sources: Maryland iMAP, Maryland Floodplain - Effective FEMA Floodplain, Maryland Coastal Resiliency Assessment - Community Flood Risk Areas, 2020 Nuisance Tidal Inundation-Flood Depth Grid.

5.8 FLOOD HAZARDS CONCLUSION

Through the identification and understanding of flood hazard risks, Talbot County has taken an important step to becoming more resilient. Communicating the hazard risk information compiled within this plan to residents, businesses, and institutional members of the community so that they fully understand flood risk is a crucial next step.

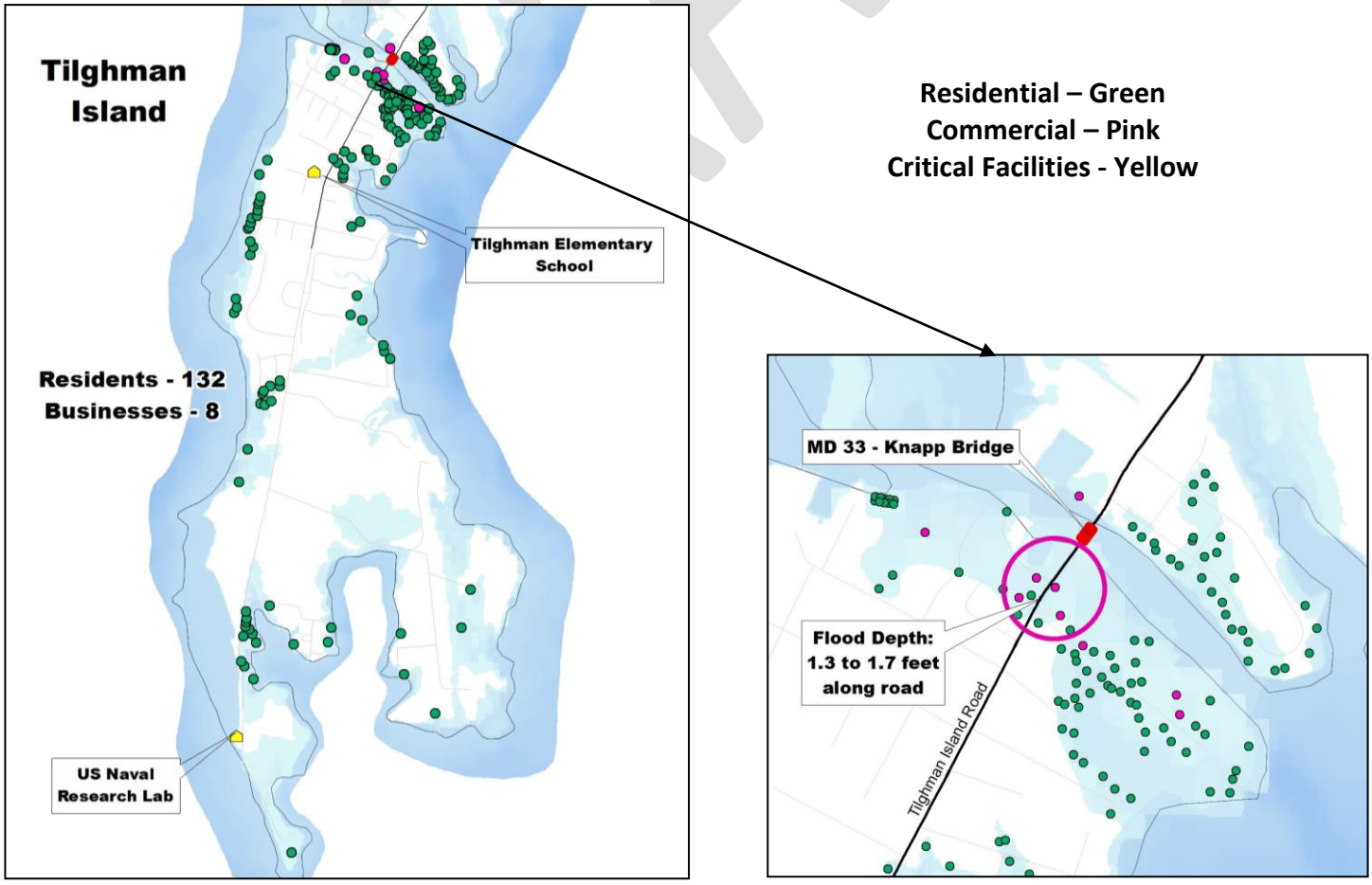
Conclusions per the five Talbot County Community Pillars are included in the following sections.

Based upon the location of the 1-percent-annual-chance flood zone, high-risk areas include Oxford, St. Michaels, Tilghman Island, and the areas of Royal Oak, Sherwood, Bozman, and Whitman.

In particular, the Tilghman Island area is susceptible to multiple hazards, including storm surge, sea-level rise, and the flood hazards identified in this chapter. The area includes the following:

- 132 Residential Structures with a total estimated loss of $2,346,542 (MDPropertyView database)
- 8 Commercial Structures with a total estimated loss of $248,559 (MDPropertyView database)
- Two critical facilities: Tilghman Island Elementary School and the U.S. Naval Research Lab.

Figure 5-3: Tilghman Island, Structures at Risk
Source: Smith Planning and Design



Finally, all critical and public facilities within the SFHA should be prioritized for mitigation activity. Those facilities with a higher measured flood depth at the lowest adjacent grade should be prioritized first. Facilities with particularly high depth of flooding (3.0 feet or greater) are highlighted in Table 5-20 and listed below.

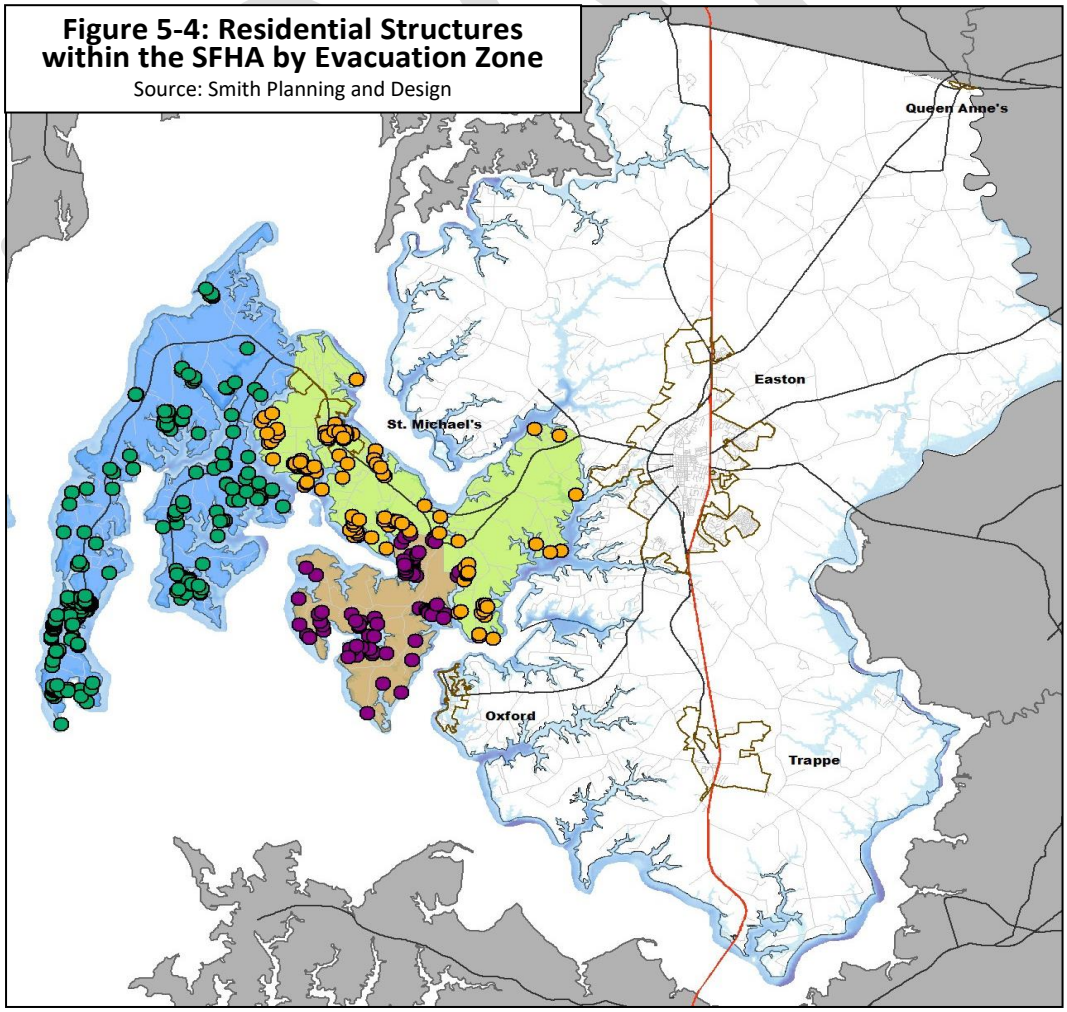
- Dock, County-Owned Dock, Claiborne Landing, Claiborne, 3.5 ft
- Dock, County-Owned Dock, Windy Hill Road, Trappe, 3.7 ft
- Dock, County-Owned Dock, Skipton Landing Road, Cordova, 4.4 ft
- Dock, County-Owned Dock, Matthewstown Road, Easton, 3.7 ft
- Marina, Higgins Yacht Yard, Carpenter Street, St. Michaels, 3.3 ft
- Marina, Pier Street Marina, 104 W Pier Street, Oxford, 3.0 ft
- Museum, Chesapeake Bay Maritime, 213 North Talbot Street, St. Michaels, 3.8 ft
- Pumping Station, Bachelors Harbor Drive, Oxford, 3.7 ft

5.8.1 Health, Safety and Welfare

The following figure (Figure 5-4) depicts some of Talbot County's most at-risk populations in relation to residential structures and the special flood hazard area. Residential structures within each of the county's three evacuation zones have been mapped alongside the 1-percent-annual-chance flood zone.

Evacuation Zone 1 (blue) contains 282 residential structures. Evacuation Zone 2 (brown) contains 73 residential structures. Evacuation Zone 3 (green) contains 136 residential structures.

Figure 5-4: Residential Structures within the SFHA by Evacuation Zone
Source: Smith Planning and Design



5.8.1.1 Social Vulnerability

An important aspect relating to the health, safety, and welfare of Talbot County's communities is social vulnerability. Talbot County recognizes that identifying socially vulnerable populations is an important step in mitigating for natural disaster events. According to the Centers for Disease Control and Prevention (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.[5]

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:

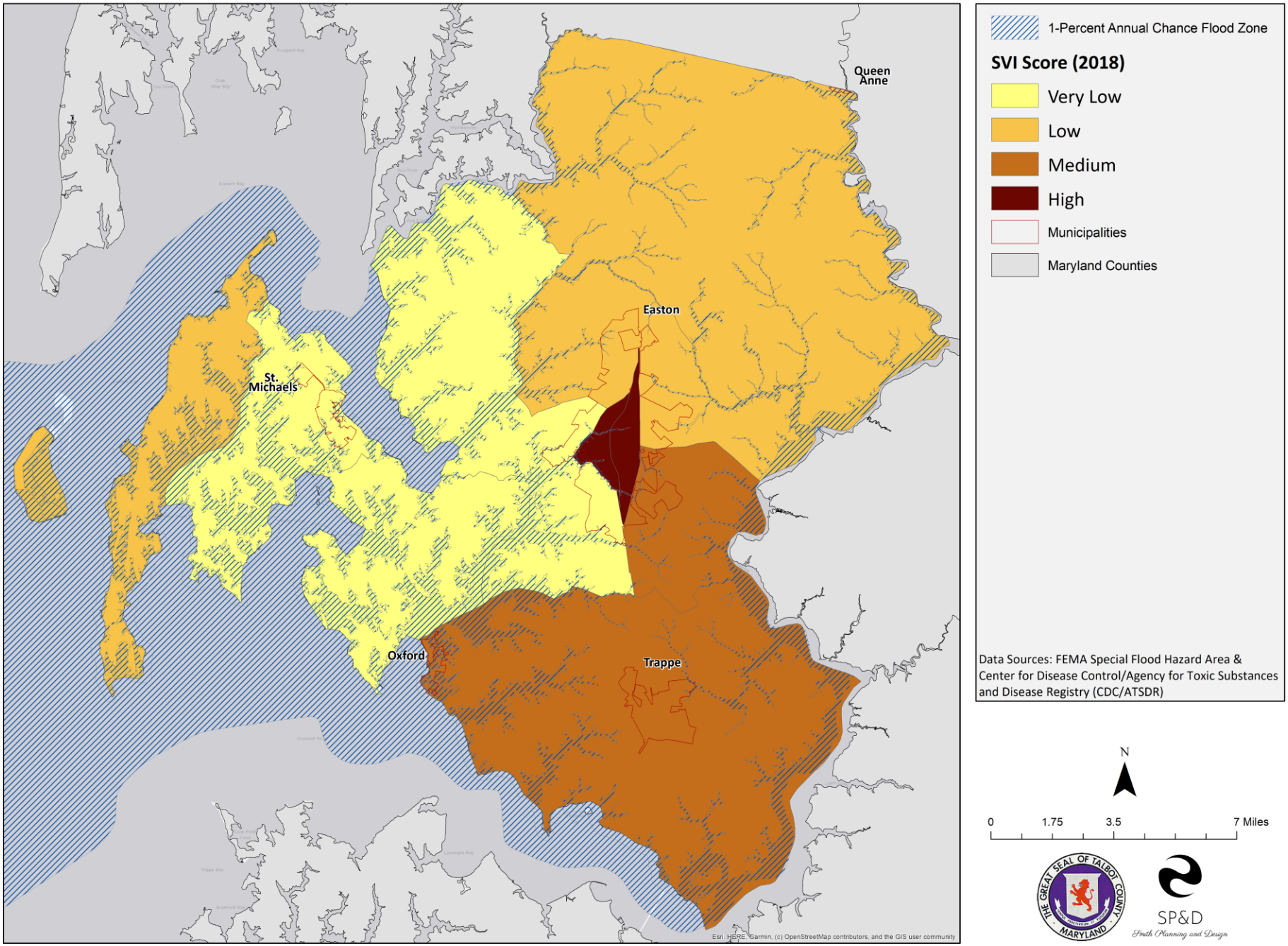
- Socioeconomic Status
  1. Below Poverty
  2. Unemployed
  3. Income
  4. No High School Diploma
- Household Composition & Disability
  1. Aged 65 or Older
  2. Aged 17 or Younger
  3. Civilian with a Disability
  4. Single-Parent Households
- Minority Status & Language
  1. Minority
  2. Speaks English "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 Talbot County at the census tract level and is mapped on the following 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 1-percent-annual-chance flood hazard area to aid in determining areas of concern where flood mitigation activities might make the most sense due to increased vulnerability. Areas of concern are locations where high social vulnerability and extensive flood hazard areas 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.

Additionally, results from *The 3rd National Risk Assessment* (refer to section 5.2.1, page 5-7) indicate the following regarding risk to social facilities in Talbot County:

> "Greatest growing risk to government, education or social facilities with 12 additional facilities at risk of becoming inoperable in 30 years."

Social Vulnerability and the FEMA 1-Percent Annual Chance Flood Zone



5.8.2 Economic Stability

The National Risk Index scores Talbot County's Expected Annual Loss (EAL) for riverine flooding as "relatively low." FEMA's EAL estimates (refer to page 5-12 for more information) for riverine flooding are included on the table below.

Table 5-22. Expected Annual Loss Overview for Talbot County, Flood Hazard

Variable	Estimated Loss
Total Expected Annual Loss	$522,041
Building Value	$349,894
Population	0.02 fatalities
Population Equivalence	$160,649
Agriculture Value	$11,499

Source: FEMA National Risk Index, Expected Annual Loss (data last collected for the years 2014-2021).
Note: Full technical documentation can be found at: www.fema.gov/sites/default/files/documents/fema_national-risk-index_technical-documentation.pdf

Loss estimates calculated by FEMA's Hazus software for Talbot County as well as its incorporated areas are included below. These estimates are for the 1-percent-annual-chance flood zone. For full details and results from this analysis, refer to page 5-13.

The loss estimates tables include the following values relating to economic stability:

- Commercial Building & Content: all classes of building including retail, wholesale, repair. Professional services, banks, hospitals, entertainment, and parking facilities.
- Other Building & Contents: losses for facilities categorized as industrial, agriculture, religious, government, and educational.
- Business Disruption: this includes losses associated with the inability to operate a business due to the damaged sustained during the flood event. Losses include inventory, income, rental income, wage, and direct output losses, as well as relocation costs.

In total, Talbot County's commercial buildings and contents within unincorporated areas are estimated to lose $8.7 million from a 1-percent-annual-chance flood event. Talbot County can expect around $2 million in losses in its unincorporated areas from business disruptions caused by a flood event in the 1-percent-annual-chance flood zone. The following tables show estimated economic loss for the county's five municipalities.

Table 5-23. Talbot County – Estimated Potential Refined Flood Losses (Total Unincorporated Area)

Type	Inventory Estimated Value (2021 dollars)	1% (100-yr) Dollar Losses (2021 dollars)
Commercial Building & Contents	$40,285,500	$8,785,000
Other Building & Contents	$6,526,000	$1,129,500
Business Disruption	N/A	$2,008,000

Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000
Source: 2016 Talbot County Flood Risk Report

Town of Easton

Table 5-24. Town of Easton – Estimated Potential Flood Losses (National AAL Study)		
Type	**Inventory Estimated Value (2021 dollars)**	**1% (100-yr) Dollar Losses (2021 dollars)**
Commercial Building & Contents	$876,115,500	$878,500
Other Building & Contents	$281,120,000	$251,000
Business Disruption	N/A	$62,750
Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000 Source: 2016 Talbot County Flood Risk Report.		

Town of Oxford

Table 5-25. Town of Oxford – Estimated Potential Refined Flood Losses		
Type	**Inventory Estimated Value (2021 dollars)**	**1% (100-yr) Dollar Losses (2021 dollars)**
Commercial Building & Contents	$15,185,500	$1,380,500
Other Building & Contents	$2,761,000	$37,650
Business Disruption	N/A	$1,129,500
Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000 Source: 2016 Talbot County Flood Risk Report.		

Town of Queen Anne

Table 5-26. Town of Queen Anne – Estimated Potential Flood Losses (National AAL Study)		
Type	**Inventory Estimated Value (2021 dollars)**	**1% (100-yr) Dollar Losses (2021 dollars)**
Commercial Building & Contents	$125,500	$0
Other Building & Contents	$0	$0
Business Disruption	N/A	$0
Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000 Source: 2016 Talbot County Flood Risk Report.		

Town of St. Michaels

Table 5-27. Town of St. Michaels – Estimated Potential Refined Flood Losses		
Type	**Inventory Estimated Value (2021 dollars)**	**1% (100-yr) Dollar Losses (2021 dollars)**
Commercial Building & Contents	$16,566,000	$6,149,500
Other Building & Contents	$3,263,000	$1,129,500
Business Disruption	N/A	$125,500
Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000 Source: 2016 Talbot County Flood Risk Report.		

Town of Trappe

Table 5-28. Town of Trappe – Estimated Potential Flood Losses (National AAL Study)		
Type	**Inventory Estimated Value (2021 dollars)**	**1% (100-yr) Dollar Losses (2021 dollars)**
Commercial Building & Contents	$22,966,500	< $10,000
Other Building & Contents	$5,647,500	< $10,000
Business Disruption	N/A	N/A
Losses are shown rounded to the nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000 Source: 2016 Talbot County Flood Risk Report.		

5.8.3 Education

Critical and public facilities deemed educational that are within the special flood hazard areas identified within this chapter (1-percent and 0.2-percent) include:

- U.S. Naval Research Lab and Tilghman Elementary School (0.2-percent zone).
- Chesapeake Bay Maritime Museum (1-percent zone).

In terms of public education and outreach regarding flood hazard risk, there is an opportunity to partner with local schools and educational institutions to utilize their resources to help inform residents of their flood risk. Educational facilities can serve as ideal locations for hosting meetings and informational sessions, or to gather feedback from large groups of stakeholders.

Additionally, results from *The 3rd National Risk Assessment* (refer to section 5.2.1, page 5-7) indicate the following regarding risk to educational facilities in Talbot County:

> "Greatest growing risk to government, education or social facilities with 12 additional facilities at risk of becoming inoperable in 30 years.

5.8.4 Infrastructure

Both gray and green infrastructure conclusions are included within this section. Gray infrastructure conclusions refer specifically to roads, critical infrastructure, and the county's culverts. The conclusion highlights culverts in need of repair and require mitigation efforts. Green infrastructure conclusions include recommendations for prioritizing future parcels of land for agricultural or conservation easements.

Green-Gray Infrastructure

Green infrastructure refers to natural systems including forests, floodplains, wetlands and soils that provide additional benefits for human well-being, such as flood protection and climate regulation.

Gray infrastructure refers to structures such as dams, seawalls, roads, pipes or water treatment plants.

"**Green-gray**" infrastructure mixes the conservation and restoration of nature (including natural coastal buffers such as seagrasses) with conventional approaches (such as concrete dams and seawalls).

Source: conservation.org

In general, results from *The 3rd National Risk Assessment* (refer to section 5.2.1, page 5-7) indicate the following conclusions regarding risk to roads and infrastructure in Talbot County:

Roads: "Greatest growing risk to commutes and transportation with 310 additional miles of roads at risk of becoming impassable in 30 years."

Infrastructure: "Greatest growing risk to critical infrastructure (utilities, emergency services, etc.) with 6 additional facilities at risk of becoming inoperable in 30 years.

5.8.4.1 Gray Infrastructure

Talbot County's Culvert Inventory/Assessment indicates that there are 25 "High Priority" culverts in need of repair and/or replacement. The map on page 5-31 depicts the physical location of all the identified culverts in the county. High priority culverts (refer to map on page 5-32) are culverts that received a low composite score based upon five variables:

1. End condition
2. Pipe condition
3. Embankment condition
4. Road Surface condition
5. Overall Inspector Rating

While dependent upon the culvert material, lower scores indicate major structural defects and failings and/or imminent shoulder collapse. Culverts rated as "high priority" within this plan should be considered first for repairs. Of these culverts, those located within low-lying areas, areas impacted by storm surge and sea-level rise (refer to *Chapter 4: Coastal Hazards*), and within special flood hazard areas as identified within this chapter should be prioritized first.

High priority culverts and those culverts within the 1-percent-annual-chance flood zone are mapped on page 5-32. High priority culverts within the 1-percent-annual-chance flood zone include the following locations, with brief descriptions:

Cordova (3)

- Chapel Road
  - "Severe rust/deterioration of pipe. Missing invert at upper end, large holes at sides of pipe. Severe infiltration into pipe holes is causing erosion of embankment, undercutting headwall, collapsed headwall, holes in embankment. Excess debris upper side - needs cleaning. Minor scouring below outfall."
- Reeses Landing Road
  - "3 pipes side by side 6' apart. Severe erosion upper side embankment. Headwall collapsed down on upper side; 2 culverts bent down from headwall collapse. Cannot see 1 pipe and only small part of middle pipe on upper side, left pipe is mostly clear. Sediment/debris clogging upper side. Moderate erosion/scouring below outfall, headwall is being undercut. All pipes visible on lower side."
- Skipton Cordova Road
  - "Severe rust in pipes, large holes upper end. Cannot see invert with pipe halfway submerged. Deformation at both pipe ends."

Neavitt (1)

- Duck Cove Lane
  - "Cannot see through to other side. Severe rust throughout, holes at pipe ends. Excess debris and sediment. Minor erosion of upper embankment above culvert."

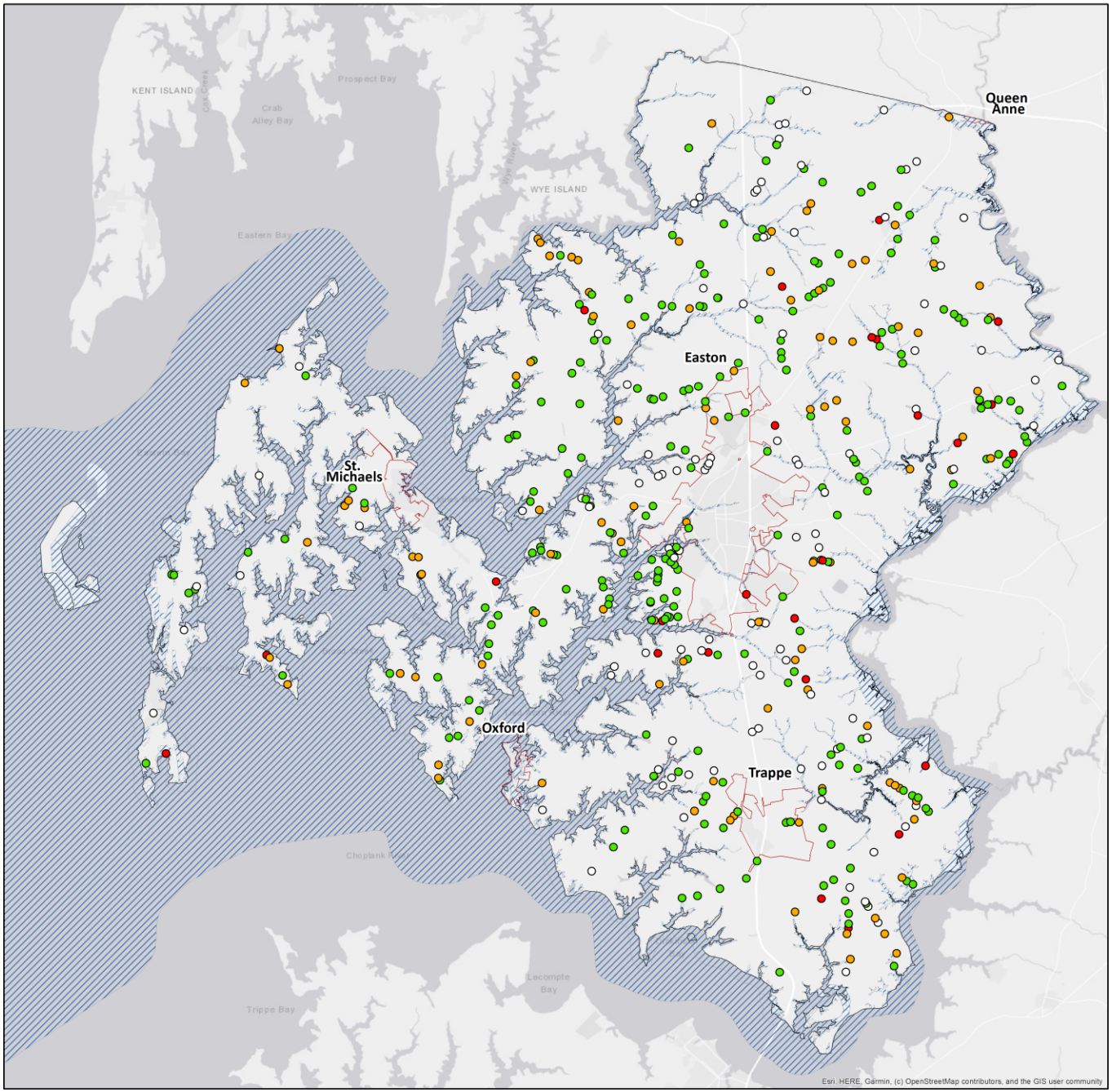
Tilghman (1)

- Bar Neck Road
  - "Rust in pipe, invert missing. Some erosion on upper embankment. Hole in road upper side and crack in road along culvert."

Trappe (1)

- Old Orchard Road
  - "Inundation of road present. Pond at upper side adjacent to road is at road elevation, lower side marsh water is 2' lower. Suspected blockage of upper side - needs cleaning."

Talbot County Culvert Inventory - Culvert Condition Priority Rating



Culvert Condition Priority Rating

- Highest Priority
- Medium Priority
- Low Priority
- Good Condition
- 1-Percent Annual Chance Flood Zone
- Municipalities
- Talbot County

Talbot County's Culvert Inventory rates culverts based upon a composite score including the following five (5) variables:

End Condition
Pipe Condition
Embankment Condition
Road Surface Condition
Overall Inspector Rating

Culverts with an overall low score (red) are considered to be in worse condition and should be prioritized for repairs. Those culverts that are in evacuation zones and in low-lying areas should be considered first.

Data Source: Talbot County Culvert Inventory, 2021, FEMA Special Flood Hazard Area.

N

0 1.75 3.5 7 Miles

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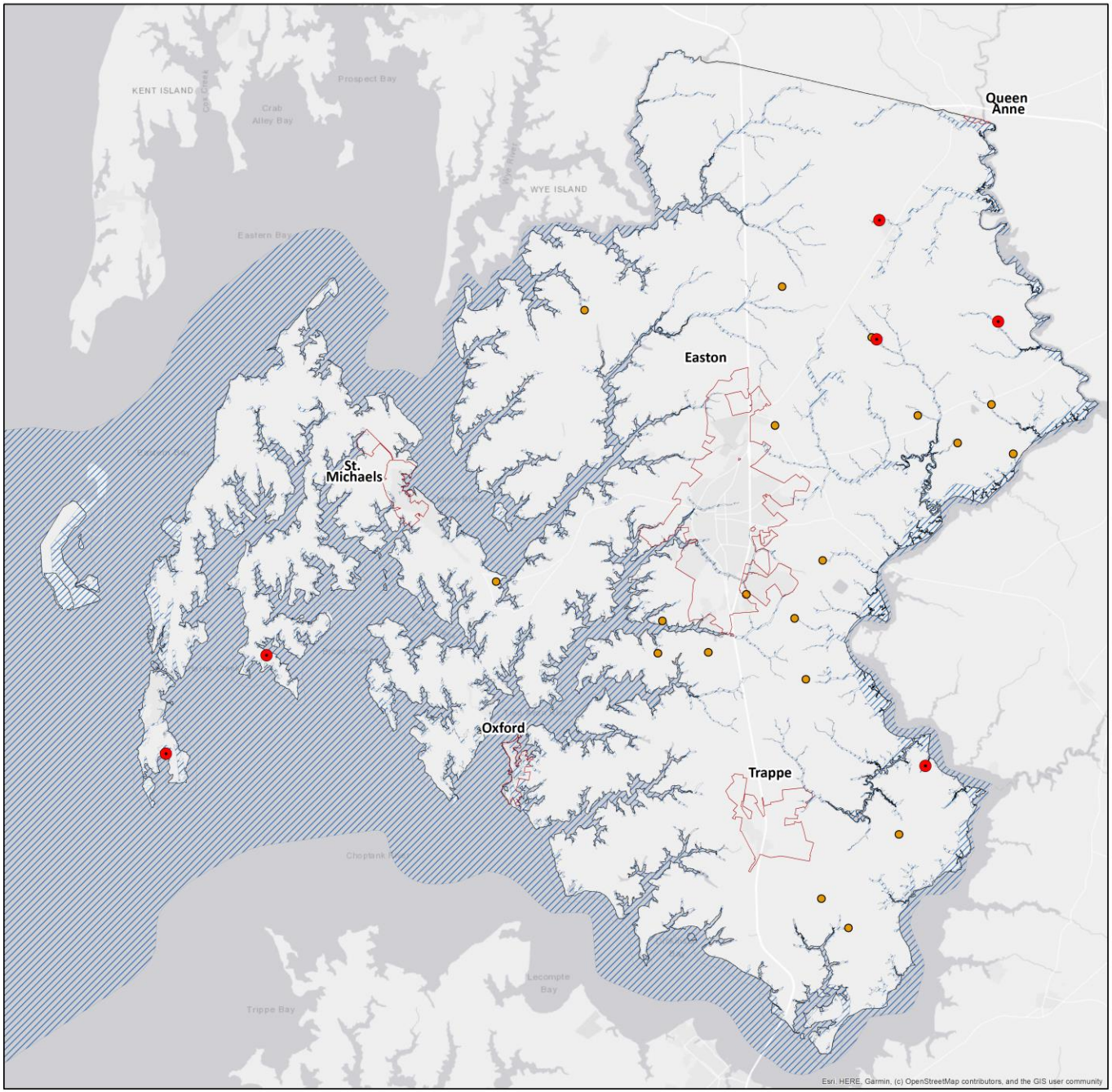
Talbot County Culvert Inventory - High Priority Culverts



High Priority Culverts within the 1% Zone

High Priority

1-Percent Annual Chance Flood Zone

Municipalities

Talbot County

Talbot County's Culvert Inventory rates culverts based upon a composite score including the following five (5) variables:

End Condition
Pipe Condition
Embankment Condition
Road Surface Condition
Overall Inspector Rating

Culverts with an overall low score (red) are considered to be in worse condition and should be prioritized for repairs. Those culverts that are within the special flood hazard area and other low-lying areas should be prioritized for mitigation actions first.

Data Source: Talbot County Culvert Inventory, 2021, FEMA Special Flood Hazard Area.

N

0 1.75 3.5 7 Miles

THE GREAT SEAL OF TALBOT COUNTY MARYLAND

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Smith Planning and Design

Conservation Easement

A "Deed of Conservation Easement" is a legal agreement between a landowner and a land trust (like Maryland Environmental Trust), which restricts the future uses of the landowner's property. It applies to all future owners of the property. The agreement often limits such things as the amount of subdivision that is allowed on a property, or the number of houses that may be built. It does not grant public access to a property unless that is what the landowner wants. Deeds of Conservation Easement are tailored to fit a landowner's individual situation. The landowner and the land trust work together to finalize the terms of the agreement.

Source: Maryland Environmental Trust

Green Infrastructure

Talbot County has identified green infrastructure in their "Cleaner, Greener Talbot" Plan. The plan emphasizes the importance of land preservation and suggests that mitigation activities should focus on preserving green infrastructure, particularly agricultural land and forested areas.

Habitat fragments, identified in the County's Green Infrastructure plan, were analyzed within the FEMA 1-percent-annual-chance flood zone and further refined to determine which fragments within the flood zone include land with a temporary land conservation easement, as opposed to a permanent easement.

Permanent easements are perpetual and "run with the land" – generally, they cannot be removed by the property owner, transferring the property to a third party, or by changing the land use. Temporary easements provide a defined timeframe or set of conditions for which the easement may be removed; this type of easement requires negotiation for removal.

The county should prioritize securing permanent agricultural easements to ensure long-term conservation of land, sensitive habitat, and other important green infrastructure. Habitat fragments identified within the 1-percent-annual-chance flood zone (see map on page 5-34) offer a starting point towards prioritizing future land parcels for open space conservation. These areas of land, if preserved, can increase corridor size and connect habitat cores. Other areas of interest would be parcels of land without a conservation easement (either temporary or permanent) that could strengthen corridors and connect habitat cores if it were to be conserved.

According to the "Cleaner, Greener Talbot" plan, a total of 5,008 acres of protected lands intersects with habitat cores, while 10,022 acres of land are within habitat fragments. Small sections of the corridors are located within the protected lands. These are located northeast and southeast of Easton. These protected lands surrounding the corridors should be reviewed for preservation or restoration.

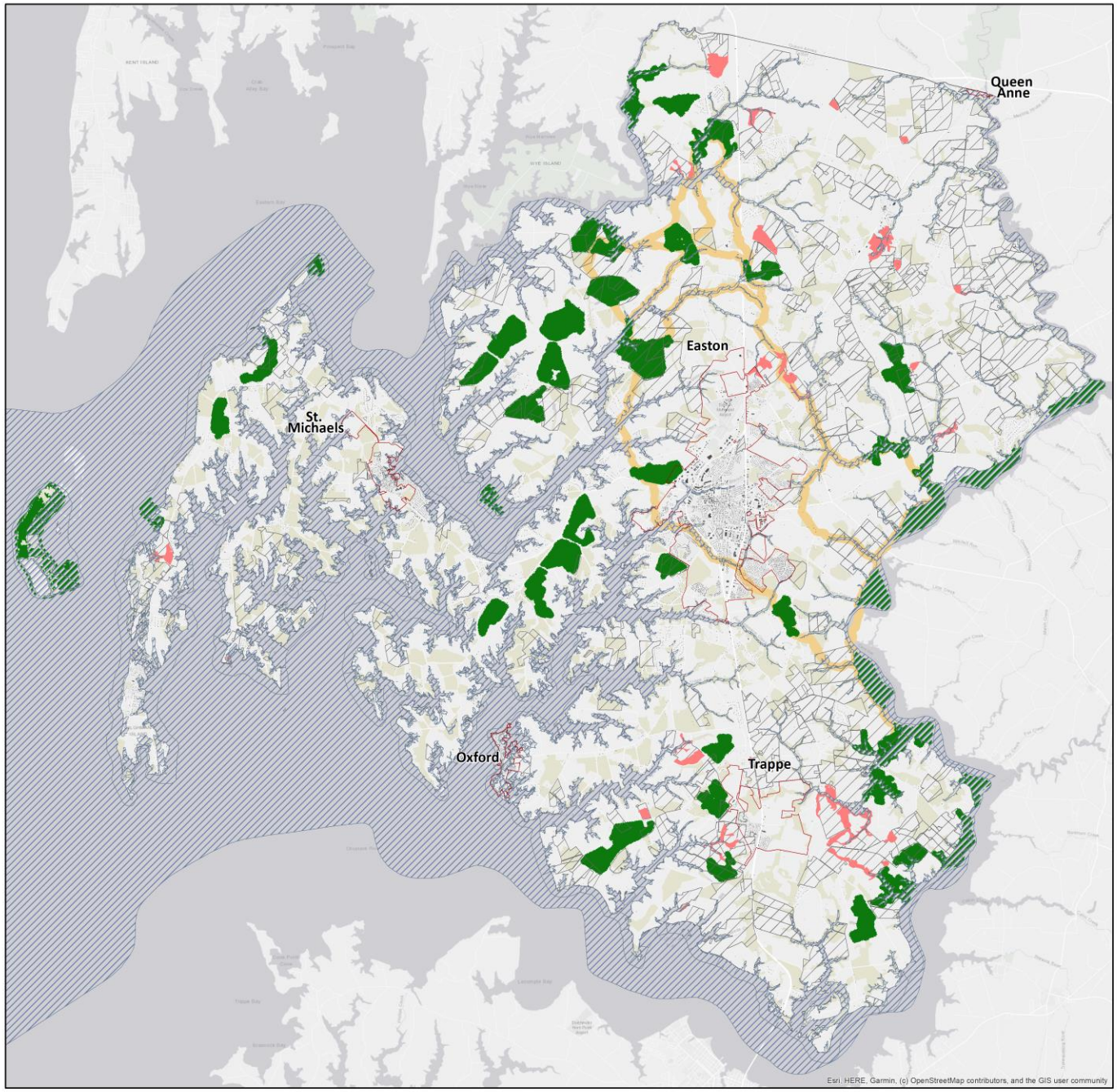
Habitat Fragmentation

Habitat fragmentation occurs when a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original.

Habitat fragmentation describes changes in habitat configuration and can be independent of or in addition to the effects of habitat loss—a reduction in habitat abundance.

Source: The Wildlife Society

Identifying GI Land for Open Space Preservation within the SFHA



- Selected Habitat Fragments
- 1-Percent Annual Chance Flood Zone
- Protected Lands
- Habitat Cores
- Corridors
- Habitat Fragments
- Municipalities
- Structures
- Talbot County

Habitat fragments were identified and selected as potentially suitable for open space preservation mitigation activities if the followin conditions were met: land is part of a habitat fragment, the center of the fragment is within the 1-percent annual chance flood zone, and if this land has a temporary easement.

Land with temporary easements should be considered for permanent easements. This will ensure the easement continues if the land transfers ownership or if the land use changes in the future.

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot Green Infrastructure Database.

N

0 1.75 3.5 7 Miles

THE GREAT SEAL OF TALBOT COUNTY MARYLAND

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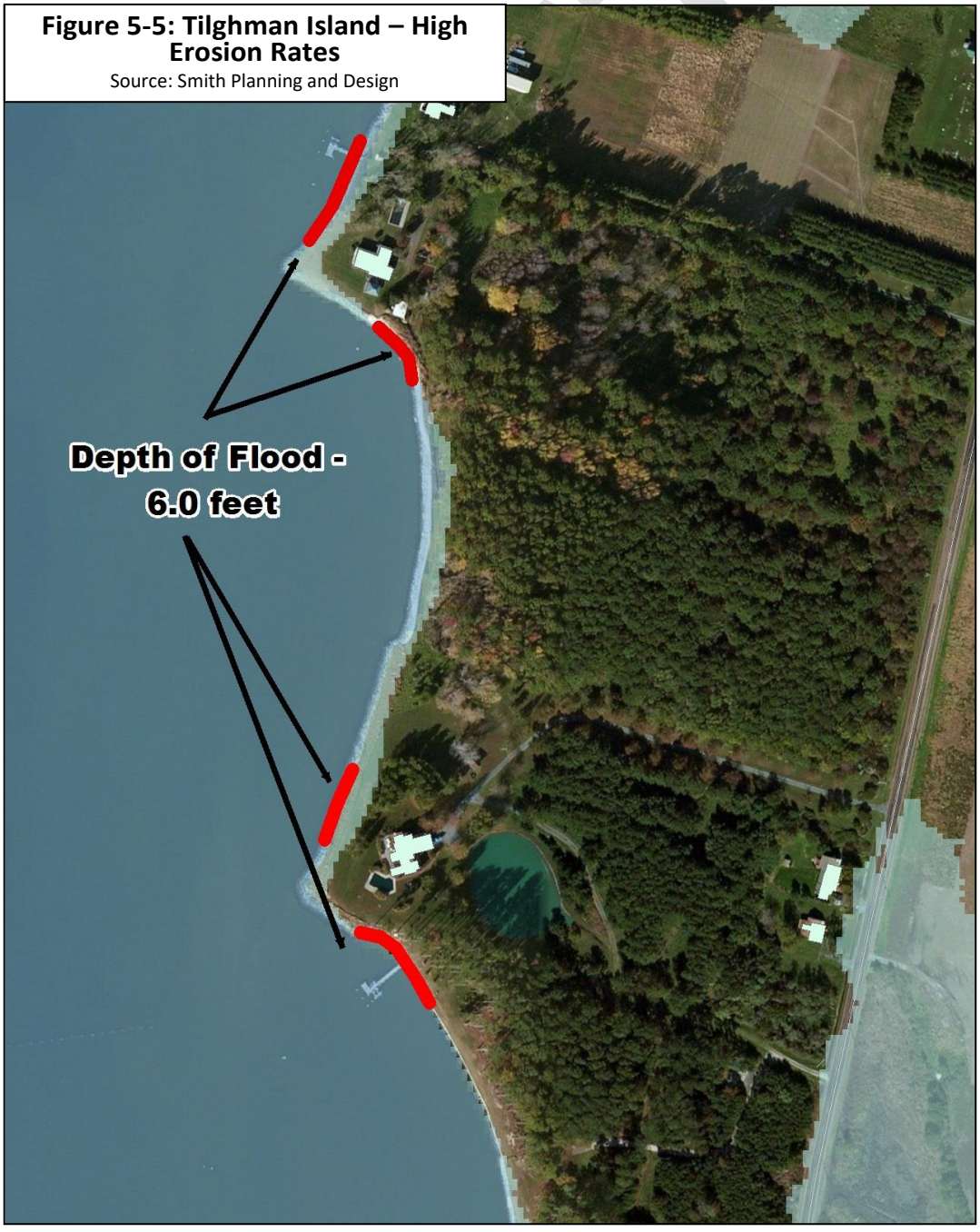
5.8.5 Environmental

As identified in the beginning of this chapter (Table 5-1), the flood hazard can exacerbate many environmental issues within the county, including: allowing pollutants from fertilizers to enter waterways, increased erosion of shorelines, and saltwater inundation to sensitive habitats. Areas of increased vulnerability to flood impacts include habitat cores, sensitive areas, and other types of green infrastructure that are within the special flood hazard area.

Areas of high erosion were identified within Talbot County; specifically, high erosion rate areas are found on Tilghman Island as depicted with depth of flooding, below. Further information regarding shoreline erosion, including erosion rates and mapping, can be found in *Chapter 4: Coastal Hazards, Section 4.6 Shoreline Erosion Risk & Vulnerability* (Page 4-18).

Figure 5-5: Tilghman Island – High Erosion Rates
Source: Smith Planning and Design



[1] assets.firststreet.org/uploads/2021/09/The-3rd-National-Risk-Assessment-Infrastructure-on-the-Brink.pdf
[2] www.iii.org/article/spotlight-on-flood-insurance
[3] www.fema.gov/sites/default/files/2020-08/fema_dam-safety_aware-community_fact-sheet_2016.pdf
[4] www.fema.gov/sites/default/files/2020-08/fema_dam-safety_aware-community_fact-sheet_2016.pdf
[5] www.atsdr.cdc.gov/placeandhealth/svi/index.html

Chapter 6: Winter Storm

PLAN UPDATE

- **Page 1** – Included "Wind Chill Chart" figure from NOAA/NWS.
- **Page 2** – Updated the Hazard Impact Table to include new comments from stakeholders.
- **Page 2** – updated text regarding winter storm events and presidential declarations and state of emergencies
- **Page 3 thru 5** – Updated risk assessment tables to include most up to date data from the NCEI Storm Events Database for the eight hazards related to Winter Weather.
- **Page 5** – Updated "General Building Stock Exposure (Structures Only) and Estimates Losses from Winter Storm Hazard" Table with most recently available building stock data.
- **Page 6** – Updated Critical & Public Facilities Constructed 1965 or Prior" Table with most recently available critical and public facility data.
- **Page 8** – Added new text relating to Talbot County's Snow Emergency Plan.

CHAPTER 6: WINTER STORM

Winter weather can take many forms including snow, freezing rain, sleet and extreme cold. Some of the most significant winter storms that affect Maryland are known as "Nor'easters" because they are accompanied by strong northeast winds. The following types of winter weather are considered part of this hazard.

1. Heavy Snowstorm: Accumulations of four inches or more in a six-hour period; or six inches or more in a 12-hour period. The most common impacts are traffic accidents, interruptions in power supply and communications; and the failure of inadequately designed and/or maintained roofing systems.
2. Sleet Storm: Significant accumulations of solid pellets that form from the freezing of raindrops or partially melted snowflakes, resulting in slippery surfaces and posing hazards to pedestrians and motorists.
3. Ice Storm: Significant accumulations of rain or drizzle freezing on objects such as trees, power lines and roadways, causing slippery surfaces and damage from the sheer weight of ice accumulation.
4. Blizzard: Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile, prevailing over an extended period.
5. Severe Blizzard: Wind velocity of 45 miles an hour or more, temperatures of 10 degrees or lower, a high density of blowing snow with visibility frequently measured in inches, prevailing over an extended period.
6. Dangerously cold temperatures in the teens and single digits pose a hazard risk and are often associated with winter weather. Some of the major threats include:
7. Wind Chill: a measure of what the temperature *feels* like when accounting for the wind speed. As the wind increases, more heat is removed from your body by the wind.
8. Frostbite: results from prolonged exposure to very cold air. The freezing of body tissue causes injury. Extremities such as fingers and toes are most susceptible to frostbite.
9. Hypothermia: like frostbite, this occurs when the body has been exposed to prolonged cold. The onset of hypothermia occurs when the body temperature drops below 95°F.

Temperature (°F)																		
Wind (mph)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

Figure 1. Wind Chill Chart[1]

6.1 WINTER STORM IMPACTS

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of the Plan Update process, stakeholders were provided an opportunity to review and modify information within the table. Results were reviewed and finalized during the Hazard Mitigation Planning Committee meeting held on September 22, 2021. The following table provides impacts from winter weather events to Talbot County per Community Pillar.

Table 6-1. Hazard Impact Table

Winter Storm	
Health, Safety, and Welfare	• Impacts transportation & access, burst pipes, and environmental exposure. Long-term: • Community stability, shelter, and warming.
Economic Stability	• Power outages lead to business closures. • Road closures prohibit employee's ability to work. • Storms would limit tourism, impacting a major economic driver.
Education	TCPS and Chesapeake College: – During extreme cold events, water in pipes freezes. – Closures – no people/no body heat – Heavy snow – skylights, roofs (auditoriums and gymnasiums). o Snow removal is custodial work on sidewalks. If roads are closed or hard to drive, school can't clear walkways resulting in closures. – Interruptions in service – can lead to lost educational/instructional time.
Infrastructure	• Roads and bridges – loss of use until snow/ice is removed. • Communication – ice and wind related O.H. Line Impacts. • Power - ice and wind related O.H. Line Impacts.
Environmental	• Danger to animals and livestock. **Snow** • Excessive use of de-ice chemicals and traction aids **Freezing Rain/Sleet** • Tree/vegetation damage from ice storms, stream blockages, and flooding **Extreme Cold** • Vegetation, habitat, and wildlife population loss • Oysters die off • Increased power usage • Air pollution and climate change concerns **Climate Change** • Increased water content of storms

Source: Talbot County Hazard Mitigation Planning Committee.

Snow and winter storms are not uncommon in Talbot County. Two notable severe winter storm events impacting Talbot County in the last decade occurred in February of 2010. The first event began on February 5, 2010 and ended with a second event beginning February 9 and ending on February 11, 2010. These events resulted in a total snowfall accumulation of 28 inches on the ground.[2] A state of emergency was declared on February 5th prompting the closure or roads and activation of the National Guard to assist paramedics. On May 6, 2010, President Obama issued a disaster declaration for the State of Maryland for the period of February 5th through February 11th, 2010.[3]

Winter Storm Jonas was the fourth most powerful snowstorm to hit the Northeast in at least 66 years, according to the National Oceanic and Atmospheric Administration. At least fifty people died in the storm, a quarter of a million customers lost power, and countless vehicular accidents were reported. Maryland Governor Larry Hogan declared a State of Emergency on Friday, January 22, 2016, for the duration of the event. While the State of Maryland was issued a Presidential Disaster Declaration, Talbot County was one of the five jurisdictions not included in the disaster declaration

6.2 PROBABILITY OF FUTURE WINTER STORM HAZARD EVENTS

According to Climate Communication Science and Outreach (www.climate communication.org), climate change is fueling an increase in the intensity and snowfall of winter storms. The atmosphere now holds more moisture, and that in turn drives heavier than normal precipitation, including heavier snowfall in the appropriate conditions. Planning for existing and potentially more extreme winter weather conditions makes good sense. Undertaking preparedness campaigns, as well as infrastructure and utilities upgrades, and preparedness initiatives will strengthen Talbot County's resilience.

6.3 WINTER STORM RISK

To assess winter storm hazard risk, a composite score method was utilized. The composite score method was based on a blend of quantitative and qualitative factors extracted from the National Centers for Environmental Information (NCEI), a stakeholder survey, and other available data sources. These included:

- Historical impacts, in terms of human lives and property
- Geographic extent
- Historical occurrence
- Future probability
- Community perspective

Based on this method, the winter storm hazard was assigned a ranking of "Medium-High" during the 2022 Plan Update. This ranking remains consistent with the 2017 planning cycle. Detailed information is available within *Appendix A: Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables.*

The following tables represent the data that was utilized within the composite scoring method developed to assess risk for the winter storm hazard. Within the NCEI Storm Events Database, "winter weather" included the following eight (8) categories: Winter Storm, Winter Weather, Sleet, Cold/Wind Chill, Blizzard, Heavy Snow, Extreme Cold, and Frost/Freeze. The time covered by the NCEI data used for this risk assessment varies but is primarily between 1/1/1996 through 05/31/2021.

Table 6-2. Winter Weather Hazard Risk Assessment Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Events
0	2	$400k	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total – 145 Annualized – 5.58

Source(s): National Centers for Environmental Information Storm Events Database (as of February 2021) and NOAA/NWS.

Table 6-3. Winter Storm Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$400k	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 20 Annual Avg. = 0.77

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Winter Storm (Z). A winter weather event that has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24-hour warning criteria for at least one of the precipitation elements. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Normally, a Winter Storm would pose a threat to life or property.

Table 6-4. Winter Weather Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	2	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 74 Annual Avg. = 2.85

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Winter Weather (Z). A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria. A Winter Weather event could result from one or more winter precipitation types (snow, or blowing/drifting snow, or freezing rain/drizzle). The Winter Weather event can also be used to document out-of-season and other unusual or rare occurrences of snow, or blowing/drifting snow, or freezing rain/drizzle. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.

Table 6-5. Sleet Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1997-2021)
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 3 Annual Avg. = 0.12

Note: Data collected for 1950-present, no data available for this event type prior to 1997.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Sleet (Z). Sleet accumulations meeting or exceeding locally/regionally defined warning criteria (typical value is ½ inch or more). The Storm Data preparer should include in the narrative the times that sleet accumulation began, met criteria, and ended.

Table 6-6. Cold/Wind Chill Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 24 Annual Avg. = 0.92

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Cold / Wind Chill (Z). (Z). Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -180 F or colder) conditions. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. There can be situations where advisory criteria are not met, but the combination of seasonably cold temperatures and low wind chill values (roughly 150 F below normal) may result in a fatality. In these situations, a cold/wind chill event may be documented if the weather conditions were the primary cause of death as determined by a medical examiner or coroner. Normally, cold/wind chill conditions should cause human and/or economic impact.

Table 6-7. Blizzard Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2010-2021)
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 1 Annual Avg. = 0.08

Note: Data collected for 1950-present, no data available for this event type prior to 2010.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Blizzard (Z). A winter storm which produces the following conditions for 3 consecutive hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile.

Table 6-8. Heavy Snow Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1996-2021)
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 21 Annual Avg. = 0.81

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Heavy Snow (Z). Z). Snow accumulation meeting or exceeding locally/regionally defined 12 and/or 24-hour warning criteria. This could mean values such as 4, 6, or 8 inches or more in 12 hours or less; or 6, 8, or 10 inches in 24 hours or less. If the event that occurred is considered significant, even if it affected a small area, it should be entered into Storm Data. In some heavy snow events, structural damage, due to the excessive weight of snow accumulations, may occur in the few days following the meteorological end of the event.

Table 6-9. Extreme Cold Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2014-2021)
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 1 Annual Avg. = 0.125

Note: Data collected for 1950-present, no data available for this event type prior to 2014.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Extreme Cold (Z). A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -350 F or colder). If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Normally these conditions should cause significant human and/or economic impact. However, if fatalities occur with cold temperatures/wind chills but extreme cold/wind chill criteria are not met, the event should also be included in Storm Data as a Cold/Wind Chill event and the fatalities are direct.

Table 6-10. Frost/Freeze Hazard Data Table					
Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2007-2021)
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 1 Annual Avg. = 0.067

Note: Data collected for 1950-present, no data available for this event type prior to 2007.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Frost / Freeze (Z). A surface air temperature of 32 degrees Fahrenheit (F) or lower, or the formation of ice crystals on the ground or other surfaces, for a period long enough to cause human or economic impact, during the locally defined growing season. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.

Talbot County owns and maintains approximately 380 miles of public roads and 9 bridges. The Maryland State Highway Administration has about 130 miles of roads and 6 bridges in Talbot County. There are over 360 privately owned and maintained roads in Talbot County.[4]

The entire general building stock inventory in Talbot County is exposed and vulnerable to the winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Current modeling tools are not available to estimate specific losses for this hazard.

The table below provides percent damages that could result from winter storm conditions on the County's total general building stock (structure only). The following represent conservative estimates for losses associated with severe winter storm events.

Table 6-11. General Building Stock Exposure (Structures Only) and Estimated Losses from Winter Storm Hazard				
Census Tract	Total (All Occupancies)	1% Damage Loss Estimates	5% Damage Loss Estimates	10% Damage Loss Estimates
Talbot County (Unincorporated Areas)	$3,204,976,000	$32,049,760	$160,248,800	$320,497,600
Easton	$2,707,213,000	$27,072,130	$135,360,650	$270,721,300
St. Michaels	$241,108,000	$2,411,080	$12,055,400	$24,110,800

Table 6-11. General Building Stock Exposure (Structures Only) and Estimated Losses from Winter Storm Hazard				
Census Tract	**Total (All Occupancies)**	**1% Damage Loss Estimates**	**5% Damage Loss Estimates**	**10% Damage Loss Estimates**
Trappe	$123,103,000	$1,231,030	$6,155,150	$12,310,300
Oxford	$200,799,000	$2,007,990	$10,039,950	$20,079,900
Queen Anne's	$11,782,000	$117,820	$589,100	$1,178,200
Source: HAZUS-MH 3.1- Valuation of general building stock. Note: RV Replacement Value.				

6.4 WINTER STORM CRITICAL AND PUBLIC FACILITIES VULNERABILITY

Vulnerability to the effects of winter storms on buildings depends on the age of the building (and the building code in effect or lack of building code at the time of construction), type of construction, and condition of the structure (how well it has been maintained).

Before acceptance of the International Building Code as a national code, multiple building codes were used throughout the United States. The Building Officials Code Administrators (BOCA) was used on the East Coast. Drifting loads were first incorporated into BOCA in 1975. Unbalanced roof snow loads were not introduced in UBC until 1988. Only relatively recently have drifting and sliding snow loads been addressed in building codes. A building constructed 40 years ago may not have been designed for snow loads as they are understood today.[5]

SNOW: According to C.A. Gooch, "Heavy Snow Loads", the weight of 1 foot of fresh snow ranges from 3 pounds per square foot for light, dry snow to 21 pounds per square foot for wet, heavy snow.

ICE: One inch of ice weighs a little less than 5 pounds per square foot, and 1 foot of ice weighs approximately 57 pounds per square foot. Ice weighs significantly more than heavy, wet snow per inch depth.

The following excerpt has been included from Talbot County Building Code, Chapter 16 Structural Design.

> *"1608.1.2 Ground Snow Loads. The ground snow loads to be used in determining the design snow loads for roofs are given in Figure 1608.2 for the contiguous United States and all Talbot County ground snow load shall be based on the upper limit of 30 lb./sq. ft."*

The critical and public facilities listed in the table below were built prior to 1965 and may be at a higher risk due to age of construction and lack of building codes in effect at the time of construction.

Table 6-12. Critical & Public Facilities Constructed 1965 or Prior			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
County Owned	Museum	Historical Society of Talbot	29 S Washington Street, Easton
County Owned	Museum	Longwoods School	11308 Longwoods Road, Easton
County Owned	Office	Talbot County Courthouse	11 N Washington Street, Easton
County Owned	Office	Talbot County Government Offices	215 Bay Street, Easton
Education	Private School	Cummings Nancy Riding	27990 Oxford Road, Easton
Education	Public School	Easton High	720 Mecklenburg Avenue, Easton
Education	Public School	Easton Middle	201 Peachblossom Road, Easton
Education	Public School	Tilghman Elementary School	21374 Foster Avenue, Tilghman
Education	Public School	White Marsh Elementary School	4322 Lovers Lane, Trappe
Emergency	Fire Department	Easton VFD	315 Aurora Park Drive, Easton
Emergency	Police Station	Trappe Police	4011 Powell Avenue, Trappe

Table 6-12. Critical & Public Facilities Constructed 1965 or Prior			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Emergency	Police Station	US Coast Guard	904 S Morris Street, Oxford
Medical	Hospital	Robert J. Patterson MD	800 S Talbot Street, St. Michaels
Medical	Nursing Home	The Pines Genesis Elder Care	610 Dutchmans Lane, Easton
Medical	Office	Adam Wienstien, MD	7969 Ocean Gateway, Easton
Medical	Office	Dr. Mehrizi Ali	719 Goldsborough Street, Easton
Medical	Office	Dr. Periz Detrich	140 S Washington Street, Easton
Medical	Office	Mid Shore Surgical Eye	8420 Ocean Gateway, Easton
Medical	Office	Periodontist	218 Bay Street, Easton
Medical	Senior Housing	The Dixon House Inc.	108 N Higgins Street, Easton
Medical	Special Needs	Deaf Independent Living	13 Wrightson Avenue, Easton
Medical	Special Needs	Deaf Independent Living	8784 Black Dog Alley, Easton
Miscellaneous	Marina	Brewers Oxford Boatyard	500 E Strand Street, Oxford
Miscellaneous	Marina	Brewers Oxford Marina	402 Strand Street, Oxford
Miscellaneous	Marina	Pier Street Marina	104 W Pier Street, Oxford
Miscellaneous	Marina	Severn Marine Services	Chicken Point Road, Tilghman
Miscellaneous	Storage Yard	Marina Mart	12214 Ocean Gateway, Easton
Municipal-Easton	Housing Authority	Easton Residence	323 South Street, Easton
Municipal-Easton	Office	Chesapeake Wildlife Heritage	46 Pennsylvania Avenue, Easton
Municipal-Oxford	Community Center	Oxford Community Center	200 Oxford Road, Oxford
Municipal-Oxford	Library	Oxford Library	103 Market Street, Oxford
Municipal-Oxford	Museum	Oxford Museum Inc.	101 S Morris Street, Oxford
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	Maritime Museum Road, St. Michaels
Municipal-St. Michaels	Museum	J Intern	103 Fremont Street, St. Michaels
Municipal-St. Michaels	Museum	St. Mary's Square Museum	409 St Mary's Square, St. Michaels
Municipal-St. Michaels	Office	Town of St. Michaels	300 Mill Street, St. Michaels
Municipal-St. Michaels	Public Works	St. Michaels Town Shop	Glory Avenue, St. Michaels
Utility	Gas/Oil	Griffith Energy Services, Inc.	400 S Aurora Street, Easton
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co	956 Port Street, Easton
Utility	Gas/Oil	Sharp Energy Inc.	9387 Ocean Gateway, Easton
Utility	Gas/Oil	Suburban Propane	1080 N Washington Street, Easton
Utility	Gas/Oil	Tri Gas and Oil Company	407 Brookletts Avenue, Easton
Utility	Gas/Oil	Tri Gas and Oil Company	9253 Ocean Gateway, Easton
Utility	Gas/Oil	United Shoregas	929 S Talbot Street, St. Michaels
Utility	Tower	American Towers Inc.	30530 Matthewstown Road, Easton
Utility	Tower	Cellular One	11780 Longwoods Road, Easton
Utility	Tower	Cellular One	402 Brookletts Avenue, Easton
Utility	Tower	Dover Radion Page	2987 Ocean Gateway, Trappe
Municipal-Easton	Office	Chesapeake Wildlife Heritage	46 Pennsylvania Avenue, Easton
Municipal-Oxford	Community Center	Oxford Community Center	200 Oxford Road, Oxford
Municipal-Oxford	Library	Oxford Library	103 Market Street, Oxford
Municipal-Oxford	Museum	Oxford Museum Inc.	101 S Morris Street, Oxford
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	Maritime Museum Road, St. Michaels
Municipal-St. Michaels	Museum	J Intern	103 Fremont Street, St. Michaels
Municipal-St. Michaels	Museum	St. Mary's Square Museum	409 St Mary's Square, St. Michaels
Municipal-St. Michaels	Office	Town of St. Michaels	300 Mill Street, St. Michaels
Municipal-St. Michaels	Public Works	St. Michaels Town Shop	Glory Avenue, St. Michaels
Utility	Gas/Oil	Griffith Energy Services, Inc.	400 S Aurora Street, Easton
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co	956 Port Street, Easton
Utility	Gas/Oil	Sharp Energy Inc.	9387 Ocean Gateway, Easton
Utility	Gas/Oil	Suburban Propane	1080 N Washington Street, Easton
Utility	Gas/Oil	Tri Gas and Oil Company	407 Brookletts Avenue, Easton
Utility	Gas/Oil	Tri Gas and Oil Company	9253 Ocean Gateway, Easton
Utility	Gas/Oil	United Shoregas	929 S Talbot Street, St. Michaels
Utility	Tower	American Towers Inc.	30530 Matthewstown Road, Easton
Utility	Tower	Cellular One	11780 Longwoods Road, Easton
Utility	Tower	Cellular One	402 Brookletts Avenue, Easton
Utility	Tower	Dover Radion Page	2987 Ocean Gateway, Trappe
Utility	Tower	Falcon Cable Trappe Tower	29415 Tarbutton Mill Road, Trappe
Utility	Tower	Verizon	Landing Neck Road, Easton
Utility	Tower	WCEI Radio	306 Port Street, Easton
Utility	Tower	Wye Tree Experts Inc.	12721 Ocean Gateway, Cordova

Source: Talbot County 2022 Critical and Public Facility Database.

In addition, severe winter storm activities pose a significant threat to unprotected or exposed lifeline systems. Generally, commercial power networks are very susceptible to interruption from lightning strikes, high winds, ice conditions, and hail.

6.5 SNOW EMERGENCY PLAN

The Maryland State Police (MSP) declare snow emergencies with input from the State Highway Administration (SHA). Talbot County implements the snow emergency plan during hazardous winter weather incidents. If a snow emergency is declared, the law requires certain precautions including:

- Prohibited parking on roads and streets designated as snow emergency routes; and
- The use of snow tires/chains (most cars now use all weather tires, so changing to "snow" tires is unnecessary),

Once an emergency is in effect, all requirements are in effect until lifted. A Snow Emergency Plan is put into effect by each county. Certain exceptions can occur while a snow emergency plan is in effect. A specific route(s) can be lifted and the remainders of the roads in the county may remain under the Snow Emergency Plan. For the most up to date information during a winter weather/snow emergency, it is advised to call the local MSP barrack for Talbot County.

6.6 WINTER STORM CONCLUSION

Conclusions from the five Talbot County Community Pillars have been summarized below.

Pillar	Conclusions
6.6.1 Health, Safety, and Welfare 	Exploring potential preparedness measures and seasonal hazard specific public outreach campaigns are useful endeavors in improving community resilience. Winter weather conditions can quickly become dangerous due to winter storms and extreme cold. Driving in winter conditions proves challenging due to reduced tire traction on roads from snow and ice and poor visibility from blowing snow. Outreach that includes driving safety tips may prove helpful. An example has been provided below: Slow down – Fog, black ice, slush or snow-covered roads can make driving dangerous. Drive slowly and leave plenty of distance between vehicles. Get winter tires – Traction is the key to good movement, turning and stopping on wet, slushy or icy surfaces. Check tires and tire pressure at least once a month when tires are cold and remember that tire air pressure decreases in colder weather. Winter tires provide additional traction in colder weather. Top-up windshield fluid – Fill up on winter washer fluid and replace wiper blades that streak. Make sure there is enough windshield washer fluid in the reservoir and that it is rated in the -40C temperature range. Carry an extra jug in the vehicle. Keep the gas tank topped up - When driving in bad weather, think caution, plan and make sure you have enough fuel. Keep the fuel tank at least half full. See and be seen – clear all snow from the hood, roof, windows and lights. Clear all windows of fog or ice. If visibility becomes poor, find a place to safely pull off the road as soon as possible. Get an emergency car kit – Have the appropriate safety and emergency winter equipment always stored in your car. The basic emergency kit for cars should include the following items: • Food – that won't spoil, such as energy bars • Water – in plastic bottles so they won't break if frozen (change every six months)

Pillar	Conclusions
	• Blanket • Extra clothing and shoes • First aid kit – with seatbelt cutter • Small shovel, scraper and snowbrush • Candle in a deep can and matches • Crank flashlight • Whistle – in case you need to attract attention • Roadmaps • Copy of your emergency plan Also keep these inside your trunk: • Sand, salt or cat litter (non-clumping) • Antifreeze/windshield washer fluid • Tow rope • Jumper cables • Fire extinguisher • Warning light or road flares Additional outreach efforts include public notification and warning. Efforts to make the public aware of available information and tools that may assist them in planning and storm preparation should be maximized. The Maryland Transportation Department offers information and tools for citizens on-line. The Maryland Transportation Authority issues both traffic advisories and emergency alerts. Severe weather information is available and may be accessed using live traffic cameras. The Maryland Department of Transportation (MDOT) offers live traffic camera feed via their website. There are 37 traffic cameras stationed within the Eastern Shore Region of Maryland. Finally, weather station information is also available through the MDOT website. Air temperature, precipitation type, wind speed, wind gust, wind direction, and pavement temperature are available in real-time from the website. The weather station located at Route 50 and Route 301 is especially informative for Talbot County.
6.6.2 Economic Stability 	According to FEMA, most buildings are not at risk of snow-induced failure. Often, attempting to remove snow from a roof is more hazardous than beneficial, posing a risk to both personnel and the roofing structure. However, buildings may be vulnerable to structural failure and possible collapse if basic preventative steps are not taken in advance of a snow event. Structural failure due to roof snow loads may be linked to several possible causes, including but not limited to the following: • Actual snow load significantly exceeds design snow load • Drifting and sliding snow conditions • Deficient workmanship • Insufficient operation and maintenance • Improper design • Inadequate drainage design • Insufficient design: in older buildings, insufficient design is often related to inadequate snow load design criteria in the building code in effect when the building was designed. Business should access their facility(s) construction and maintenance to mitigate winter storm related issues and improve resilience. Business disruption may be avoided through mitigation and resilience planning and action implementation.

<table>
<tr><th>Pillar</th><th>Conclusions</th></tr>
<tr><td>6.6.3
Education</td><td>
Interruptions in services and an impaired transportation network can lead to lost educational instructional time. In addition, educational facilities built prior to modern building codes may be at a higher risk to winter storms, especially those that do not meet the design snow loads within the Talbot County Building Code.

There are five schools that were built in or prior to 1965.

<table>
<tr><th colspan="4">Education Facilities Constructed 1965 or Prior</th></tr>
<tr><th>Facility Type</th><th>Facility Detail</th><th>Facility Name</th><th>Address</th></tr>
<tr><td>Education</td><td>Private School</td><td>Nancy Cummings Riding</td><td>27990 Oxford Road, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Easton High</td><td>720 Mecklenburg Avenue, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Easton Middle</td><td>201 Peachblossom Road, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Tilghman Elementary School</td><td>21374 Foster Avenue, Tilghman</td></tr>
<tr><td>Education</td><td>Public School</td><td>White Marsh Elementary School</td><td>4322 Lovers Lane, Trappe</td></tr>
<tr><td colspan="4">Source: Talbot County 2022 Critical and Public Facility Database.</td></tr>
</table>

Facilities with flat roofs may be considered vulnerable, as well. Low slope roofs retain snow more so than pitched roofs. However, roof pitches as low as 10 degrees have been observed to shed snow.
</td></tr>
<tr><td>6.6.4
Infrastructure</td><td>
In addition to problems associated with transportation, utilities, such as communication towers are also at risk to winter storm events. Communication towers and/or shelter-accessory structures at tower sites built in or prior to 1965 include:

<table>
<tr><th colspan="4">Communication Towers Constructed 1965 or Prior</th></tr>
<tr><th>Facility Type</th><th>Facility Detail</th><th>Facility Name</th><th>Address</th></tr>
<tr><td>Utility</td><td>Tower</td><td>American Towers Inc.</td><td>30530 Matthewstown Road, Easton</td></tr>
<tr><td>Utility</td><td>Tower</td><td>Cellular One</td><td>11780 Longwoods Road, Easton</td></tr>
<tr><td>Utility</td><td>Tower</td><td>Cellular One</td><td>402 Brookletts Avenue, Easton</td></tr>
<tr><td>Utility</td><td>Tower</td><td>Dover Radion Page</td><td>2987 Ocean Gateway, Trappe</td></tr>
<tr><td>Utility</td><td>Tower</td><td>Falcon Cable Trappe Tower</td><td>29415 Tarbutton Mill Road, Trappe</td></tr>
<tr><td>Utility</td><td>Tower</td><td>Verizon</td><td>Landing Neck Road, Easton</td></tr>
<tr><td>Utility</td><td>Tower</td><td>WCEI Radio</td><td>306 Port Street, Easton</td></tr>
<tr><td>Utility</td><td>Tower</td><td>Wye Tree Experts Inc.</td><td>12721 Ocean Gateway, Cordova</td></tr>
<tr><td colspan="4">Source: Talbot County 2022 Critical and Public Facility Database.</td></tr>
</table>
</td></tr>
<tr><td>6.6.5
Environmental</td><td>
Blizzards not only pose a danger to the health of people, but blizzards also threaten the environment, including the health of local plants and animals.

Temperatures quickly drop below zero during a blizzard, especially with the wind chill. Ice and winds cause trees to fall and plants to die. The Environmental Protection Agency says that such storms have the potential to cause significant damage to entire forests, which then release carbon during decay. The excess carbon causes an imbalance in the local ecosystem, which impacts other plants and wildlife. When other plants and flora are killed during a blizzard, their lack of availability also impacts the food supply for local animals and wildlife.

For instance, the oyster population within the Chesapeake Bay has declined by more than 50-fold since the early part of this century.[6] Oyster protection is especially important owing to the radically diminished population. Water temperature affects oyster viability. Temperature: optimum for larvae is 68-90.5 degrees F (20-32.5 degrees C), for adults 68-86 degrees F (20- 30 degrees C); adults can tolerate 35.6-96.8 degrees F (2-36 degrees C) and up to 120.2 degrees F (49 degrees C) for short periods. Larvae can grow in water as cold as 63.5 degrees F (17.5 degrees C).

In addition, whether blizzards result in flooding or not, they blanket the land with heavy precipitation that is drawn up into the atmosphere because of evaporation. In each case, whether it is the snow from the blizzard or the water from the resulting flood, blizzards can contribute to heavy accumulation of water vapor in the atmosphere. That can lead to greater rainfall throughout the rest of the year (on a continental scale), including heavy storms. Those storms can raise water levels and impact plant and animal populations, depending on their severity.
</td></tr>
</table>

[1] www.weather.gov/safety/cold-wind-chill-chart
[2] National Oceanic and Atmospheric Administration, National Centers for Environmental Information Storm Events Database.
[3] obamawhitehouse.archives.gov/the-press-office/president-obama-signs-maryland-disaster-declaration-0
[4] talbotcountymd.gov/facilities
[5] www.fema.gov/sites/default/files/documents/fema957_snowload_guide.pdf
[6] Decline of the Chesapeake Bay oyster population: a century of habitat destruction and overfishing. B. J. Rothschild 1, J. S. Ault, P. Goulletque, M. Heral. University of Maryland, Center for Environmental and Estuarine Studies, Chesapeake Biological Laboratory, Solomons, Maryland 20688, USA. IFREMER, Laboratoire National Ecosystemes Conchylicoles, F-17390 La Tremblade, France.

Chapter 7: Tornado

PLAN UPDATE

- Page 2 – Added new introduction text to Section 7.2, discussing how and when tornadoes are formed.
- Page 2 – Updated the list of notable historical tornado events that have occurred in Maryland and included the total amount of tornadoes to have occurred within the state since 1950 based on data from NOAA.
- Page 4 – Text was added to Section 7.3 describing the composite scoring method utilized to measure risk for this hazard. The present risk score for tornado was modified from "Medium" (2017) to "Low" (2022). See *Appendix A* for more information related to Hazard Identification and Risk Assessment.
- Page 5 – Updated the tornado, funnel cloud, and waterspout risk assessment tables with the latest data from NCEI Storm Events Database.
- Pages 6 & 7 – Added a figure and table further describing the Enhanced Fujita Scale.
- Page 8 – Updated text relating to building code regarding manufactured home standards.
- Page 10 – Updated Section 7.6 to include new conclusions related to debris management and the vulnerability of some facilities to high winds due to larger doors.

CHAPTER 7: TORNADO

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

According to the National Severe Storms Laboratory, whenever and wherever conditions are right, tornadoes are possible. In the U.S. they are most common in the central plains of North America, east of the Rocky Mountains and west of the Appalachian Mountains. They occur mostly during the spring and summer; the tornado season comes early in the south and later in the north because spring comes later in the year as one moves northward. They usually occur during the late afternoon and early evening. However, they have been known to occur in every state in the United States, on any day of the year, and at any hour. Approximately 1,200 tornado events occur within the United States each year.

7.1 TORNADO IMPACTS

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of the Plan Update process, stakeholders were provided an opportunity to review and modify information within the table. Results were reviewed and finalized during the Hazard Mitigation Planning Committee meeting held on September 22, 2021. The following table provides impacts from tornado events to Talbot County per Community Pillar.

Table 7-1. Hazard Impact Table

Tornado	
Health, Safety, and Welfare	• Injury • Access to emergency care. • Infrastructure damage. • Public safety radio knocked out. • Boats, especially Waterman community, affected.
Economic Stability	• Property damage • Infrastructure damage could negatively impact ability to do business. • Extensive damage to specific town centers, such as St. Michaels or Easton, could adversely impact the overall business environments with a single storm. • Major employers and manufacturers who require raw material inputs and energy to produce product would be impacted. Also, businesses with chemicals.
Education	• Unavoidable risk; can't be forecasted accurately. • Building damage/property damage. • Data loss. • Risk of injury/death. • Hazmat/environmental release of stored materials. • Loss of electricity. • Broken gas lines. **Transportation:** • Even if schools are unaffected, roads affected can mean students remain on campus.
Infrastructure	• Communication – wind related O.H. line impacts. • Power - wind related O.H. line impacts.
Environmental	• Fuel spills from above ground tanks. • Wastewater treatment plant - contamination to surrounding areas if facility is damaged. • Debris fields/marine debris - hazards to divers and boaters.

Table 7-1. Hazard Impact Table	
Tornado	
	• Damage to water quality BMP's. • Coastal habitat loss/damage.
Source: Talbot County Hazard Mitigation Planning Committee.	

7.2 PROBABILITY OF FUTURE TORNADO EVENTS

Tornadoes are byproducts of cold air moving quickly over a warm air mass. As warm moist air moves upward and the cold air downward, thunderstorms form from the condensation and, depending on the wind speed and rotation, tornadoes are spawned. Tornadoes have also been known to form off fast-moving winds generated by hurricanes and large wildfires. Tornadoes are extremely unpredictable and can occur almost anywhere. They are most prevalent in the American mid-west and plains states, due to warm moist air from the Gulf of Mexico and cold air from the Rocky Mountains constantly colliding during the spring and summer months. The traditional tornado season is from March through August, and while most events occur within these months, tornadoes can strike anytime. Warning time for tornadoes is minimal and ranges from no warning time to 30 minutes.

The following list includes notable (i.e., events including significant property damage, injuries, or fatalities) tornadoes that have occurred within the State of Maryland; it is not an exhaustive list of all tornado events.

Table 7-2. Notable Historic Tornado Events in Maryland			
Date/Time	**Description**	**Number of Injuries**	**Number of Fatalities**
Jun 28, 1879, 4:45 pm	About fifty buildings were unroofed in downtown Baltimore.	20	0
Aug 21, 1888, 2:45 pm	A "grand spectacle" of four waterspouts near Jacobson overturned boats and moved ashore.	15	0
Aug 21, 1888, 3:30 pm	A tornado moved east-northeast near Still Pond, Kent County, killing 10 people in a cannery	40	11
Nov 9, 1926, 2:35 pm	Most of the deaths (14) occurred at a small school outside La Plata, Charles County.	65	17
Nov 17, 1927, 2:20 pm	After hitting Alexandria and D.C., the funnel tore apart a dozen homes in Hyattsville.	15	0
July 22, 1928, 5:30 pm	A cottage was destroyed along the Potomac River in Charles County.	1	1
May 2, 1929, 7:30 pm	A couple was killed as their farmhouse was destroyed west of Frederick.	8	2
May 2, 1929, 9:30 pm	A home was destroyed, killing three people near Laytonville, in Montgomery County.	4	4
Aug 19, 1939, 12:15 am	A hurricane-generated tornado crossed the 10-mile-wide mouth of the Potomac River estuary.	20	1
Jun 23, 1944, 6:11 pm	Deadly tornado that crossed Pennsylvania hit Oakland, Garrett County; seven homes were destroyed.	25	3
Jun 23, 1944, 11:15 pm	Thirteen homes were destroyed at Cambridge, Dorchester County.	33	2
May 19, 1967, 8:15 pm	East of Loch Lynn Heights, Garrett County, a small frame house was picked up and thrown 100 yards.	0	1
Jun 29, 1980, 3:30 pm	A trailer park near the Aberdeen Reservation was ripped apart.	11	0
May 8, 1984, 5:05 pm	A tornado destroyed a large chicken house near Hurlock, Dorchester County. One worker was killed.	6	1

Table 7-2. Notable Historic Tornado Events in Maryland			
Date/Time	**Description**	**Number of Injuries**	**Number of Fatalities**
Oct 18, 1990, 3:30 pm	One of three Maryland tornadoes hit Reisterstown, Baltimore County; 50 homes were torn apart.	59	0
Sept 24, 2001, 4:19 pm	A large multi-vortex tornado touched down near Hyattsville then crossed into Howard County. The tornado caused 100 million dollars in damage.	55	2

As of this Plan Update, according to the National Centers for Environmental Information (NCEI) Storm Events Database, 397 tornado events have been recorded in in Maryland since 1950. These tornadoes have generated 338.79 million dollars in property damage, 563.5 thousand dollars in crop damage, and caused 9 deaths and 319 injuries. Based on this information, approximately 5.59 tornado events occur annually in the state.

The likelihood of a tornado occurring during any given year within Talbot County is much lower than for the State of Maryland. The following table indicates that five tornado events have occurred in Talbot County between 1967 and 2021. On average 0.09 tornado events occur per year. Data presented below was obtained through the NCEI Storm Events Database.

Table 7-3. Tornado Storm Event Narrative		
Date	**Event Narrative**	**Property Damage**
July 28, 1967	Tornado touched down on a farm, destroying one farm building and damaging two others, then moved on a line SSW to NNE to Bozman and inflicted damage along this narrow path. No one saw a funnel as it struck so quickly. Hail to the size of ice cubes was also reported. Many trees were twisted and broken off.	25K
May 6, 1975	F1 Tornado. No write up available	25K
June 27, 1978	Small tornado, moving SW to NE, was sighted between Bozman and Neavitt. It first struck a boathouse where it picked up the roof, turned it on a 35-degree angle and tore out the front. It then cleared a house and touched down again 200 yards away where it ripped a porch from a horse barn and shredded a tree into “toothpicks”.	25K
May 18, 1995	A strong (F2) tornado touched down along the eastern shore of Chesapeake Bay just south of Cordova in the Kittys Corner area at 1430 EST. The tornado destroyed two homes and damaged about ten other structures, mostly in the Cordova area. In the Cordova area the tornado destroyed two chicken houses at the Dunmore Heath Farms and killed about 40,000 birds. The tornado blew a house 30 feet from its foundation. A two-story barn was twisted and destroyed. The roof of another barn was carried one mile and landed near the Fairview Church of the Brethren. The tornado tossed a car 30 feet and twisted trees and telephone poles along Chapel Road. The tornado proceeded through an unpopulated area of eastern Talbot and Southwest Caroline County. It crossed into Caroline County about four miles south of Hillsboro along the Tuckahoe Creek. The tornado lifted in Martinak State Park, just south of Denton. Before lifting, it snapped and twisted more than 100 trees in the park. Several persons within the park avoided injury by clinging to trees or hiding in phone booths. About 1,800 homes lost power in the two counties. No serious injuries were reported.	0K
July 15, 2000	A thunderstorm produced several funnel clouds over Chesapeake Bay and its tributaries around Talbot County. Two of the funnels became waterspouts on the Miles River near Newcomb and Oak Creek. The waterspouts were captured on video. One briefly came inland as a weak (F0) tornado. The tornado carried a swing chair and wrapped it around one tree, tossed a rowboat, knocked down an outhouse and knocked down a couple of trees. No serious injuries were reported. The same parent thunderstorm dropped hail as large as quarters from Royal Oak to Easton and caused wind damage to one store in the Easton Plaza. Heavy rain fell again on Saint Michaels and caused roadway flooding and flooded one basement.	1K
Source: National Centers for Environmental Information Storm Events Database.		

In addition to tornado events listed within the NCEI Storm Events Database, three (3) Funnel Cloud Events from 1950-2021 were included.

Table 7-4. Funnel Cloud Event Narrative		
Date	**Event Narrative**	**Property Damage**
April 28, 2002	The strength of the LaPlata (Charles County) Tornado was evident across Easton and Talbot County. The same tornadic thunderstorm passed across Dorchester County. The outflow from the thunderstorm and tornado dropped cancelled checks, assessment documents, bank documents, tax documents and teller receipts from LaPlata across Federalsburg (Caroline County), Oxford (Talbot County) and Easton (Talbot County). Federalsburg is 66 miles east of LaPlata.	0
May 18, 2011	The deep counterclockwise circulation around a low-pressure system that extended well upward into the atmosphere over the southern Appalachians helped cause a funnel cloud to form in Talbot County. A funnel cloud was spotted over Island Creek south of Oxford. It did not touch down and no damage was reported.	0
July 28, 2016	A cold frontal boundary moved southward into the region. This led to the development of afternoon showers and thunderstorms. Some of thunderstorms became severe with locally heavy rainfall as well. A funnel cloud was observed at the Easton Airport. A funnel cloud was observed at 9148 Centreville Road. A photo of a funnel cloud was taken by a COOP observer.	0
Source: National Centers for Environmental Information Storm Events Database.		

Finally, one (1) Waterspout event was included within the NCEI Storm Events Database for Talbot County from 1950-2021.

Table 7-5. Waterspout Event Narrative		
Date	**Event Narrative**	**Property Damage**
July 15, 2000	A thunderstorm produced several funnel clouds over Chesapeake Bay and its tributaries around Talbot County. Two of the funnels became waterspouts on the Miles River near Newcomb and Oak Creek. The waterspouts were captured on video. One briefly came inland as a weak (F0) tornado. The tornado carried a swing chair and wrapped it around one tree, tossed a rowboat, knocked down an outhouse and knocked down a couple of trees. No serious injuries were reported. The same parent thunderstorm dropped hail as large as quarters from Royal Oak to Easton and caused wind damage to one store in the Easton Plaza. Heavy rain fell again on Saint Michaels and caused roadway flooding and flooded one basement.	0
Source: National Centers for Environmental Information-Storm Event Database.		

Climate change may result in increased storm intensity. Talbot County acknowledges the likelihood of the increasing risks and vulnerability from natural hazards. Through the development and implementation of the 2022 Talbot County Hazard Mitigation and Community Resilience Plan, planning consideration for both today and tomorrow are evidenced.

7.3 TORNADO RISK

To assess tornado hazard risk, a composite score method was utilized. The composite score method was based on a blend of quantitative and qualitative factors extracted from the National Centers for Environmental Information (NCEI), a stakeholder survey, and other available data sources. These included:

- Historical impacts, in terms of human lives and property
- Geographic extent
- Historical occurrence
- Future probability
- Community perspective

Based on this method, the tornado hazard was assigned a ranking of "Low" during the 2022 Plan Update. This represents a slight change from the hazard's ranking of "Medium" during the 2017 planning cycle. Detailed information is available within *Appendix A: Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables.*

The following tables represent the data that was utilized within the composite scoring method developed to assess risk for the tornado hazard. Reported information from the NCEI Storm Events Database for tornado included the following categories: tornado, funnel cloud, and waterspout. The timeframes covered by the NCEI data used is from 8/11/1950 through 05/31/2021.

Table 7-6. Total Tornado Hazard Risk Assessment Data Table
Hazards included within this table from NCEI Data: Tornado, Funnel Cloud, and Waterspout

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1967-2021)
0	0	$76k	$0	SVRGIS (intensity & frequency) = 1	Total = 9 Annual Avg. = 0.16

Source(s): National Centers for Environmental Information Storm Events Database (as of May 2021) and 2016 State of Maryland Hazard Mitigation Plan.
Note: Data collected for 1950-present, no data available for this event type prior to 1967.

Table 7-7 Tornado Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (1967-2021)
0	0	$76k	$0	SVRGIS (intensity & frequency) = 1	Total = 5 Annual Avg. = 0.09

Note: Data collected for 1950-present, no data available for this event type prior to 1967.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Tornado (C). A violently rotating column of air, extending to or from a cumuliform cloud or underneath a cumuliform cloud, to the ground, and often (but not always) visible as a condensation funnel. For a vortex to be classified as a tornado, it must be in contact with the ground and extend to/from the cloud base, and there should be some semblance of ground-based visual effects such as dust/dirt rotational markings/swirls, or structural or vegetative damage or disturbance.

Table 7-8. Funnel Cloud Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2002-2021)
0	0	$0	$0	SVRGIS (intensity & frequency) = 1	Total = 3 Annual Avg. = 0.16

Note: Data collected for 1950-present, no data available for this event type prior to 2002.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Funnel Cloud (C). A rotating, visible extension of a cloud pendant from a convective cloud with circulation not reaching the ground. The funnel cloud should be large, noteworthy, or create strong public or media interest to be entered.

Table 7-9. Waterspout Hazard Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent	Days with Events (2000-2021)
0	0	$5k	$0	SVRGIS (intensity & frequency) = 1	Total = 1 Annual Avg. = 0.05

Note: Data collected for 1950-present, no data available for this event type prior to 2000.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Waterspout (M). A rotating column of air, pendant from a convective cloud, with its circulation extending from cloud base to the water surface of bays and waters of the Great Lakes, and other lakes with assigned Marine Forecast Zones. A condensation funnel may or may not be visible in the vortex.

Tornadoes in Talbot County during the past fifty years have been classified as low intensity and have

caused minimal damage. In fact, since 1967, only five tornado events have occurred totaling less than $76,000 in damages according to NCEI Storm Events Database. Tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities and populations are exposed to this hazard and could potentially be impacted.

A tornado is given a Fujita rating of 0-5, based on the most intense damage along its path. Wind velocities necessary to produce center damage are often associated with the Fujita category, but that practice is often misleading.

The Fujita wind estimates are based upon the expected damage to a well-built residential structure. Poorly built structures can suffer significant structural damage under lesser winds than the Fujita Scale might suggest. Commercial properties may or may not experience the same failures under high wind speeds as a residence. Thus, the Fujita scale is largely a residential scale, with much more care required in assessment after wind damage to a commercial structure. A wider range of construction techniques and materials can be found in a building section classified as commercial. For example, a concrete/steel reinforced building is much more durable than a typical community convenience store, yet both may be considered commercial in city land use/appraisal data sets.

Since February 2007, the Fujita scale has been replaced by the Enhanced Fujita scale, which retains the same basic design as its predecessor with six strength categories. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures. The Enhanced Fujita Scale is visualized in the following figure and table.

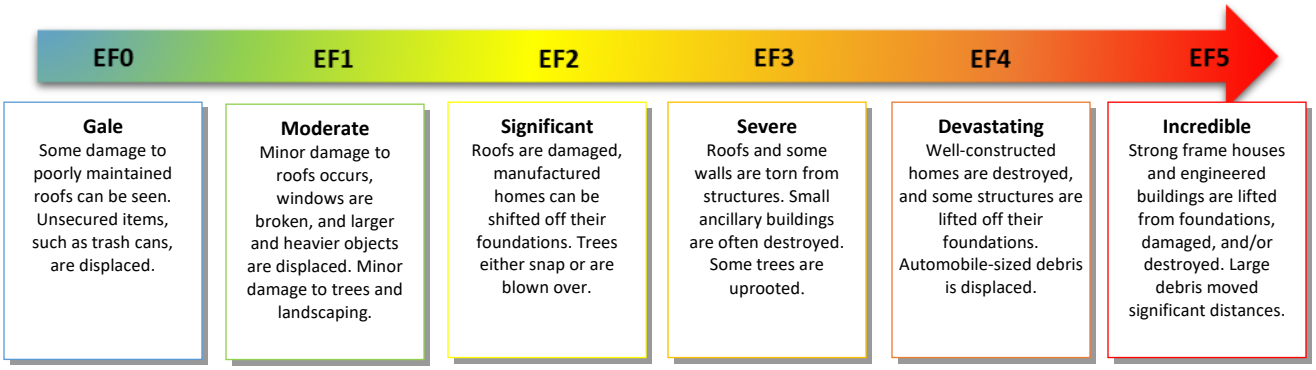


Table 7-10. Enhanced Fujita (EF) Wind Scale

Storm Category	Damage Level	3 Second Gust (Mph)	Description Of Damages	Photo Example
EF0	Gale	65–85	Some damage to chimneys; breaks branch off trees; pushes over shallow-rooted trees; damages to sign boards. Note: Talbot County is typically impacted by tornadoes classified as EF0 or EF1.	
EF1	Moderate	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages might be destroyed. Note: Talbot County is typically impacted by tornadoes classified as EF0 or EF1.	
EF2	Significant	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.	
EF4	Devastating	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown, and large missiles generated.	
EF5	Incredible	200+	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly more than 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.	

Source: www.weather.gov/oun/efscale

Manufactured homes are especially at-risk and vulnerable to tornado damage. Proper stabilization measures must be in-place to mitigate tornado impacts. Hyde Park is a large, manufactured homes park in Talbot County. Tie-down enforcement for all new and retrofits of existing manufactured homes should be employed as a tornado mitigation measure. Specific language for mobile homes is found within *Chapter 190: Zoning, Subdivision, and Land Development Article V: Development Standards*.

Talbot County code states the following regarding manufactured homes that are new, replaced or substantially improved (including repair after substantial damage):

(1) Be elevated on a permanent, reinforced foundation in accordance with Article IV or V;
(2) Be installed in accordance with the building code and manufacturer's anchor and tie-down requirements and installation instructions and specifications; and
(3) Have any enclosures below the lowest floor of the elevated manufactured home, including those that are surrounded by rigid skirting or other material attached to the frame or foundation, comply with Article IV or V.

7.4 TORNADO VULNERABILITY & LOSS ESTIMATIONS

There are no standard loss estimations models or tables for tornadoes currently, thereby making it very difficult to calculate actual losses. The entire general building stock inventory in Talbot County is exposed and vulnerable to the tornado hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Current modeling tools are not available to estimate specific losses for this hazard.

The table below provides one, five, and ten percent damage loss estimates that could result from tornado incidents to the County's total general building stock (structures only). The following represent conservative estimates for losses associated with high wind events.

Table 7-11. General Building Stock Exposure (Structures Only) and Estimated Losses from High Wind Hazard

Census Tract	Total (All Occupancies)	1% Damage Loss Estimates	5% Damage Loss Estimates	10% Damage Loss Estimates
Talbot County (Unincorporated Areas)	$3,204,976,000	$32,049,760	$160,248,800	$320,497,600
Easton	$2,707,213,000	$27,072,130	$135,360,650	$270,721,300
St. Michaels	$241,108,000	$2,411,080	$12,055,400	$24,110,800
Trappe	$123,103,000	$1,231,030	$6,155,150	$12,310,300
Oxford	$200,799,000	$2,007,990	$10,039,950	$20,079,900
Queen Anne's	$11,782,000	$117,820	$589,100	$1,178,200

Source: HAZUS-MH 3.1- Valuation of general building stock.
Note: RV Replacement Value

7.5 TORNADO CRITICAL AND PUBLIC FACILITIES VULNERABILITY

Vulnerability to the effects of tornado events on buildings depends on the age of the building (and the building code in effect or lack of building code at the time of construction), type of construction, and

condition of the structure (how well it has been maintained).

The following excerpt has been included from Talbot County Building Code, Chapter 16 Structural Design.

> *1609.3 Basic Wind Speed. The basic wind speed, in miles per hour, for the determination of the wind loads are given in Figure 1609 or by ASCE 7 Figure 6-1 when using the provisions of ASCE 7. Basic wind speeds determined by the local jurisdiction shall be in accordance with Section 6.5.4 of the ASCE 7 with the default basic wind speed being the upper limit of 100 mph as shown in figure 1609.*

The following critical and public facilities were built prior to 1965 and may be at a higher risk due to age of construction and lack of building codes in effect at the time of construction.

Table 7-12. Critical & Public Facilities Constructed 1965 or Prior

Facility Type	Facility Detail	Facility Name	Address
County Owned	Museum	Historical Society of Talbot	29 S Washington Street, Easton
County Owned	Museum	Longwoods School	11308 Longwoods Road, Easton
County Owned	Office	Talbot County Courthouse	11 N Washington Street, Easton
County Owned	Office	Talbot County Government Offices	215 Bay Street, Easton
Education	Public School	Easton High	720 Mecklenburg Avenue, Easton
Education	Public School	Easton Middle	201 Peachblossom Road, Easton
Education	Public School	Tilghman Elementary School	21374 Foster Avenue, Tilghman
Education	Public School	White Marsh Elementary School	4322 Lovers Lane, Trappe
Emergency	Fire Department	Easton VFD	315 Aurora Park Drive, Easton
Emergency	Fire Department	Oxford VFD	300 Oxford Road, Oxford
Emergency	Police Station	Maryland State Police	7053 Ocean Gateway, Easton
Emergency	Police Station	Oxford Police	101 Market Street, Oxford
Emergency	Police Station	Trappe Police	4011 Powell Avenue, Trappe
Emergency	Police Station	US Coast Guard	904 S Morris Street, Oxford
Medical	Office	Robert J. Patterson MD	800 S Talbot Street, St. Michaels
Medical	Nursing Home	The Pines Genesis Elder Care	610 Dutchmans Lane, Easton
Medical	Office	Adam Wienstien, MD	7969 Ocean Gateway, Easton
Medical	Office	Dr. Mehrizi Ali	719 Goldsborough Street, Easton
Medical	Office	Dr. Periz Detrich	140 S Washington Street, Easton
Medical	Office	Mid Shore Surgical Eye	8420 Ocean Gateway, Easton
Medical	Office	Periodontist	218 Bay Street, Easton
Medical	Senior Housing	The Dixon House Inc.	108 N Higgins Street, Easton
Medical	Special Needs	Deaf Independent Living	13 Wrightson Avenue, Easton
Medical	Special Needs	Deaf Independent Living	8784 Black Dog Alley, Easton
Miscellaneous	Marina	Mears Yacht Haven	500 E Strand Street, Oxford
Miscellaneous	Marina	Oxford Boatyard Yacht Sales	407 Strand Street, Oxford
Miscellaneous	Marina	Pier Street Marina	104 W Pier Street, Oxford
Miscellaneous	Marina	Severn Marine Services	Chicken Point Road, Tilghman
Miscellaneous	Storage Yard	Marina Mart	12214 Ocean Gateway, Easton
Municipal-Easton	Housing Authority	Easton Residence	323 South Street, Easton
Municipal-Easton	Office	Chesapeake Wildlife Heritage	46 Pennsylvania Avenue, Easton
Municipal-Oxford	Community Center	Grace Community Church	Oxford Road, Oxford
Municipal-Oxford	Library	Oxford Library	Market Street, Oxford
Municipal-Oxford	Museum	Oxford Museum Inc.	Morris Street, Oxford
Municipal-St. Michaels	Museum	St. Mary's Square Museum	409 St Mary's Square, St. Michaels
Municipal-St. Michaels	Office	Town of St. Michaels	300 Mill Street, St. Michaels
Municipal-St. Michaels	Public Works	St. Michaels Town Shop	Glory Avenue, St. Michaels

Table 7-12. Critical & Public Facilities Constructed 1965 or Prior			
Facility Type	**Facility Detail**	**Facility Name**	**Address**
Utility	Gas/Oil	Griffith Energy Services, Inc.	400 S Aurora Street, Easton
Utility	Gas/Oil	Pep Up Inc./Russ Oil Co	56 Port Street, Easton
Utility	Gas/Oil	Sharp Energy Inc.	9387 Ocean Gateway, Easton
Utility	Gas/Oil	Suburban Propane	1080 N Washington Street, Easton
Utility	Gas/Oil	Tri Gas and Oil Company	407 Brookletts Avenue, Easton
Utility	Gas/Oil	Tri Gas and Oil Company	9253 Ocean Gateway, Easton
Utility	Gas/Oil	United Shoregas	929 S Talbot Street, St. Michaels
Utility	Tower	American Towers Inc.	30530 Matthewstown Road, Easton
Utility	Tower	Cellular One	11780 Longwoods Road, Easton
Utility	Tower	Cellular One	402 Brookletts Avenue, Easton
Utility	Tower	Dover Radion Page	2987 Ocean Gateway, Trappe
Utility	Tower	Falcon Cable Trappe Tower	29415 Tarbutton Mill Road, Trappe
Utility	Tower	Verizon	Landing Neck Road, Easton
Utility	Tower	WCEI Radio	306 Port Street, Easton
Utility	Tower	Wye Tree Experts Inc.	12721 Ocean Gateway, Cordova
Source: 2022 Talbot County Critical and Public Facility Database			

In addition, designated shelter locations should be assessed for wind speed strength to ensure that they are appropriate locations and will withstand wind speeds generated by tornados.

7.6 TORNADO CONCLUSION

Through the identification and understanding of tornado risk, Talbot County has taken an important step to becoming more resilient. Communicating the hazard risk information compiled within this plan to residents, businesses, and institutional members of the community so that they fully understand is a crucial next step.

Conclusions from the five Talbot County Community Pillars have been summarized below.

Pillar	Conclusions
7.6.1 Health, Safety, and Welfare 	Essential Facilities, such as fire and police facilities that were built prior to 1965 may be more susceptible to wind damage. These facilities should be evaluated for wind load and vulnerability and retrofitted accordingly to mitigate wind damage. Facilities include: Easton VFD, Oxford VFD, Trappe Police Department, Oxford Police Department, and the U.S. Coast Guard facility. Debris generated from tornado winds oftentimes create a health and safety hazard, particularly along roads. Debris scattered by a tornado is handled, to varying extents, by the local, state, and federal governments. Although exact procedures depend on the level of damage caused by a tornado, the standard clean-up includes collecting, separating and disposing of debris in landfills. Talbot County's Debris Management Plan will need to be followed and updated as needed to prepare for a major debris generation event.
7.6.2 Economic Stability	Wind damages oftentimes lead to long periods of business interruption. Power outages, debris cleanup, and damage repair may take days, if not weeks. The

<table>
<tr><th>Pillar</th><th>Conclusions</th></tr>
<tr><td>  </td><td>faster a business can reopen their doors following a disaster event, the better. Business continuity planning is integral to mitigating long periods of business interruption, which results in a more resilient community.</td></tr>
<tr><td>7.6.3 Education
  </td><td>Interruptions in services and an impaired transportation network can lead to lost educational instructional time. In addition, educational facilities built prior to modern building codes may be at a higher risk to tornado events, especially those that do not meet the design wind speeds of 100 mph within the Talbot County Building Code. There are four schools that were built in or prior to 1965:

<table>
<tr><th colspan="4">Education Facilities Constructed 1965 or Prior</th></tr>
<tr><th>Facility Type</th><th>Facility Detail</th><th>Facility Name</th><th>Address</th></tr>
<tr><td>Education</td><td>Public School</td><td>Easton High</td><td>720 Mecklenburg Avenue, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Easton Middle</td><td>201 Peachblossom Road, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Tilghman Elementary School</td><td>21374 Foster Avenue, Tilghman</td></tr>
<tr><td>Education</td><td>Public School</td><td>White Marsh Elementary School</td><td>4322 Lovers Lane, Trappe</td></tr>
<tr><td colspan="4">Source: Talbot County 2022 Critical and Public Facility Database.</td></tr>
</table></td></tr>
<tr><td>7.6.4 Infrastructure
  </td><td>High wind speeds impact infrastructure, specifically communications and utilities. Mass power outages affect facilities and utilities. In addition, downed trees and power lines on roadways negatively impact the communities' ability to quickly return to normal operations following a tornado event.

Large garage doors on fire and rescue stations might be vulnerable to high winds caused by tornado events if they do not meet design standards that protect against building envelope penetration which leads to building failure during a high wind event.</td></tr>
<tr><td>7.6.5 Environmental
  </td><td>Damages from high wind events, such as a tornado, oftentimes impact fuel tanks causing contamination. Tornados can easily pick above ground storage tanks off their blocks or foundations and throw them hundreds of feet away. A best practice is the installation of underground storage tanks. Also, utilization of a propane tank dome is the first line of defense against damage that can be caused to tank fittings installed under the dome. Without a protective dome, tank fittings are subject to damage and possible breakage by falling debris, heavy materials, or large tree limbs.</td></tr>
</table>

Chapter 8: High Wind & Thunderstorm

PLAN UPDATE

- Page 1 – Added a text box discussing the difference between downbursts and tornadoes.
- Page 2 – Included a map of Wind Zones in the United States, based upon ICC basic wind design speeds.
- Page 4 – Updated the "High Wind" event table to include two new high wind events (from 2018 and 2019) from the NCEI Storm Events Database.
- Page 7 – Updated the "Strong Wind" event table with one new event from the NCEI Storm Events Database.
- Page 9 – Text was added to Section 8.3 describing the composite scoring method utilized to measure risk for this hazard. The present risk score for both high wind & thunderstorm is "Medium-High" See *Appendix A* for more information related to Hazard Identification and Risk Assessment.
- Page 9-11 – Updated the High Wind and Thunderstorm risk assessment tables with the latest available data from NCEI Storm Events Database.
- Page 11 – Added new conclusions to section 8.5 related to debris management and cleanup following a high-wind event.

CHAPTER 8: HIGH WIND & THUNDERSTORM

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

Downbursts v. Tornadoes: What's the Difference?

Downbursts are often mistaken for tornadoes for three reasons:

1. Both can have very damaging winds causing significant or extensive damage.
   - Tornado winds range from 40 to over 300 MPH and downburst winds can exceed 165 MPH.
2. A loud "roaring" sound
   - Wind speeds greater than 75 MPH often sound loud, leading some to believe they heard a tornado when in fact they heard straight-line wind.
3. Trees are damaged in such a way (i.e., "twisted") that it appears to be tornado damage.
   - Due to the asymmetrical nature of tree growth, certain sides of a tree are more wind resistant than others. If wind speeds are high enough the tree will begin to tear apart in a twisting motion – even though the winds are relatively straight.

Source: www.weather.gov/iwx/2013_straight-line_winds_vs_tornado

8.1 HIGH WIND & THUNDERSTORM IMPACTS

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of the Plan Update process, stakeholders were provided an opportunity to review and modify information within the table. Results were reviewed and finalized during the Hazard Mitigation Planning Committee meeting held on September 22, 2021. The following table provides impacts from high wind and thunderstorm events to Talbot County per Community Pillar.

Table 8-1. Hazard Impact Table

High Wind & Thunderstorms	
Health, Safety, and Welfare	• Injury • Infrastructure damage. • Food security issues for all in a long-term disaster, i.e., looting, protecting and distributing food, etc. • Boats, especially Waterman community, affected.
Economic Stability	• Damage to infrastructure (electric, cable, internet) negatively impacts businesses. • Property damage impacts business operations. • Crop damage for agriculture.
Education	• Interruption in power, data, communication • Building damage/property damage. • Data loss.
Infrastructure	• Communication – wind related O.H. line impacts. • Power - wind related O.H. line impacts.

Table 8-1. Hazard Impact Table	
High Wind & Thunderstorms	
Environmental	• Tree and habitat loss. • Sediment transport, dust from farm fields and construction sites carried into local waterways and homes/businesses. • Sinking boats may leak fuel, sewage, and debris. • Wave/tides lead to increased erosion and flooding.
Source: Talbot County Hazard Mitigation & Community Resilience Stakeholder Committee	

8.2 PROBABILITY OF FUTURE HIGH WIND & THUNDERSTORMS

Seasonal patterns are relevant to high wind events. Most wind events in Maryland occur in June and July. Two basic types of damaging wind events other than tropical systems affect Maryland: synoptic-scale winds and thunderstorm winds.

Wind is air that flows in relation to the earth's surface, generally horizontally. There are four areas of wind that are measured: direction, speed, character (gusts and squalls), and shifts.

Synoptic-scale or large-scale winds are high winds that occur typically with cold frontal passages or Nor'easters. When thunderstorm winds are over 58 mph, the thunderstorm is considered severe, and a warning is issued. "Downbursts" cause the high winds in a thunderstorm. Downburst winds result from the sudden descent of cool or cold air toward the ground. As the air hits the ground, it spreads outward, creating a fast-moving surge of high winds. Unlike tornadoes, downburst winds move in a straight line. Straight-line winds include any surface wind that is not associated with rotation. An example is the first gust from a thunderstorm, as opposed to tornado wind.

Talbot County's is considered in Wind Zone II (i.e., a basic structure design wind speed of 160 MPH) and in a "hurricane-susceptible" region, indicating that high-wind events are of a higher probability.

The following table indicates that twenty-two (22) high wind events have occurred from 1996-2021 as reported within the National Centers for Environmental Information (NCEI) Storm Events Database. "High Wind" is defined as sustained non-convective winds of 35 knots (40 mph) or greater lasting for 1 hour or longer, or gusts of 50 knots (58 mph) or greater for any duration (or otherwise locally/regionally defined).

On average just under one (1) high wind event occurs per year.

Table 8-2. High Wind Event Narrative

Date	Event Narrative	Property Damage ($)
March 19, 1996	High winds developed during the late afternoon and evening of the 19th as a low-pressure system intensified across the central Appalachians and its associated occluded front moved through the region. The winds were strong enough to down trees and large limbs throughout the Eastern Shore and even take the roof off a chicken house in Caroline County. No serious injuries were reported.	0
February 4 to February 5, 1998	The strongest Nor'easter of the winter brought heavy rain, damaging winds and minor tidal flooding to the southern half of the Maryland Eastern Shore. The strongest winds occurred during the afternoon and evening of the 4th, although gustiness continued through midday on the 5th. The heaviest rain occurred also at about the same time as lighter rain persisted well into the 5th. The combination of the strong winds and heavy rain made it easier for the trees to be knocked down because of the loose ground. Minor tidal flooding started during the afternoon high tide on the 4th and persisted in some areas through the 6th. The combination of the heavy rain, strong winds and higher than normal tides caused the worst problems the afternoon of the 4th with several road closures in each county. In Talbot County, flooding was reported along low-lying areas of Neavitt, Oxford, Saint Michaels and Unionville during the afternoon of the 4th. Roadway flooding was also reported in Trappe. A few roads were closed, and minor outages were reported because of the downed trees. The heavy rain might have also damaged the 275,000 acres of winter wheat planted across the lower Eastern Shore, especially if precipitation continues above normal for the rest of the winter.	0
November 2, 1999	An unseasonably humid air mass spread across the Middle Atlantic States on November 2nd. A couple of bands of showers preceding a cold front attached to a rapidly intensifying low-pressure system moved through the Maryland Eastern Shore during the afternoon and early evening of the 2nd. These bands tapped into the very strong winds located just above the surface and mixed them to the ground. This produced wind damage across the Maryland Eastern Shore mainly in the form of downed trees, tree limbs and wires. In Talbot County, a skipjack sank just off Tilghman Island. No serious injuries were reported.	0
January 11, 2000	A strong cold front produced damaging wind gusts in Cecil County and wind gusts as high as 50 mph across the rest of the Maryland Eastern Shore.	0
January 13, 2000	An Alberta Clipper (low pressure system) moved through Pennsylvania and New Jersey during the day on the 13th. The Delmarva Peninsula was in the warm sector of this system and received little precipitation. The relatively warm surface temperatures coupled with an approaching cold front and strong winds aloft produced strong gusty winds near the ground during the afternoon. Isolated trees, tree limbs and wires were knocked down across the Eastern Shore as peak wind gusts averaged around 50 mph. In Royal Oak (Talbot County), one dead pine tree blew over and caught on fire. There was a ban on recreational vehicles and empty tractor trailers crossing the Chesapeake Bay Bridge between 3 p.m. and 8 p.m. EST. Peak wind gusts included 53 mph in Salisbury (Wicomico County) and 50 mph in Centreville (Queen Annes County).	0
April 8, 2000	Gusty southwest winds spread across the Maryland Eastern Shore during the afternoon and early evening of the 8th. Peak wind gusts reached between 40 and 45 mph and downed some weak tree limbs.	0
April 9, 2000	A strong cold front moved through the Maryland Eastern Shore during the early evening on the 8th. A strong secondary low formed on the frontal boundary overnight and by 8 a.m. EDT on the 9th was located near Worcester, MA. The intensifying low-pressure system brought strong and gusty west to northwest winds into the Eastern Shore from the early morning of	0

Table 8-2. High Wind Event Narrative		
Date	**Event Narrative**	**Property Damage ($)**
	the 9th into the early evening the same day. It also ingested enough cold air to change the rain over to snow before it ended across the region during the morning of the 9th. The changeover was too brief for snow to accumulate across much of the Eastern Shore. The highest wind gust at the Baltimore-Washington International Airport was 43 mph.	
December 12, 2000	A rapidly intensifying low-pressure system and its associated cold front produced high winds across the Maryland Eastern Shore. during the morning of the 12th. Peak wind gusts ranged between 50 and 60 mph and knocked down trees, tree limbs and power lines. About 11,000 homes and businesses lost power. But by 2 p.m. EST, all but 100 customers had it restored. The peak wind gust at the Baltimore-Washington International Airport was 54 mph.	0
December 17, 2000	An unseasonably warm air mass and an intense low-pressure system and cold front set the stage for an extremely windy day across the Maryland Eastern Shore on December 17th. Gusty southerly winds buffeted the region during the first half of the day. Thunderstorms embedded within bands of heavy precipitation exacerbated the wind, especially in Cecil County. As the cold front passed through the region during the early afternoon of the 17th, the strong southerly winds were replaced by equally strong westerly winds into the evening. The difference was there were no thunderstorms to mix down even stronger winds. Most of the peak wind gusts occurred during the morning and were between 40 and 50 mph. The peak wind gust at Baltimore-Washington International Airport was 43 mph and the high temperature was 62 degrees. The high temperature in Stevensville (Queen Anne's County) was 61 degrees and was 64 degrees in Easton (Talbot County).	0
February 10, 2000	A strong cold front moved through the Maryland Eastern Shore during the morning of the 6th. Gusty northwest winds accompanied and followed the cold frontal passage. Peak wind gusts were between 40 and 50 mph. No serious damage was reported. The peak wind gust at the Baltimore-Washington International Airport was 48 mph.	0
January 13, 2001	A strong cold front moved through the state around daybreak on the 13th. As its associated low-pressure system intensified quickly as it moved into the Canadian Maritimes, northwest winds increased, and peak wind gusts reached between 40 to 45 mph in most places.	0
February 1, 2002	A rapidly intensifying low-pressure system and the pressure gradient (difference in surface pressure) between the low and a high-pressure system building in from the Southern Plains caused strong southwest winds preceding the cold front during the early afternoon and even stronger northwest winds behind the cold front the during the late afternoon and evening on the first. Peak wind gusts averaged between 40 and 50 mph and included 49 mph at the Baltimore-Washington International Airport.	0
February 4, 2002	A cold front ushered in colder air into the Maryland Eastern Shore during the mid-afternoon on the 4th. Strong gusty winds followed the front through the evening of the 4th. Peak wind gusts averaged between 40 and 50 mph and included 46 mph at the Baltimore-Washington International Airport.	0
February 11, 2002	For the third time during the first eleven days of February, strong winds followed the passage of a vigorous cold front through the Maryland Eastern Shore. Strong winds began around sunrise and persisted throughout the daylight hours. Peak wind gusts averaged between 40 and 50 mph and included 44 mph at the Baltimore-Washington International Airport.	0
March 10, 2002	A strong cold frontal passage before dawn ushered in one of the coldest air masses of the winter season on the 10th. Scattered thunderstorms accompanied its passage. As the high-pressure system moved closer to Maryland late in the day, winds diminished. Peak wind gusts averaged between 40 and 50 mph. The peak wind gust at the Baltimore-Washington International Airport was 49 mph.	0
March 21, 2002	A strong cold front moved through the Maryland Eastern Shore during the evening of the 21st. It was accompanied by wind gusts of around 40 mph inland and around 50 mph along the bay. The strong gusty winds persisted throughout the night, although the strongest wind gusts occurred with the cold frontal passage and during the ensuing evening. Peak wind gusts 41 mph at the Baltimore-Washington International Airport.	0
September 11, 2002	The pressure difference between a strong high-pressure system in the central part of the country and Tropical Storm Gustav located well east of the Delmarva Peninsula produced strong gusty northwest winds throughout the day on the 11th. The strongest gusts occurred during the early afternoon and averaged around 40 mph. The winds pulled down tree limbs and caused power outages to about 3,000 Conectiv Power Delivery customers. All power was	0

Table 8-2. High Wind Event Narrative

Date	Event Narrative	Property Damage ($)
	restored by the evening of the 11th. Peak wind gusts included 44 mph in Tolchester Beach (Kent County), 37 mph in Salisbury (Wicomico County) and 36 mph at the Baltimore Washington International Airport.	
December 1, 2004	The combination of a rapidly intensifying low-pressure system and a strong cold frontal passage produced peak wind gusts of between 50 and 62 mph across most of the Maryland Eastern Shore during the second half of the morning and throughout most of the afternoon. Winds increased from the southwest preceding the cold front after 9 a.m. EST but reached their peak speeds from the time of the cold frontal passage (around 10 a.m. EST) into the first half of the afternoon. Numerous weaker trees and limbs were knocked down. The wind damage was exacerbated by the recent wet weather which made the ground soft and the prolonged duration of the stronger winds. Peak wind gusts (from the west) included 62 mph in Saint Michael's (Talbot County), 60 mph in Tolchester Beach (Kent County), 56 mph at the Baltimore-Washington International Airport and 53 mph in Salisbury (Wicomico County).	10K
December 31, 2008	High winds buffeted the Eastern Shore during the afternoon of the 31st. Numerous tree limbs, trees and power lines were knocked down. Delmarva Power and Light reported about 40,000 homes and businesses lost power in their service area including the Eastern Shore. Peak wind gusts included 62 mph in Salisbury (Wicomico County) and 51 mph at the Baltimore-Washington International Airport.	4K
February 15, 2015	The increasing pressure difference (gradient) between a rapidly intensifying low-pressure system offshore and an arctic high-pressure system moving east from the Great Lakes caused strong to high damaging northwest winds to occur on the Eastern Shore from the evening of the 14th into the early afternoon on the 15th. Strong wind gusts started during the second half of the evening on the 14th, peaked overnight and continued into the early afternoon of the 15th. Peak wind gusts averaged around 55 mph and knocked down or snapped trees and tree limbs. This caused downed wires and widely scattered power outages. The strong to high winds also hampered road crews trying to keep roadways clear from the snow that fell on the 14th. It also ushered into the Eastern Shore one of the coldest air masses of the entire winter season. Peak wind gusts 55 mph in Easton (Talbot County) and 54 mph in Royal Oak (Talbot County).	12.5K
March 2, 2018	A cold front stalled north of the region on March 1st. Meanwhile, a wave of low pressure developed along this front in the Ohio Valley and move eastward, explosively deepening just Southeast of Long Island on March 2nd. This large and very deep area of low pressure moved slowly just south of due East over the open waters of the North Atlantic Ocean through Sunday March 4th. This led to a variety of weather hazards during this time frame. Strong Northwest winds with gusts up to around 60 mph occurred on March 2nd and 3rd. This led to widespread damage to trees and power lines, leading to extensive power outages across the region. Heavy rainfall occurred in Cecil County Maryland on March 1st and 2nd, with widespread rainfall amounts of 1 to 2 inches. As the rain changed to snow on the 2nd, up to around a Trace of snowfall was observed in Cecil County Maryland.	0
February 25, 2019	A departing very deep cyclone combined with strong high pressure to the west yielded a strong pressure gradient from the Plains eastward to the northern Mid-Atlantic and New England regions. High winds gusting 50-60 mph resulted in scattered power outages and trees down across the region. Some minor structural damage also occurred.	0

Source: National Centers for Environmental Information-Storm Event Database

In addition to “high wind” events, the following table includes “strong wind” events with damages of $5k or more having occurred from 2006-2021 as reported within the NCEI Storm Events Database. “Strong Winds” are defined as non-convective winds gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph), resulting in a fatality, injury, or damage.

On average, just under one (0.73) strong wind event resulting in $5K or more in property damage occurs per year.

Table 8-3. Strong Wind Event Narrative		
Date	**Event Narrative**	**Property Damage**
September 1 to September 2, 2006	The combination of the remnants of Tropical Storm Ernesto and a large high-pressure system over eastern Canada produced heavy rain and strong winds along the Maryland Eastern Shore. Strong winds started during the late morning on the 1st, peaked during the evening of the 1st and around midnight EDT on the 2nd and subsided before sunrise on the 2nd.	100K
December 3, 2007	Strong winds buffeted the Maryland Eastern Shore during the second half of the morning and the afternoon on the 3rd. Highest wind gusts averaged around 50 mph and downed trees and wires caused power outages. The strong winds blew over road signs and one streetlight in Easton (Talbot County). One downed tree also caused isolated power outages. Specific wind gusts included 54 mph in Salisbury (Wicomico County), 53 mph in Ridgely (Caroline County), 47 mph at the Baltimore-Washington International Airport and 46 mph in Tolchester Beach.	20K
March 8, 2008	Strong winds both preceding and then following a strong cold front downed weak tree, tree limbs and wires across the Eastern Shore during the afternoon and evening of the 8th. Peak wind gusts averaged around 50 mph. Peak wind gusts included 53 mph in Tolchester Beach (Kent County) and 51 mph in Queen Anne (Talbot County).	5K
February 12, 2009	Strong to high winds affected the Eastern Shore during the day on the 12th. The strong winds started shortly after a cold frontal passage between 3 a.m. and 5 a.m. EST and persisted through most of the day. Peak wind gusts averaged around 50 mph and knocked down several tree limbs, weak trees and power lines. Delmarva Power and Light reported about 4,600 homes and businesses in Delaware and Cecil County lost power.	5K
March 2, 2009	Strong winds occurred just after Midnight EST on March 2nd along most of the Eastern Shore as a gravity wave helped mix stronger winds aloft to the ground. The combination of the wind and heavy snow helped cause power outages across the Delmarva Peninsula. Delmarva Power and Light reported about 26,000 homes and businesses lost power in its service area. About 16,000 of the outages were in Kent, Queen Anne's, Caroline and Talbot Counties. All power was restored by Noon EST on the 3rd. Choptank Electric reported about 8,700 homes and businesses lost power along the Eastern Shore with the most outages in Kent and Cecil Counties. Most power was restored by the afternoon of the 2nd. The strong winds also caused considerable blowing and drifting of snow and made it difficult for crews to keep roads plowed and open. The strong winds were associated with the nor'easter that brought the heavy snow to the Eastern Shore. The nor'easter low pressure system moved from the Georgia and South Carolina border at 7 a.m. EST on the 1st to about 150 miles east of the southern New Jersey coast at 7 a.m. EST on the 2nd. The strongest winds occurred during the early morning of the 2nd as a gravity wave that emanated from the low-pressure system passed across the state.	12.5K
January 25, 2010	Strong southerly winds affected the Eastern Shore during the morning of the 25th. Peak wind gusts averaged 45 to 50 mph, with the strongest winds in the southern part of the Eastern Shore. The strong winds caused isolated power outages as the combination of the rain and wind helped knock down weak trees, tree limbs and power lines. In Queen Anne's County, downed trees damaged two homes in Centreville. Across the Eastern Shore about 2,300 homes and businesses lost power. Peak winds included 55 mph in Salisbury (Wicomico County), 48 mph in Easton (Talbot County), 47 mph in Stevensville (Queen Anne's County) and 43 mph in Tolchester Beach (Kent County). A wind gust of 58 mph was measured across Chesapeake Bay in Annapolis.	5K
February 25, 2011	A very strong cold frontal passage produced strong to high winds across the Eastern Shore during the afternoon of the 25th. Peak wind gusts averaged 50 to 60 mph and downed trees, tree limbs and power lines. The highest wind gusts occurred during the hour after the cold front passed and then slowly decreased the rest of the afternoon and evening. Peak wind gusts included 63 mph in Annapolis (Anne Arundel County), 61 mph at Tolchester Beach (Kent County), 60 mph at the Baltimore-Washington International Airport, 52 mph in Salisbury (Wicomico County) and 47 mph at Easton (Talbot County).	5K
December 27, 2011	Strong south winds occurred during the late afternoon and the early part of the evening on the 27th. A line of showers also helped mix stronger winds to the surface. Peak wind gusts averaged around 50 mph. The combination of the heavy rain and strong winds helped knock down tree limbs and weak trees in the Eastern Shore, particularly in Queen Anne's, Talbot and Caroline Counties. About 1,000 homes and businesses lost power. In Talbot County, in Easton, a downed tree badly damaged a home on Ocean Gateway. The home's	35K

Table 8-3. Strong Wind Event Narrative		
Date	**Event Narrative**	**Property Damage**
	roof and ceiling collapsed, and electrical lines were severed. It was deemed uninhabitable. Another downed tree blocked Stoney Ridge Road in Easton. There were a couple of other trees that were knocked down on county roads. Peak wind gusts included 52 mph in Salisbury (Wicomico County) and 49 mph in Easton (Talbot County).	
February 24 to February 25, 2012	A nearly seventy millibar surface pressure difference between an intense low-pressure system moving through the Canadian Maritimes (it bottomed at 963 millibars at 1 p.m. EST on the 25th in the Gulf of Saint Lawrence) and a high-pressure system in the Central Plains produced nearly twenty-four hours of strong winds across the Maryland Eastern Shore from the late evening on the 24th through the early evening on the 25th. The strong winds downed weak trees, tree limbs and power lines and caused scattered outages. About 3,000 homes and businesses lost power, most of them in the southern part of the Eastern Shore. Peak wind gusts included 48 mph at the Baltimore- Washington International Airport and 45 mph in Salisbury (Wicomico County).	5K
October 29, 2012	Post Tropical Storm Sandy caused an initial estimate of $5 million dollars in damage in the Eastern Shore of Maryland. Most of the damages were due to flooding caused by excessive rainfall, as up to 13 inches of rain were reported, and due to the high winds, which caused trees and wires to come down across the state. Delmarva Power, which serves portions of the eastern shore counties, reported over 30,000 households without power during the peak of the storm. The majority of residents had power returned by the morning of the 30th. Hundreds of roads were closed due to numerous downed trees and flooding. No direct deaths were reported on the Eastern Shore of Maryland due to the storm. Peak wind gusts included 60 mph in Tolchester Beach (Kent County), 59 mph in Bay City (Queen Anne's County), 55 mph in Royal Oak (Talbot County), 53 mph at the Stevensville Airport (Queen Anne's County), 48 mph at the Easton Airport (Talbot County), 47 mph in Colora (Cecil County) and 41 mph near Jumptown (Caroline County). Strong winds spread northward along the Western Shore on the morning of the 29th with the highest winds (from the west) occurring during the evening of the 29th. Winds decreased rapidly during the early morning (shortly after Midnight) on the 30th.	100K
March 6, 2013	An intense nor'easter brought strong winds across the Eastern Shore on the 6th. Peak wind gusts reached 45 to 50 mph downed weak trees, tree limbs and wires and caused scattered power outages. Downed trees and tree limbs caused isolated structural damage. In Easton (Talbot County), one downed tree fell onto a house. A westbound tractor-trailer overturned on the Chesapeake Bay Bridge. In combination with the strong winds, this forced the closure of the bridge on the 6th. The bridge was re-opened to passenger vehicles later that afternoon and to all traffic the next day. Peak wind gusts included 47 mph at Tolchester Beach (Kent County), 46 mph at Royal Oak (Talbot County), 44 mph in Easton (Talbot County) and 42 mph in Chesapeake City (Cecil County). The nor'easter low pressure system emerged from the southern Rockies on the 4th and moved into the Tennessee Valley on the morning of the 5th, passed across the southern Appalachians during the evening of the 5th and reached northeastern North Carolina on the morning of the 6th. From there it slowly moved northeast and was off the Delmarva Peninsula on the afternoon of the 6th. It then drifted slowly offshore to the east that evening and that motion continued the 7th and 8th. The low-pressure system was not that intense overall (never deepened to less than 985 millibars near the coast), but a strong high-pressure system that was located over southeastern Canada helped intensify the surface pressure gradient (difference) throughout this event.	20K

In addition to "strong wind" and "high wind" events, the following table indicates that six "thunderstorm wind" events with damages of $5k or more have occurred from 2000-2021 as reported within the NCEI Storm Events Database. "Thunderstorm Wind" is defined as winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or winds of any speed (non-severe thunderstorm winds below 50 knots) producing a fatality, injury, or damage.

On average, 0.29 thunderstorm wind events resulting in $5K or more in property damages occur per year.

Climate change may result in increased storm intensity, which may cause higher winds and more extreme thunderstorm events. Talbot County acknowledges the likelihood of the increasing risks and vulnerability from natural hazards. Through the development and implementation of the 2022 Talbot County Hazard Mitigation and Resilience Plan Update, planning consideration for both today and tomorrow are evidenced.

Table 8-4. Thunderstorm Wind Event Narrative

Date	Event Narrative	Property Damage
July 31, 2009	A cold front that moved through the Eastern Shore Friday afternoon helped produce strong to severe thunderstorms during the late afternoon of the 31st. Most of the wind damage occurred as a line of severe thunderstorms known as a bow echo moved across the region. Delmarva Power and Light reported about 8,000 homes and businesses lost power across the Delmarva Peninsula. Power was fully restored by August 1st. The gust front from a severe thunderstorm knocked down several trees in Easton and pushed a mobile home off its foundation in the Black Dog Alley Development. The mobile home landed about twenty-five feet behind its foundation. No injuries were reported. Five large trees were also uprooted in the development. Damage was estimated at $40,000.	40K
August 12, 2010	A complex of showers and thunderstorms with damaging winds and frequent lightning moved along a stationary frontal boundary on the morning of the 12th through the lower Delmarva Peninsula. A severe thunderstorm knocked down several trees and caused cosmetic and isolated roof damage to homes on Tilghman Island.	5K
November 17, 2010	A squall line of showers and thunderstorms that preceded a cold front produced wind damage during the early morning on the 17th across the Maryland Eastern Shore. A severe thunderstorm knocked down numerous trees from St. Michaels east through Easton. The greatest concentration of wind damage occurred southwest of Easton. Trees were knocked down near Peachblossom Creek on Old Country Road. A sailboat in one garage was damaged by a downed tree. On Bailey's Neck Road, dozens of trees were knocked down. One downed tree shattered the roof of a garage. A couple of homes in the area suffered siding damage and had outdoor furniture damaged.	10K
June 17, 2011	A decaying frontal boundary still managed to act as a focus for strong to severe thunderstorms to form during the early evening of the 17th. About 2,500 homes and businesses lost power in Talbot County and the last 100 did not have it restored until later in the day on the 18th. A severe thunderstorm on Tilghman Island knocked down several very large trees, poles and electrical wires at the entrance to Black Walnut Point. Another half dozen large trees were knocked over on Bar Neck Road and damaged the power lines and power meters to several homes. In addition, sheds and patio furniture was overturned. One boat was also damaged as was the screened porch of another home. The same severe thunderstorm knocked down a very large tree that blocked Elston Shore Road in Neavitt.	25K
June 17, 2011	A decaying frontal boundary still managed to act as a focus for strong to severe thunderstorms to form during the early evening of the 17th. About 2,500 homes and businesses lost power in Talbot County and the last 100 did not have it restored until later in the day on the 18th. A severe thunderstorm caused pockets of property damage throughout Oxford. A boat was blown off its lift at Campbell's Boatyard at Jacks Point. The masthead at the Pier Street Marina was pulled off and rooftop air conditioning units were overturned. Flying debris shattered the glass of four cars. A homes' chimney at South Morris and Pier Street was blown away and debris fell through the window of a neighbors' home Fencing around the town's tennis courts and temporary construction fencing were destroyed. A tree fell onto a garage on Holly Harbor Road.	50K

Table 8-4. Thunderstorm Wind Event Narrative		
Date	**Event Narrative**	**Property Damage**
June 29, 2012	A gust front outrunning a cluster of severe thunderstorms entered the Tilghman Island area of western Talbot County at approximately 11:22 pm EDT on the 29th. This gust front produced damaging wind gusts estimated at 65 mph as it traversed eastward across the county. Within approximately 20 minutes of the gust front passage, a potent line of severe thunderstorms tracked eastward through Talbot County, producing another round of destructive wind gusts, estimated at 65 mph. A significant number of trees and electric wires were reported down county-wide with damage first being noted on Tilghman Island. Severe thunderstorms exited eastern Talbot County, including the town of Matthews, at approximately 12:31 am EDT on the 30th.	50K
Source: National Centers for Environmental Information-Storm Event Database		

8.3 HIGH WIND & THUNDERSTORM RISK AND VULNERABILITY

To assess high wind and thunderstorm hazard risk, a composite score method was utilized. The composite score method was based on a blend of quantitative and qualitative factors extracted from the National Centers for Environmental Information (NCEI), a stakeholder survey, and other available data sources. These included:

- Historical impacts, in terms of human lives and property
- Geographic extent
- Historical occurrence
- Future probability
- Community perspective

Based on this method, both high wind and thunderstorm were assigned a ranking of "Medium-High" during the 2022 Plan Update. This ranking remains consistent with the 2017 planning cycle. Detailed information is available within *Appendix A: Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables.*

The following tables represent the data that was utilized within the composite scoring method developed to assess risk for both the high wind and thunderstorm hazard.

8.3.1 HIGH WIND RISK

Reported information from the NCEI Storm Events Database for High Wind included the following NCEI categories: high wind and strong wind. The timeframes covered by the NCEI data used is from 1/01/1996 through 05/31/2021.

Table 8-5. High Wind Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: High Wind and Strong Wind*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$417.5k	$1.01k	ASCE Wind Design Speed = 115	Total: 112 Annualized: 4.31
Source(s): National Centers for Environmental Information Storm Events Database (as of May 2021) and 2019 Building Code Administration Note: Data collected for 1950-present, no data available for this event type prior to 1996					

Table 8-6. Strong Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1997-2021)**
0	0	$391k	$1.01k	ASCE Wind Design Speed = 115	Total: 89 Annualized: 3.56
Note: Data collected for 1999-present, no data available for this event type prior to 1997 Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone. Based on NCEI definitions/criteria: Strong Wind (Z). Non-convective winds gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph), resulting in a fatality, injury, or damage. Consistent with regional guidelines, mountain states may have higher criteria. A peak wind gust (estimated or measured) or maximum sustained wind will be entered.					

Table 8-7. High Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$26.5k	$0	ASCE Wind Design Speed = 115	Total: 23 Annualized: 0.89
Note: Data collected for 1996-present, no data available for this event type prior to 1996 Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone. Based on NCEI definitions/criteria: High Wind (Z). Sustained non-convective winds of 35 knots (40 mph) or greater lasting for 1 hour or longer, or gusts of 50 knots (58 mph) or greater for any duration (or otherwise locally/regionally defined). In some mountainous areas, the above numerical values are 43 knots (50 mph) and 65 knots (75 mph), respectively. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.					

8.3.2 THUNDERSTORM RISK

Reported information from the NCEI Storm Events Database for Thunderstorm included the following NCEI categories: thunderstorm wind, lightning, and hail. The timeframes covered by the NCEI data used is from 1/01/1996 through 05/31/2021.

Table 8-8. Thunderstorm Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Thunderstorm Wind, Lightning, and Hail.*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1957-2021)**
6	0	$1.393M	$0	ASCE Wind Design Speed = 115 2"> hail and lightning events with Injuries/Deaths = 1	Total = 114 Annual Avg. = 1.75
Source: National Centers for Environmental Information, as of February 2021, & 2019 Building Code Administration & 2016 State of Maryland Hazard Mitigation Plan Note: Data collected for 1950-present, no data available for this event type prior to 1957.					

Table 8-9. Thunderstorm Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1965-2021)**
0	0	$180k	$0	ASCE Wind Design Speed = 115	Total = 108 Annual Avg. = 1.90
Note: Data collected for 1950-present, no data available for this event type prior to 1965. Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone. Based on NCEI definitions/criteria: Thunderstorm Wind (C). Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or winds of any speed (non-severe thunderstorm winds below 50 knots) producing a fatality, injury, or damage. Maximum sustained winds or wind gusts (measured or estimated) equal to or greater than 50 knots (58 mph) will always be entered. Events with maximum sustained winds or wind gusts less than 50 knots (58 mph) should be entered as a Storm Data event only if the result in fatalities, injuries, or serious property damage.					

Table 8-10. Lightning Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1997-2021)**
6	0	$1.213M	$0	Countywide	Total = 15 Annual Avg. = 0.60
Note: Data collected for 1950-present, no data available for this event type prior to 1997. Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone. Based on NCEI definitions/criteria: Lightning (C). A sudden electrical discharge from a thunderstorm, resulting in a fatality, injury, and/or damage.					

Table 8-11. Hail Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1957-2021)**
0	0	$0	$0	2"> hail and lightning events with Injuries/Deaths = 0	Total = 21 Annual Avg. = 0.32
Note: Data collected for 1950-present, no data available for this event type prior to 1957. Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone. Based on NCEI definitions/criteria: Hail (C). Frozen precipitation in the form of balls or irregular lumps of ice. Hail 3/4 of an inch or larger in diameter will be entered. Hail accumulations of smaller size, which cause property and/or crop damage or casualties, should be entered. Maximum hail size will be encoded for all hail reports entered.					

8.4 CRITICAL AND PUBLIC FACILITIES HIGH WIND & THUNDERSTORM VULNERABILITY

There are no standard loss estimations models or tables for high wind events currently, thereby making it very difficult to calculate actual losses. The *Enhanced Hazus Analysis* conducted in 2017 for Hurricane Wind results contained in *Chapter 4: Coastal Hazards* may review as a reference. In terms of critical facilities, facility locations should be assessed for wind speed strength to ensure that they will withstand wind speeds generated by tornadoes and other weather events that generate high wind.

8.5 HIGH WIND & THUNDERSTORM CONCLUSION

Through the identification and understanding of high wind risk, Talbot County has taken an important step to becoming more resilient. Communicating the hazard risk information compiled within this plan to residents, businesses, and institutional members of the community so that they fully understand high wind and thunderstorm is an important next step.

Conclusions from the five Talbot County Community Pillars have been summarized on the following page.

<table>
<tr><th>Pillar</th><th>Conclusions</th></tr>
<tr><td>8.5.1 Health, Safety, and Welfare</td><td>Essential Facilities, such as fire and police facilities that were built prior to 1965 may be more susceptible to wind damage. These facilities should be evaluated for wind load and vulnerability and retrofitted accordingly to mitigate wind damage.

Facilities include: Easton VFD, Oxford VFD, Trappe Police Department, Oxford Police Department, MSP Barracks, and the U.S. Coast Guard facility.</td></tr>
<tr><td>8.5.2 Economic Stability</td><td>Wind damages oftentimes lead to long periods of business interruption. Power outages, debris cleanup, and damage repair may take days, if not weeks. The faster a business can reopen their doors following a disaster event, the better. Business continuity planning is integral to mitigating long periods of business interruption, which results in a more resilient community.

Much like the tornado hazard discussed in Chapter 7, debris generated from high winds and thunderstorms oftentimes create a health and safety hazard, particularly along roads. Debris cleanup is often handled by local governments and exact procedures followed depend on the level of damage caused by the high wind event. In many cases stage agencies, such as the State High Administration, will also be involved in the effort. The standard clean-up includes collecting, separating and disposing of debris in landfills. Talbot County's Debris Management Plan will need to be followed and updated as needed to prepare for a major debris generation event.</td></tr>
<tr><td>8.5.3 Education</td><td>Interruptions in services and an impaired transportation network form downed power lines and trees can lead to lost educational instructional time. In addition, educational facilities built prior to modern building codes may be at a higher risk to high wind events, especially those that do not meet the design wind speeds of 100 mph within the Talbot County Building Code. There are four schools that were built in or prior to 1965.

<table>
<tr><th colspan="4">Education Facilities Constructed 1965 or Prior</th></tr>
<tr><th>Facility Type</th><th>Facility Detail</th><th>Facility Name</th><th>Address</th></tr>
<tr><td>Education</td><td>Public School</td><td>Easton High</td><td>720 Mecklenburg Avenue, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Easton Middle</td><td>201 Peachblossom Road, Easton</td></tr>
<tr><td>Education</td><td>Public School</td><td>Tilghman Elementary School</td><td>21374 Foster Avenue, Tilghman</td></tr>
<tr><td>Education</td><td>Public School</td><td>White Marsh Elementary School</td><td>4322 Lovers Lane, Trappe</td></tr>
<tr><td colspan="4">Source: Talbot County 2022 Critical and Public Facility Database.</td></tr>
</table>
</td></tr>
<tr><td>8.5.4 Infrastructure</td><td>High wind speeds impact infrastructure, specifically communications and utilities. Mass power outages affect facilities and utilities. In addition, downed trees and power lines on roadways negatively impact the communities' ability to quickly return to normal operations following a high wind event.</td></tr>
<tr><td>Environmental</td><td>Damages from high wind events, such as a synoptic scale winds and thunderstorm wind, oftentimes impact fuel tanks causing contamination. High winds may impact above ground storage tanks. A best practice is the installation of underground storage tanks. Also, utilization of a propane tank dome is the first line of defense against damage that can be caused to tank fittings installed under the dome. Without a protective dome, tank fittings are subject to damage and possible breakage by falling debris, heavy materials, or large tree limbs.</td></tr>
</table>

Chapter 9: Drought & Extreme Heat

PLAN UPDATE

- Page 1 – Updated the Hazard Impact Table to include new comments from stakeholders.
- Page 3 – added text about The National Integrated Drought Information System (NIDIS)/The U.S. Drought Monitor. Included reference to drought.gov and mapping of drought conditions for the State of MD.
- Page 4 – added figure showing drought conditions from 2000-present, from drought.gov.
- Page 5 – Updated the risk assessment tables with latest data from NCEI Storm Events Database.
- Page 7 – updated text related to Water Audits and Loss Reduction Reports with 2019 figures. Updated table with results from water audits for years 2016-2019.
- Page 8 – updated drought coordinators for the County.

CHAPTER 9: DROUGHT & EXTREME HEAT

1. Drought – are periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in precipitation or stream flow. Although maintaining water supplies for human use is an important aspect of drought management, drought can also have many other dramatic and detrimental effects on the environment and wildfire.
2. Extreme Heat – temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground.

9.1 DROUGHT & EXTREME HEAT IMPACTS

The Hazard Impact Table below was initially completed by project stakeholders and included in the 2017 Plan. The hazard impacts identified have been organized under each of the five Community Pillars identified by Talbot County. As part of the Plan Update process, stakeholders were provided an opportunity to review and modify information within the table. Results were reviewed and finalized during the Hazard Mitigation Planning Committee meeting held on September 22, 2021. The following table provides impacts from drought & extreme heat events to Talbot County per Community Pillar.

Table 9-1. Hazard Impact Table

	Drought & Extreme Heat
Health, Safety, and Welfare	– Long-term economic impacts to the agricultural economy. – Towns have wells.
Economic Stability	– Impacts to local farms/agriculture economy. – More irrigation could adversely increase cost to framing operation and run-off issues. – Impact on crop insurance cost.
Education	– Food supply & drinking water shortages. o Increased cost for bottled water o Delay while waiting for assistance
Infrastructure	– Water issues may arise for older residential wells (older shallow wells). **Extreme Heat** – Problems with utilities associated with heat events.
Environmental	– Increased withdraw of ground water for irrigation may lead to saltwater intrusion and depressed water table. – Shrink & swell cycle of soils may lead to decrease in soil health, pipe damage, and damage to foundations. – Lower water levels impact waterfowl. – Loss of surface water inputs to ponds, swimming area closures, and loss of habitat/biodiversity (inland aquatic habitat). **Extreme Heat** – Increased power demand and fossil fuel use – Wildlife Stress Warming water temperature leading to less dissolved oxygen, which is harmful to fish and crabs.

Source: Talbot County Community Resilience Stakeholder Committee

9.2 PROBABILITY OF FUTURE DROUGHT & EXTREME HEAT HAZARDS

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.

According to United States Geological Survey-Water Science for Maryland, Delaware, and the District of Columbia, the most severe drought of record was 1930-32; 1930 was the driest year recorded since 1869.[1] The 1958-71 drought was regional in extent and produced the largest recorded annual departures from average stream discharge.

Droughts occur when large-scale atmospheric circulation is persistently unfavorable to normal precipitation - producing mechanisms for several weeks, months, seasons, or years. A strong flow of air from the northwest tends to prevent moisture from the Atlantic Ocean and the Gulf of Mexico from reaching the area by pushing the coastal storm track further eastward. If this situation persists for more than a month, it commonly creates a drought.

Another pattern that can produce a drought at any time of the year, although most often in the summer, is a strong ridge of high pressure in the upper atmosphere near the central Appalachian Mountains or mid- Atlantic area. Even though humidity in the lower atmosphere may be nearly normal, moisture aloft is deficient because of a large-scale descending flow of air that warms the air mass. A mixed layer of air extending from the surface of the Earth to a height of about 0.5 to 1 mile is capped by a warm air layer (temperature inversion) that inhibits the growth of convective clouds, which decreases significant thunderstorm activity. This occurrence results in a drought that generally is augmented by excessive heat. During the winter, this pattern results in dry conditions, primarily because frontal systems are kept from the area. Typically, droughts affecting Talbot County result from prolonged periods of dry weather accompanied by extreme heat and usually occur in the summer months (July and August) when high pressures settle in with prevailing dry, west to southwest winds. The warmest time of the year is July when maximum temperatures average 89 degrees Fahrenheit. The occurrence of drought cannot be predicted.

Several major droughts have occurred in Maryland, as described below.

Table 9-2. Major Droughts in Maryland

Date	Area Affected	Recurrence Interval (yrs.)	Remarks
1930-32	Statewide	>25	Regional drought. Estimated crop losses in 1930, $40 million.
1953-56	Statewide	10 to >25	None
1956-71	Statewide	>25	None
1980-83	Statewide, except for Western Region	10 to 25	Multistate
1984-88	Monocacy River Basin. East of Baltimore, and Chesapeake Bay	10 to 25	Estimated agricultural losses for 1886-88, $302 million.

Source: USGS Water Science for Maryland, Delaware, and the District of Columbia, Online Publication-WSP-2375

Data was compiled and analyzed producing a drought analysis summary for Maryland, and presented in USGS Water Science for Maryland, Delaware, and the District of Columbia, Online Publication-WSP-2375. Annual departures from average streamflow were determined, and recurrence intervals were assigned to droughts by using data from 38 gaging stations. Results indicate that droughts have occurred about once every 10 years since 1930 but differed in severity and duration. Annual departure generally was most severe at the end of the 1958-71 drought.

According to the Maryland Department of the Environment (MDE), the drought status for the Eastern Region, which includes Talbot County, has been at normal as of July 31, 2021.[2] This information is maintained and updated by MDE and may be obtained on their website. The National Integrated Drought Information System (NIDIS) maintains The U.S. Drought Monitor, which is updated on a weekly basis and available at drought.gov. NIDIS is a multi-agency partnership that coordinates drought monitoring, forecasting, planning, and information at national, state, and local levels across the country. The NIDIS compiles information from the National Drought Mitigation Center to deliver drought status at the state and county level – the system categorizes drought conditions across Maryland using a five-category system, from "Abnormally Dry" (D0) conditions to "Exceptional Drought" (D4). As of August 19th, 2021, zero percent of Talbot County is impacted by drought. The figure below depicts drought conditions in Maryland as of this date. Citizens may sign up for drought alerts to keep notified when drought conditions change.

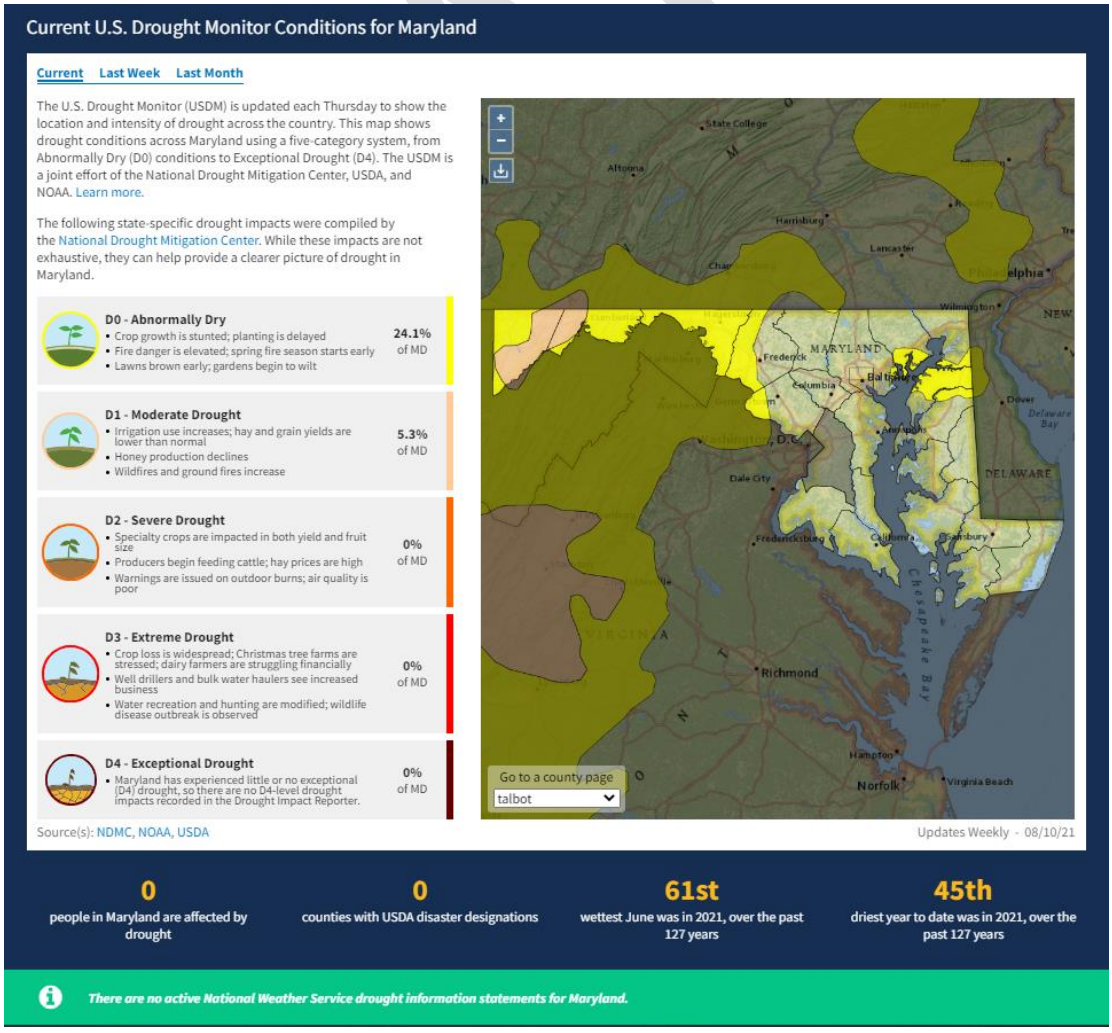


Figure 9-1. U.S. Drought Monitor Conditions for Maryland

The U.S. Drought Monitor also keeps historical records of drought conditions at the state level. The figure below depicts drought conditions since the year 2000.

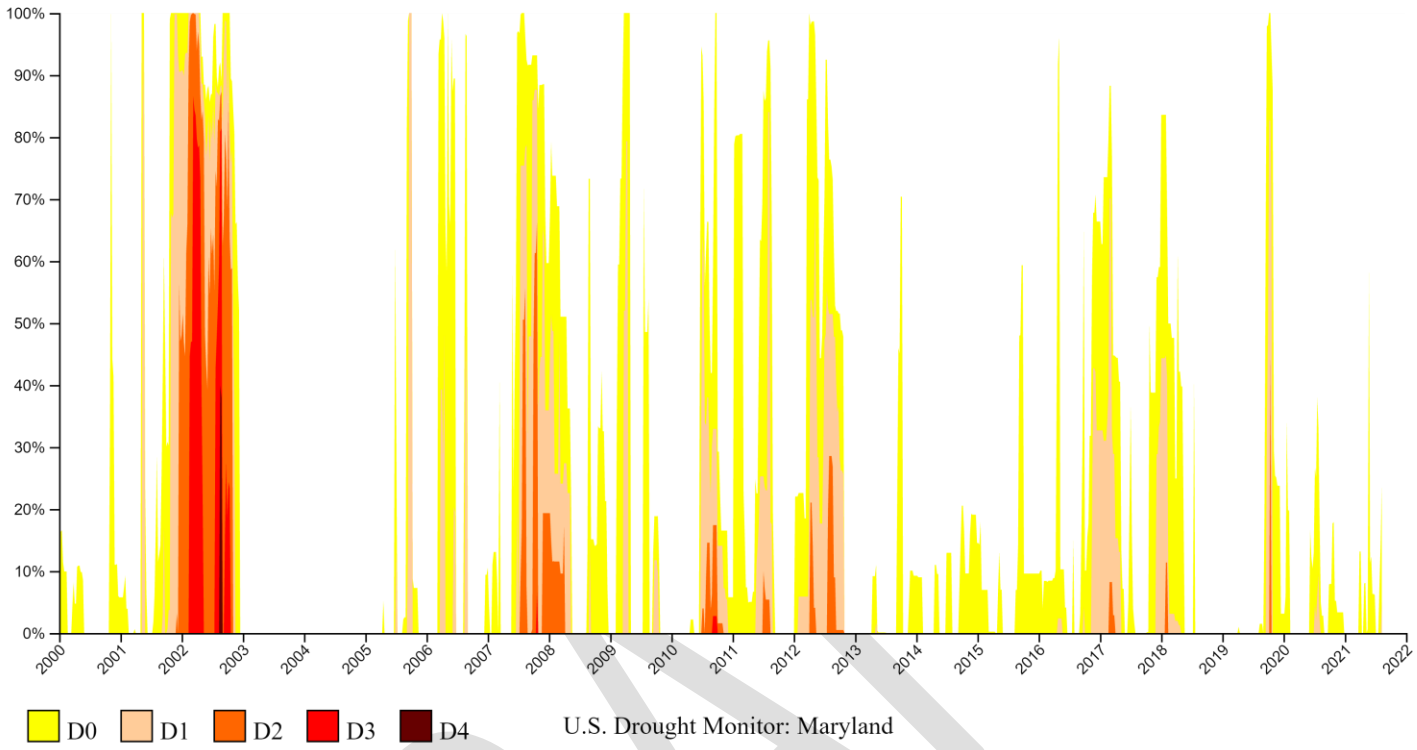


Figure 9-2. Historical Drought Record for Maryland

The Center for Climate and Energy Solutions reported the following information regarding extreme heat and climate change:

> *"During the past decade, daily record high temperatures have occurred twice as often as record lows across the continental United States, up from a near 1:1 ratio in 1950. By midcentury, if greenhouse gas emissions are not significantly curtailed, scientists expect 20 record highs for every low. The ratio could be 50:1 by the end of the century. By the 2050's, many of the Mid-Atlantic States including urban parts of Maryland and Delaware could see a doubling of days per year above 95 degrees F.*
>
> *Extreme heat can also increase the risk of other types of disasters. When heat occurs in conjunction with a lack of rain, drought can occur. This, in turn, can encourage more extreme heat, as the sun's energy acts to heat the air and land surface, rather than to evaporate water. Hot dry conditions also increase the risk of wildfires, like the ones in 2013 in Colorado that were fueled by record high heat and an ongoing drought."*

9.3 DROUGHT & EXTREME HEAT RISK

Drought and extreme heat risk and vulnerability assessed for Talbot County included the following variables:

1. Injuries & Deaths: As reported within the National Center for Environmental Information (NCEI) – Storm Events Database from 1/1/1997 through 05/31/2021.
2. Property & Crop Damage: As reported within the National Center for Environmental Information

(NCEI) – Storm Events Database from 1/1/1997 through 05/31/2021.

3. Geographic Extent: Information obtained from 2017 Agricultural Census.
4. Events: As reported within the National Center for Environmental Information (NCEI) – Storm Events Database through 05/31/2021.

This risk assessment includes data gathered from the National Center for Environmental Information (NCEI) Storm Events Database. Within the NCEI Storm Events Database, drought included the following categories: Drought, Excessive Heat, and Heat. The time covered by the NCEI data used is from 1/1/1997 through 05/31/2021.

Table 9-3. Drought Hazard Risk Assessment Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent (% Crop land cover)	Events
0	0	$0	$0	55%	Total: 59
					Annualized: 2.36

Source(s): National Centers for Environmental Information Storm Events Database (as of February 2021) and USDA Cropland Data (2017).

Table 9-4. Extreme Heat & Heat Hazard Risk Assessment Data Table

Injuries	Deaths	Property Damage	Crop Damage	Geographic Extent (% Crop land cover)	Events
2	5	$0	$0	55%	Total: 75
					Annualized: 2.89

Source(s): National Centers for Environmental Information Storm Events Database (as of February 2021) and USDA Cropland Data (2017).
NCEI definitions/criteria: Excessive Heat – Excessive Heat results from a combination of high temperatures (well above normal) and high humidity. An Excessive Heat event occurs and is reported in Storm Data whenever heat index values meet or exceed locally/regionally established excessive heat warning thresholds. Fatalities (directly related) or major impacts to human health that occur during excessive heat warning conditions are reported using this event category. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Heat – A period of heat resulting from the combination of high temperatures (above normal) and relative humidity. A Heat event occurs and is reported in Storm Data whenever heat index values meet or exceed locally/regionally established advisory thresholds. Fatalities or major impacts on human health occurring when ambient weather conditions meet heat advisory criteria are reported using the Heat event. If the ambient weather conditions are below heat advisory criteria, a Heat event entry is permissible only if a directly related fatality occurred due to unseasonably warm weather, and not man-made environments.

9.4 DROUGHT & EXTREME HEAT VULNERALBILITY

The record high temperature of 102 degrees F was recorded at Royal Oak on 7 July 2012 according to www.plantmaps.com.

To monitor potential drought conditions, Maryland uses four indicators for water sufficiency. The indicators are based on the amount of precipitation (or lack of precipitation) in the hydrologic system. These indicators include: precipitation levels, stream flows, ground water levels, and reservoir storage.

According to the Maryland Department of the Environment, Maryland will implement a staged process for defining drought conditions. Drought indicators will be monitored on an ongoing, year-round basis, and drought status will be determined on a variable timeframe according to drought stage (refer to table below). The frequency of evaluation will increase if the drought intensifies as indicated below:

- Stage 1 Monthly
- Stage 2 Bi-weekly
- Stage 3 Weekly
- Stage 4 Weekly or as needed

Table 9-5. Stages of Drought in Maryland		
Stages	**Color**	**Description**
Stage 1	**Normal (Green)**	No more than one indicator outside of the normal range. • Precipitation exceeds the percent of normal precipitation for the time • Streamflows are above the 25th percentile • Ground water levels are above the 25th percentile • Reservoirs exceed 120 days of storage
Stage 2	**Watch (Yellow)**	At least 2 indicators meet the following conditions: • Precipitation levels are at or below the percent of normal precipitation for the time • Streamflows fall between the 10th and 25th percentile • Ground water levels fall between the 10th and 25th percentile • Reservoirs contain between 90 and 120 days of storage
Stage 3	**Warning (Orange)**	At least 2 indicators meet the following conditions: • Precipitation levels are at or below the percent of normal precipitation for the time • Streamflows fall between the 5th and 10th percentile • Ground water levels fall between the 5th and 10th percentile • Reservoirs contain between 60 and 90 days of storage
Stage 4	**Emergency (Red)**	At least 2 indicators meet the following conditions: • Precipitation levels are at or below the percent of normal precipitation for the time • Streamflows are at or below the 5th percentile • Ground water levels are at or below the 5th percentile • Reservoirs contain 60 days or less of storage
Source: Maryland Department of the Environment.		

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 the operation of ornamental fountains, waterfalls, and reflecting pools
- 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
- 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: md.water.usgs.gov/drought/index.html. Real time Maryland streamflow data is available, as well as drought status and resources. In addition, Water Audits and Loss Reduction Reports for 2013 through 2019 as per the Maryland Department of the Environment indicate the following information:

"Water audits are conducted to determine the amount of water lost from a distribution system due to leakage, storage overflow, water theft, and/or water meter malfunctions. A comprehensive audit can provide the water system with a detailed profile of the distribution system and the water uses allowing for more effective management of the resource and infrastructure. As a condition of the water system's Water Appropriation and Use Permit, water audits are usually required for water systems serving greater than 10,000 people. Audits are completed annually using data from the previous year and report on how efficiently the systems are operating. When water loss is greater than 10%, it triggers submission of a water loss reduction plan. For calendar year 2015: The State had 31 water systems serving a population greater than 10,000 people."

As of 2019, twenty-nine (29) systems completed an audit, and 45% of the systems reported water loss below 10%, while 55% reported more than 10% water loss. Collectively these 29 systems produced 106.8 billion gallons (bg) of water in 2019. Of these billions of gallons, 14.1 bg were lost. Easton is included as one of the 29 water systems within the MDE data. Easton's water system serves a population of 16,118 people and reported a water loss of 9.81% in 2019.[3]

The Easton water system has been included in the 38% of water systems reporting a water loss below 10% for the past three consecutive years as indicated on the table below (Easton is the only municipality in Talbot County included in this report). The water system is reporting an increased water loss per year. In fact, the water loss was just under 10% in 2019, at 9.81%.

Table 9-6. Water Audit for Town of Easton

System	Population Served	Loss Per Year (2016-2019)		Water Loss Reduction Plan
Easton	16,118	2019	9.81%	No
	11,760	2018	7.01%	No
	11,760	2017	7.08%	No
	11,760	2016	9.20%	No

Source: Maryland Department of the Environment Water Audits and Loss Reduction Reports for 2016-2019.

9.5 DROUGHT & EXTREME HEAT CONCLUSION

Through the identification and understanding of drought and extreme heat risk, Talbot County has taken an important step to becoming more resilient. Communicating the hazard risk information compiled within this plan to residents, businesses, and institutional members of the community so that they fully understand is a crucial next step.

Mitigation involves management and planning activities to prevent or decrease the potential for water-shortage emergencies and planning for extreme heat events. These activities include watershed planning and development of supplemental supplies, water-conservation programs, local drought and water-shortage emergency plans, and planning cooling centers. Preparation and response activities incorporate various monitoring, alert, and response actions designed to provide timely and useful information and assistance during actual or impending water shortages and extreme heat events. These actions include drought-monitoring programs, identification of emergency supply sources, and control of water withdrawals through the water appropriation permit program. Finally, cooling centers are established during extremely hot days. Libraries and community centers are frequently used in Talbot County as cooling centers.

Conclusions from the five Talbot County Community Pillars have been summarized below.

Pillar	Conclusions
9.5.1 Health, Safety, and Welfare 	Local law enforcement agencies are responsible for the enforcement of mandatory drought restrictions. Public safety works with the health department and allied agencies to determine the need for and establishment of community cooling centers during extreme heat events.
9.5.2 Economic Stability 	Each community water supplier is responsible for monitoring water supply conditions in their service areas, responding to customer complaints and problems related to drought conditions, and reporting any drought-related problems to MDE. Water suppliers may impose water use restrictions on their customers based on their individual situations when conditions warrant.
9.5.3 Education 	Responsibilities of Local Environmental Health Agencies include: 1. Provide year-round oversight of transient non-community water systems including assistance with drought-related problems. 2. Assess and respond to impacts of water shortages on public health. Issue well construction permits. 3. Assist owners of residential wells with drought-related problems. 4. Provide public education related to drought, well failures and public health issues.
9.5.4 Infrastructure & Environmental 	The members of Talbot County Council will appoint a drought coordinator to coordinate with MDE regarding drought assessment and response, and to handle applications for exemptions or variances to the Mandatory Drought Restrictions. During times of drought emergency, drought coordinators may be removed from that designation at any time by the Secretary of the Department of the Environment and replaced by Drought Coordinators of the Secretary's choice who may serve for the duration of the emergency. Local Drought Coordinators: 1. Maintain communications and coordinate with MDE throughout the drought emergency. 2. Render decisions regarding applications received for exemptions or variances to mandatory restrictions and nonessential water uses when a drought emergency has been declared; and, 3. Establish local drought emergency public information and education programs.

[1] Maryland and the District of Columbia: Floods and Droughts. R.W. James, Jr., U.S. Geological Survey; "General Climatology" section by W.J. Moyer, Maryland State Climatologist, and A.J. Wagner, National Oceanic and Atmospheric Administration; "Water Management" section by G.T. Setzer, Maryland Department of Natural Resources

[2] mde.maryland.gov/programs/water/droughtinformation/pages/index.aspx

[3] mde.maryland.gov/programs/Water/waterconservation/Documents/WaterAuditsAndLossReduction-MDE-2019.pdf

Chapter 10:
Emerging Infectious Diseases

CHAPTER 10: EMERGING INFECTIOUS DISEASES

The *Maryland Department of Health's Emerging Infectious Plan* defines Emerging Infectious Diseases as the following:

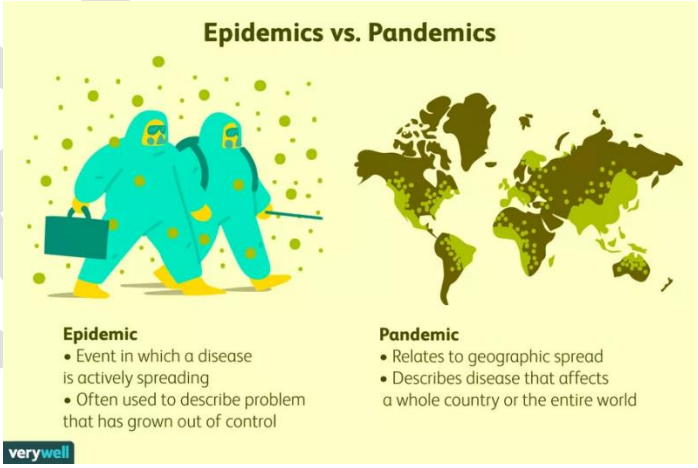
a) An infectious disease that is novel or new to a geographic area;
b) An existing infectious disease that is causing a marked increase in cases or geographic spread; or,
c) A biological agent used to cause harm or death in a population (bioterrorism).

Epidemics can be considered as part of a broad hazard category that could be termed "public health emergencies." In addition to disease epidemics, such events can 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. Epidemics may also be secondary to some other disaster such as flood, tornado, and hurricane or HazMat incident.

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. A disease outbreak is **Endemic** when it is consistently present but limited to a particular region. This makes the disease spread and rates predictable. Malaria, for example, is considered endemic to certain countries and regions.

Pandemic

The World Health Organization (WHO) defines a pandemic as the worldwide spread of a new disease. A pandemic happens 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 get ready for a pandemic before it happens.



Source: www.verywellhealth.com

Epidemic

The World Health Organization (WHO) defines an epidemic as the occurrence in a community or region of cases of an illness, specific health-related behavior, or other health-related events clearly more than normal expectancy. The community or region and the period in which the cases occur are specified precisely. The number of cases indicating the presence of an epidemic varies according to the agent, size, and type of population exposed, previous experience or lack of exposure to the disease, and time and place of occurrence.

The Emerging Infectious Diseases chapter will focus on the following:

- Pandemics
  - Novel Covid-19 Virus
  - Novel Influenza A (H1N1)
  - Severe Acute Respiratory Syndrome (SARS).

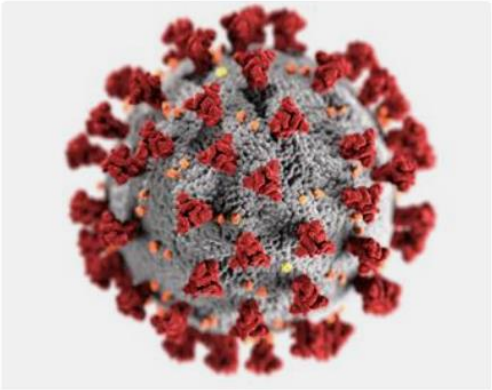
- ❖ Epidemics
  - Zika Virus
  - Ebola Virus

The State's Department of Health and Mental Hygiene (DHMH) maintains occurrence counts for diseases, conditions, outbreaks, and unusual manifestations as reported by health care providers and other diseases notifiable by laboratories in Maryland. The surveillance and reporting of these diseases are the responsibility of the local health department, which investigates and completes reporting both electronically and manually as per DHMH regulations. Notifiable diseases include measles, Hepatitis B, AIDS, salmonellosis, giardiasis, malaria, Lyme disease and rabies.

10.1 HISTORY

10.1.1 Novel COVID-19 Pandemic

The Novel COVID-19 pandemic has exploded since cases were first reported in Wuhan, Hubei Province, China in December 2019. As of July 2021, more than 187.5 million cases of COVID-19—caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection—have been reported globally, including more than 4 million deaths. Cases have been reported in more than 189 countries, including all 50 states of the United States. Additionally, the WHO reports that approximatley 3.4 billion people globally have received the COVID-19 vaccination.



Individuals of all ages are at risk for infection and severe disease. However, the probability of fatal disease is highest in people aged ≥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), through 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 day after exposure. *Note: COVID-19 is an evolving pandemic. Symptoms are being updated as experts learn more about this virus.*

10.1.2 2009 Novel Influenza A (H1N1) Pandemic

According to the Center for Disease Control, 2009 H1N1 (sometimes called "swine flu") is a new influenza virus causing illness in people. This new virus was first detected in people in the United States in April 2009. This virus was spreading from person-to-person worldwide, probably in much the same way that regular seasonal influenza viruses spread. On June 11, 2009, the World Health Organization (WHO) declared that a pandemic of 2009 H1N1 flu was underway.

10.1.3 Severe Acute Respiratory Syndrome (SARS) Pandemic

According to the World Health Organization (WHO), severe acute respiratory syndrome (SARS) is a viral respiratory disease caused by a SARS-associated coronavirus. It was first identified at the end of February 2003 during an outbreak that emerged in China and spread to 4 other countries. SARS is an

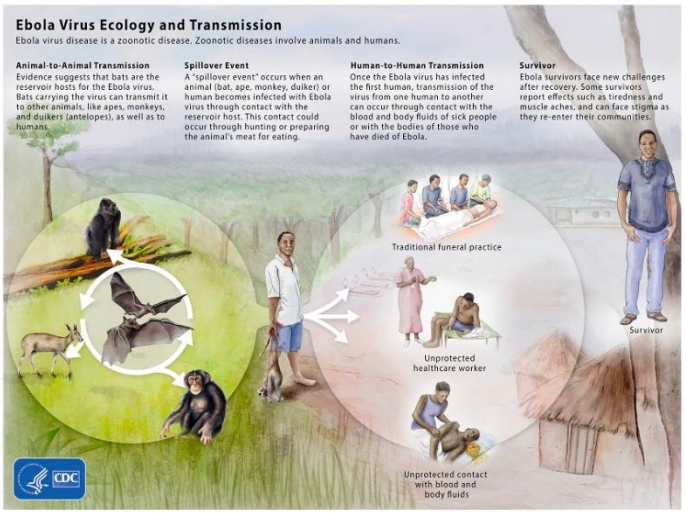
airborne virus and can spread through small droplets of saliva in a similar way to the cold and influenza. It was the first severe and readily transmissible new disease to emerge in the 21st century and showed a clear capacity to spread along the routes of international air travel. In addition, it can be spread indirectly via surfaces that have been touched by someone who is infected with the virus.

Most patients identified with SARS were previously healthy adults aged 25–70 years. A few suspected cases of SARS have been reported among children under 15 years. Symptions of SARS usually begins with a high fever (temperature greater than 100.4°F), while some have mild respiratory symptoms at the onset. Others include headache, an overall feeling of discomfort, and body aches. About 10 percent to 20 percent of patients have diarrhea. After 2 to 7 days, SARS patients may develop a dry cough, with most patients developing pneumonia.

10.1.4 Zika Virus Epidemic

According to the Maryland Department of Health, the Zika virus is an arboviral infection that is spread primarily through the bite of certain species of infected *Aedes* mosquitoes, sexually transmitted, or through blood transfusion (likely but not confirmed). Zika virus has been identified as an illness that causes multiple birth defects including microcephaly, which is defined as abnormal smallness of the head, a congenital condition associated with incomplete brain development. There is no identified vaccine or medication that can be taken to prevent Zika infection. The Eastern Shore has been mildly affected by the Zika virus in the recent past, with a few cases reported over the years. As of the latest data from 2019, no Zika cases have been reported in Talbot County, Maryland.

10.1.5 Ebola Virus Epidemic



According to the Center for Disease Control, Ebola Virus Disease (EVD) is a rare and deadly disease in people and nonhuman primates. The viruses that cause EVD are located mainly in sub-Saharan Africa. People can get EVD through direct contact with an infected animal (bat or nonhuman primate) or a sick or dead person infected with Ebola virus. It is caused by an infection with a group of viruses within the genus *Ebolavirus*:

- Ebola virus (species *Zaire ebolavirus*)
- Sudan virus (species *Sudan ebolavirus*)
- Taï Forest virus (species *Taï Forest ebolavirus*, formerly *Côte d'Ivoire ebolavirus*)
- Bundibugyo virus (species *Bundibugyo ebolavirus*)
- Reston virus (species *Reston ebolavirus*)
- Bombali virus (species *Bombali ebolavirus)*

Of these, only four (Ebola, Sudan, Taï Forest, and Bundibugyo viruses) are known to cause disease in people. Reston virus is known to cause disease in nonhuman primates and pigs, but not in people. It is

unknown if Bombali virus, which was recently identified in bats, causes disease in either animals or people. Ebola symptoms usually include:

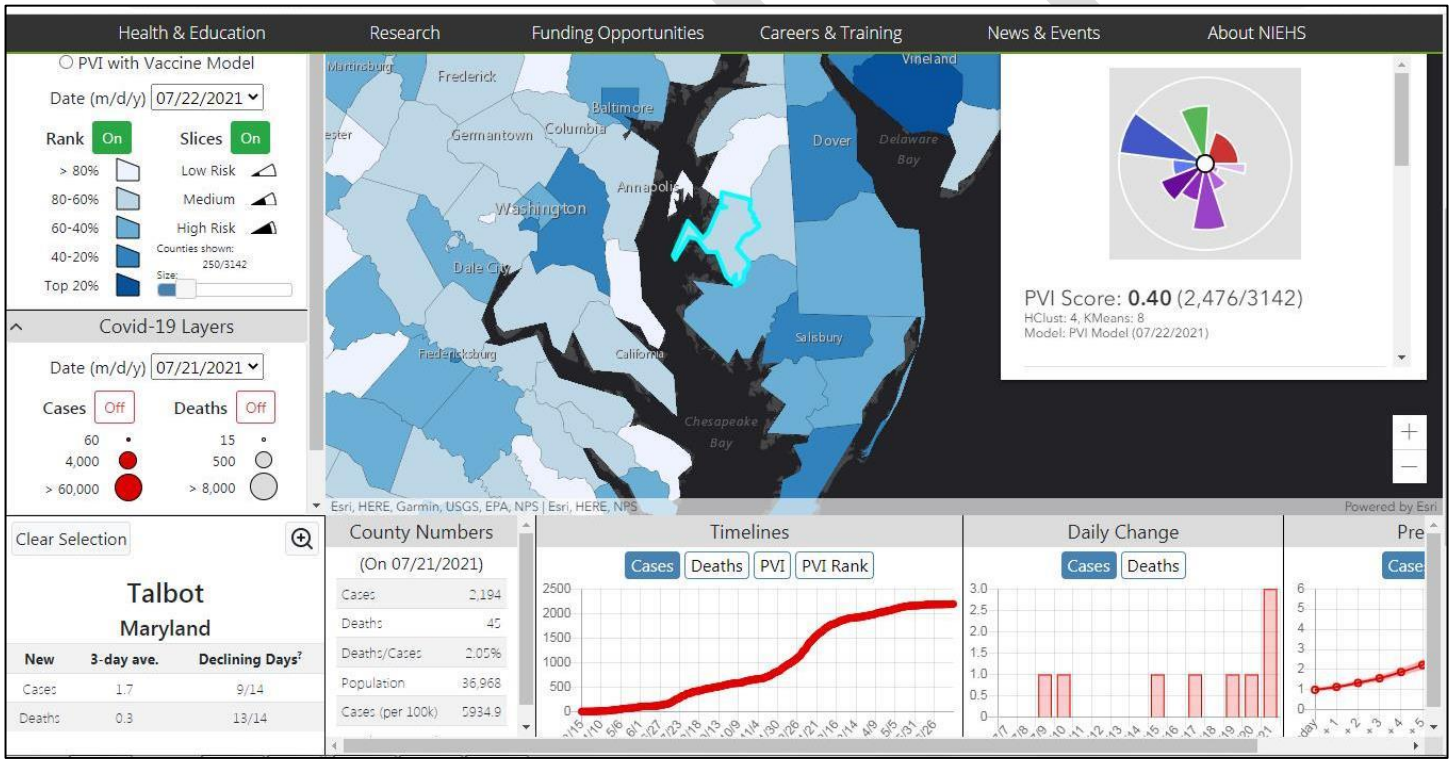
- Fever;
- Headache;
- Diarrhea;
- Vomiting;
- Weakness;
- Joint and muscle aches;
- Stomach pain;
- Lack of appetite; and,
- Bleeding.

The symptoms can be similar to other, more common, infections. Symptoms appear 2-21 days after exposure to the virus, but most commonly occur 8-10 days after exposure. Individuals who do not have a fever are not contagious and cannot transmit the disease to another person. The Ebola virus is transmitted through direct contact with the blood or body fluids of an infected person with symptoms or through exposure to objects (such as needles) contaminated by infected body fluids. Transmission can also occur from directly handling bats, rodents, or primates in areas where Ebola occurs. To date, there have been no cases of the disease acquired in Maryland.

10.2 VULNERABILITY ANALYSIS

Traveling abroad can put you at risk for infectious diseases that are not widespread in the United States. Travelers who become ill in a country where treatment for these diseases may be somewhat limited are even more at risk. All people planning travel should become informed about the potential hazards of the countries they are traveling to. Further information to reduce the risk of getting these diseases can be found here: www.hopkinsmedicine.org/health/conditions-and-diseases/emerging-infectious-diseases.

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.



The Maryland Department of Health and Mental Hygiene provides fact sheets for various illness and diseases. Reported occurrences of specific infectious diseases from the period of 2013 to 2019 within Talbot County are provided in the table below.

Table 10-1. Reported Conditions, Talbot County

Condition	2013	2014	2015	2016	2017	2018	2019
Anaplasmosis	0	0	0	0	1	0	0
Animal Bites	88	95	83	75	84	81	104
Babesiosis	1	0	0	0	1	0	0

Table 10-1. Reported Conditions, Talbot County							
Condition	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Campylobacteriosis	11	7	10	5	6	9	8
Chlamydia	125	125	76	89	100	103	119
Cryptosporidiosis	3	1	2	3	2	4	0
Cyclosporiasis	0	0	0	0	0	0	1
Ehrlichiosis	0	1	1	0	1	6	3
Encephalitis – Non-Arboviral	0	0	0	0	1	0	0
Giardiasis	2	1	1	1	2	2	1
Gonorrhea	18	17	25	26	24	16	24
H. Influenzae - Invasive Disease	0	0	1	0	2	2	3
Hepatitis A (Acute-Symptomatic)	0	0	1	0	0	1	0
Hepatitis B (Acute-Symptomatic)	0	1	1	0	0	0	0
Hepatitis C (Acute-Symptomatic)	1	0	0	0	1	0	1
Legionellosis	0	0	2	0	0	2	0
Listeriosis	1	0	0	0	0	0	0
Lyme Disease	45	30	20	15	28	12	18
Malaria	0	0	0	0	0	1	0
Meningitis, Aseptic	1	0	0	0	1	0	0
Mycobacteriosis, Other Than TB & Leprosy	4	1	4	2	9	7	7
Pertussis	2	4	0	1	0	2	0
Rabies - Animal	3	7	7	9	7	14	9
Salmonellosis - Other Than Typhoid Fever	5	7	10	9	8	18	14
Shiga Toxin Producing E. Coli (STEC)	0	1	0	0	0	1	0
Shigellosis	0	0	1	0	0	1	1
Spotted Fever Rickettsiosis	0	0	0	0	7	20	22
Strep Group A - Invasive Disease	0	0	1	1	1	1	2
Strep Group B - Invasive Disease	4	4	11	6	7	5	0
Strep Pneumoniae – Invasive Disease	0	0	2	1	4	2	2
Syphilis - Primary And Secondary	1	1	0	0	1	1	1
Tuberculosis	0	0	0	0	3	0	0
Vibriosis (Non-Cholera)	1	3	0	3	1	2	2
West Nile Virus	0	0	0	0	0	1	0

Additional information is available to the public on the Talbot County Health Department's website including:

- Emergency Preparedness
- Disease Surveillance
- Family Planning
- COVID-19 Data and Information
- Vaccine and Immunization Resources

The website provides information on health-related topics as well as information on how to prepare and prevent various types of disasters. Talbot County's Department of Emergency Services website also provides information on disaster mitigation, hazard mitigation, public resources, emergency medical

services, preparedness and recovery, and more. For information specifically related to COVID-19, Talbot County offers www.talbotcovid19.org as a resource for the community. The website serves as a hub for news, alerts, and data related to COVID-19 and offers various data sources and resources for members of the community.

10.3 CAPABILITIES

On June 10, 2020, the Federal Emergency Management Agency (FEMA) released *The Mass Care/Emergency Assistance Pandemic Planning Considerations* to assist state, tribal, and territorial governments in planning mass care delivery. The guide provides information on sheltering, feeding, evacuation and the federal resource request process. It was developed using health and safety planning information and requirements outlined by the Department of Health and Human Services (DHHS) and the Centers for Disease Control and Prevention (CDC).

This document provided planning considerations for jurisdictions that are responding to a pandemic or responding to a pandemic occurring concurrently with a natural, technological and/or human caused disaster. For planning purposes, the document includes only mass care and emergency assistance functions and planning considerations in the context of a pandemic. The delivery of mass care and emergency assistance may vary due to the health and safety planning requirements put forth by DHHS and the CDC.

Concept of operations is based on two types of events: a pandemic without a disaster event and a pandemic during a disaster event.

The following assistance components are included in the *National Response Framework (NRF), 4th Edition Annex for ESF #6, Mass Care, Emergency Assistance, Temporary Housing and Human Assistance*.

Mass Care

- Sheltering
- Feeding
- Distribution of Emergency Supplies
- Reunification

Emergency Assistance

- Assistance to People with Disabilities, and Others with Access and Functional Needs, Including those with disabilities
- Household Pets, Services and Support Animals
- Mass Evacuee Support

Response to a Pandemic Event Only

Viruses may cause moderate to severe illness and spread easily from person to person. Due to the pandemic outbreak, a range of actions have been established to prevent further spread of the disease, including social distancing, shelter-in-place, travel restrictions and cancellation of large gatherings.
A jurisdiction may experience an outbreak of disease that is beyond the capacity of the state, tribe, territory or affected local government. The affected jurisdiction should initially seek state or tribal assistance. If a state or tribe is unable to provide adequate resources, the state or tribe should request federal assistance.
Homeless populations residing in congregate shelters across the country are at risk, due to lack of space for social distancing and increased risk of cross contamination.

FEMA recognizes that non-congregate sheltering will be necessary during a pandemic to save lives, to protect property and public health and to ensure public safety, as well as to lessen or avert the threat of a catastrophe. In accordance with section 502 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, eligible emergency protective measures taken to respond to a pandemic emergency at the direction or guidance of state, local, tribal and territorial public health officials may be reimbursed under Category B of FEMA's Public Assistance program.

Source: The Mass Care/Emergency Assistance Pandemic Planning Considerations

Response to Concurrent Pandemic and Disaster Event(s)

A natural, technological, or human-caused disaster has occurred in an area disproportionately affected by a pandemic outbreak or a pandemic event emerges during disaster response.

As a direct result of the natural or human-caused disaster, it is necessary to provide mass care and emergency assistance services to affected individuals and emergency responders. In addition, evacuations may be necessary to a neighboring jurisdiction(s) as well as the provision of public health and medical services to individuals affected by the pandemic. This could place an additional burden on neighboring states or tribes providing mass care to the affected populations. Some jurisdictions may not be willing to accept survivors who have, or potentially have been, infected by illness.

NOTE: Depending on the magnitude of the disaster event, a Stafford Act declaration for major disaster may be issued to provide federal financial assistance to the state or tribe and affected survivors in accordance with existing regulations.

Source: The Mass Care/Emergency Assistance Pandemic Planning Considerations

For more details on these components, please refer to the Appendices in *The Mass Care/Emergency Assistance Pandemic Planning Considerations:* www.fema.gov/medialibrary/assets/documents/188597

Another national capability with resources available to Talbot County in the event of a health crisis is the Strategic National Stockpile. The Strategic National Stockpile (SNS) is part of the federal medical response infrastructure and can supplement medical countermeasures needed by states, tribal nations, territories and the largest metropolitan areas during public health emergencies.

The supplies, medicines, and devices for lifesaving care contained in the stockpile can be used as a short-term, stopgap buffer when the immediate supply of these materials may not be available or sufficient. The SNS team works every day to prepare and respond to emergencies, support state and local preparedness activities, and ensure availability of critical medical assets to protect the health of Americans.[1]

For example, as part of the COVID-19 response, the SNS has deployed personal protective equipment

(PPE), including N95 respirators, surgical and face masks, face shields, gloves, and disposable gowns, to help prevent transmission in all 50 states, the nation's four largest cities, and U.S. territories and ventilators to areas in need. The SNS is also working with its partners across the federal government to coordinate logistics operations to leverage all available resources to support the COVID-19 response.

Local communities may find more resources at phe.gov. Regional Emergency Coordinators assigned to each of the Health and Human Services (HHS) regions should work directly with public health authorities to determine local supply needs. Talbot County is in HHS Region 3 – Philadelphia.

10.4 CONCLUSIONS AND RECCOMENDATIONS

The CDC recommends the following "guiding principles" to consider when developing and implementing mitigation strategies during an emerging infectious disease or pandemic event. These guiding principles utilize the CVOD-19 virus as their example:

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 the table on page 12 of this chapter.
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 the table on page 12 of this chapter.

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 10-2. 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: www.cdc.gov/coronavirus/2019-ncov/community/community-mitigation.html

The following table includes mitigation strategies that Talbot County could adopt in the future if they are not already in place. These strategies are based upon the previous fifteen "guiding principles" and 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 Talbot County, but an important

component of mitigation is preparedness via foreknowledge of multiple strategies in the face of an uncertain future. These strategies are not necessarily specific to COVID-19 and may be adjusted when appropriate.

Table 10-3. Overview of Possible Mitigation Strategies to Consider in Communities with Local COVID-19 Transmission Across Settings and Sectors

Promote Behaviors that Prevent Spread	1. Educate people to stay home when sick or when they have been in close contact with someone with COVID-19 2. Teach and reinforce practicing hand hygiene and respiratory etiquette 3. Teach and reinforce the use of cloth face coverings to protect others (if appropriate) 4. 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). 5. Post signs or posters and promote messaging about behaviors that prevent spread
Maintain Healthy Environments	1. Intensify cleaning and disinfection of frequently touched surfaces 2. Ensure ventilation systems operate properly and increase circulation of outdoor air 3. Ensure all water systems are safe to use 4. Modify layouts to promote social distance of at least 6 feet between people – especially for persons who do not live together 5. Install physical barriers and guides to support social distancing if appropriate 6. Close communal spaces, or stagger use and clean and disinfect between use 7. Limit sharing of objects, or clean and disinfect between use
Maintain Healthy Operations	1. Protect people at higher risk for severe illness from COVID-19 2. 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 3. Maintain awareness of local or state regulations 4. Stagger or rotate scheduling 5. Create static groups or "cohorts" of individuals and avoid mixing between groups 6. Pursue virtual events. Maintain social distancing at any in-person events, and limit group size as much as possible 7. Limit non-essential visitors, volunteers, and activities involving external groups or organizations, especially with those who are not from the local area 8. Encourage telework and virtual meetings if possible 9. Consider options for non-essential travel in accordance with state and local regulations 10. Designate a COVID-19 point of contact 11. Implement flexible and non-punitive leave policies 12. Monitor absenteeism and create a back-up staffing plan 13. Train staff on all safety protocols 14. Consider conducting daily health checks such as temperature screening or symptom checking 15. Encourage those who share the facilities to also adhere to mitigation strategies 16. Put in place communication systems for: 17. Individuals to self-report COVID-19 symptoms, a positive test for COVID-19, or exposure to someone with COVID-19 18. Notifying local health authorities of COVID-19 cases 19. Notifying individuals (employees, customers, students, etc.) of any COVID-19 exposures while maintaining confidentiality in accordance with privacy laws 20. Notifying individuals (e.g., employees, customers, students) of any facility closures

Table 10-3. Overview of Possible Mitigation Strategies to Consider in Communities with Local COVID-19 Transmission Across Settings and Sectors	
Prepare for When Someone Gets Sick	1. Prepare to isolate and safely transport those who are sick to their home or to a healthcare facility 2. Encourage individuals who are sick to follow CDC guidance for caring for oneself and others who are sick 3. Notify local health officials of any case of COVID-19 while maintaining confidentiality in accordance with the Americans with Disabilities Act (ADA)external icon. 4. 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 5. Advise individuals who are sick when it would be safe for them to return based on CDC's criteria to discontinue home isolation 6. 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.

[1] www.phe.gov/about/sns/Pages/default.aspx

Chapter 11:
Mitigation and Resilience Goals, Objectives, and Action Items

PLAN UPDATE

- Page 1 – Goals and objectives were updated and modified as needed to represent Talbot County presently, including municipalities, residents, businesses.
- Page 5 – Sections 11.2.1 and 11.2.2 were added to highlight the planning process, including the mitigation action item status update and the mitigation action item workshop. Please refer to Appendix B for full results of the action item status update.
- Page 6 – Section 11.2.3 includes the mitigation action item project sheets developed by stakeholders during this plan update process. In total, 30 mitigation action items are included in this plan update. 12 of these action items are considered “high” priority by stakeholders; these are denoted in the section.
- Page 7 – Mitigation action item project sheets have been updated and developed by members of the Hazard Mitigation Planning Committee, with input from members of the public. The mitigation action items developed by the HMPC during this plan update address the vulnerabilities discussed in Section 2 of this plan by identifying specific measures that will help the County avoid, prevent, or otherwise reduce damages and downtime resulting from the natural hazards profiled within this plan.

CHAPTER 11: MITIGATION & RESILIENCE GOALS, OBJECTIVES & ACTION ITEMS

This chapter discusses goals, objectives, and action items established by Talbot County's Hazard Mitigation Planning Committee (HMPC) and stakeholders. The goals and objectives presented herein help to guide Talbot County in identifying and selecting mitigation actions and resilience strategies to address its hazard vulnerabilities. The mitigation action items developed by the HMPC during this plan update address the vulnerabilities discussed in Section 2 by identifying measures that will help the County avoid, prevent, and/or otherwise reduce damages and potential downtime resulting from natural hazards profiled within this plan.

While the hazard identification, risk and vulnerability assessments presented in Section 2 of the plan document identified potential hazards, the affected areas, and facilities in the County vulnerable to those hazards, Section 3 identifies specific mitigation strategies and action items that could potentially address these vulnerabilities and reduce the risk from the identified hazards.

Talbot County's vision of a safe, secure, and resilient community is:

- ✓ A County with buildings located outside of hazardous areas and built to withstand the hazards that threaten them;
- ✓ A County integrating hazard mitigation concerns into decisions on growth and future development;
- ✓ An informed citizenry charged with protecting their families, homes, workplaces, communities, and livelihoods from the impact of disasters;
- ✓ County and municipal departments integrating cost-effective mitigation and resilience programs into routine planning and budgeting decisions; and,
- ✓ A partnership of local, State, and Federal governments, volunteer agencies, business and industry, and individual citizens focused on preventing or reducing the loss of life and property from the full range of hazards.

11.1 GOALS AND OBJECTIVES

The primary desire of Talbot County's HMPC and stakeholders is that goals and objectives identified within this plan maintain the social, economic, and environmental fabric of the community. First and foremost, goals and objectives will serve to protect people, property, local governmental operations, and the local economy from the effects of natural hazards. During the various core planning and HMPC member meetings, the 2022 risk and vulnerability assessments and potential mitigation strategies were discussed.

Goal	Goals are general guidelines that explain what you want to achieve. They are usually broad policy-type statements, long-term and represent global visions.
Objective	Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, they are specific and measurable.

The goals and objectives identified in previous updates of this plan were carried forward into this plan update and stakeholders were provided the opportunity to modify and add new goals and objectives during a Mitigation Action Item Workshop held on November 19, 2021. The goals and objectives presented herein represent the County's vision for reducing damages caused by flooding and other natural hazards and creating community resilience. Goals and objectives have been categorized into fifteen (15) broad hazard areas of importance to Talbot County: Flood, Winter Storm, Erosion, Wildfire, Tornado & High Winds, Drought, Critical Facilities, Public Awareness, Sustainable Development, Building Construction, Communication, Training, Shelters, Plan Integration, and Community Resilience.

11.1.1 FLOOD

Goal 1 – Minimize damage caused by flooding.

1.1 Ensure that existing structures in the floodplain are resistant to flood damage.
1.2 Create awareness among residents and businesses of the potential hazards associated with floodplain areas and how they can protect themselves and their properties from flood events.
1.3 At a minimum, protect critical facilities located within the existing 100-year flood boundary and/or elevation. In addition, the current FEMA Flood Risk Management Standard recommends floodplain protection of critical facilities to the 0.2% chance (500-year) flood elevation as an added margin of error against flood/climate risk. Consider the most appropriate flood control measures such as acquisition and relocation, elevation, dry/wet flood proofing, etc.
1.4 Review, revise and update local floodplain ordinances, as appropriate.
1.5 Prepare and execute stormwater management plans for various areas in the County.
1.6 Reduce road closures, specifically evacuation routes and protect public infrastructure from flood damage.
1.7 Restore barrier islands to provide protection for Talbot County's shorelines from wave action.
1.8 Continue to participate in Community Rating System activities to reduce the cost of flood insurance within Talbot County.
1.9 Continue to enforce the Floodplain Ordinance to locate new development outside the floodplain.
1.10 Map future flood risk areas.
1.11 Further develop flood mitigation strategies to include concept/design.
1.12 Encourage property owners within the FEMA Special Flood Hazard Area to purchase flood insurance.

11.1.2 WINTER STORM

Goal 2 – Minimize the impacts of winter storms on County residents.

2.1 Ensure residents are forewarned to be prepared with supplies to face winter storms.
2.2 Protect utilities, to reduce potential impacts and/or disruptions due to exposure to hazards such as hail, snow, icy conditions, high winds, etc.
2.3 Increase community awareness of public warming centers and cold weather shelters.

11.1.3 EROSION

Goal 3 – Minimize damage caused by erosion.

3.1 Provide flood protection where appropriate to reduce erosion and sediment input into the Choptank River, East Wye, Miles, Tred Avon Rivers, and other vulnerable rivers.
3.2 Provide information to waterfront property owners regarding ways to mitigate erosion problems along their shorelines.
3.3 Encourage the education and use of living shorelines in appropriate locations for shoreline stabilization.

11.1.4 WILDFIRE

Goal 4 – Reduce damage and loss to existing community assets including residential structures, critical facilities, and infrastructure due to wildfire.

4.1 Reduce the exposure to critical facilities in high or extreme fire hazard areas.
4.2 Reduce the exposure of residences and infrastructure to fire hazard incidents.

11.1.5 TORNADO & HIGH WINDS

Goal 5 – Reduce exposure and risk of structures due to wind hazards.

5.1 Improve the County's ability to identify structures that are vulnerable to high winds.
5.2 Consider actions for wind mitigation wherever appropriate.

11.1.6 DROUGHT

Goal 6 – Minimize agricultural/crop loss due to drought.

6.1 Introduce farmers and residents to water saving methods and devices through an education process.
6.2 Encourage the use of xeriscaping and drip irrigation. Xeriscaping is the process of landscaping, or gardening, that reduces or eliminates the need for irrigation.

11.1.7 CRITICAL FACILITIES

Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.

7.1 Reduce the possibility of damage and loss to existing community assets, including addressable structures, critical facilities and infrastructure due to flooding and other hazard events.
7.2 Design new critical facilities with resilience against anticipated future conditions (i.e., sea level rise, flood risk, precipitation, and temperatures) that are projected throughout the lifetime of the facility.

11.1.8 PUBLIC AWARENESS

Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.

8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills.
8.2 Ensure County residents are aware of evacuation procedures.
8.3 Ensure proper real estate disclosures, including elevation certificates, to enable buyers to make informed purchase decisions.
8.4 Promote the use of Talbot County's Citizen Alert System (Everbridge) and/or other texting/email/phone call alert systems when communicating weather-related alerts with the public.

11.1.9 SUSTAINABLE DEVELOPMENT

Goal 9 – Promote sustainable development to improve the quality of life.

9.1 Provide for the conservation and protection of working lands and natural resources, such as wetlands, forests, and critical areas.
9.2 Ensure density is regulated in hazard prone areas.
9.3 Use smart growth planning techniques to conserve land and reduce exposure to hazards.

9.4 Create a Post Disaster Redevelopment Plan (PDRP) to guide rebuilding after a disaster.

11.1.10 BUILDING CONSTRUCTION

Goal 10 – Maintain high building construction standards through the adoption of current International Building Codes (IBC) - Building Performance Standards.

10.1 Ensure current building codes and standards follow FEMA's and IBC's basic guidelines and are properly enforced.

11.1.11 COMMUNICATION

Goal 11 – Improve communication between local jurisdictions.

11.1 Promote partnerships among/between the municipalities and the County to develop a countywide approach to mitigation activities and resilience initiatives.
11.2 Develop a distribution plan for public outreach materials and other relevant information.
11.3 Promote GIS technology for updating and exchanging of GIS data, countywide.

11.1.12 TRAINING

Goal 12 – Enhance performance of staff to become competent in reducing vulnerability and improving community resilience.

12.1 Encourage County and municipal staff to attend hazard mitigation and resilience related training programs to enhance performance of their existing job functions.

11.1.13 SHELTERS

Goal 13 – Ensure that there are an adequate number of shelters in the County.

13.1 Ensure that facilities designated as shelters have adequate back-up power (i.e., generators correctly sized for facility) and are structurally sufficient.

11.1.14 PLAN INTEGRATION

Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.

14.1 Integrate hazard mitigation and resilience into areas such as land use, transportation, climate change, natural and cultural resource protection, water resources, and economic development.
14.2 Solicit participation and offer opportunities for various departments to work together on a regular basis.
14.3 Clearly define roles of, and improve, inter-governmental coordination between planners, emergency managers, engineers, and other staff, as well as municipal and regional partners in improving disaster resilience.

11.1.15 COMMUNITY RESILIENCE

Goal 15 – Organize effectively and address resilience risks and priorities.

15.1 Prioritize infrastructure improvements based on their role in supporting Talbot County's five

Community Pillars: (1) Health, Safety, Welfare, (2) Economic Stability, (3) Education, (4) Infrastructure, and (5) Environmental.

15.2 Address Infrastructure dependencies and cascading effects in system failures.

15.3 Determine customized long-term resilience initiatives.

15.4 Regularly review and integrate the best available projections for sea level rise, flooding, precipitation, and other hazards into County planning.

11.2 MITIGATION & RESILIENCE ACTION ITEMS

The Core Planning Team and the HMPC worked diligently over the course of several months and multiple large and small meetings to identify, develop, and prioritize the thirty (30) mitigation action items included in the 2022 Plan Update. Stakeholders were given the opportunity to review and recommend new mitigation action items while reviewing drafts for natural hazard profiles.

11.2.1 MITIGATION ACTION ITEMS STATUS REPORT

Appendix B of this plan details the process implemented to gather feedback and updates to action items from the 2017 plan iteration. The HMPC determined that fourteen (14) action items would be carried over into the 2022 Plan Update (including 9 projects designated as "delayed" in addition to 5 projects that were identified as being "on schedule"). These items were reviewed and refined to reflect current conditions within Talbot County. In addition to these action items, new action items were developed by stakeholders throughout the plan update process. During the second stakeholder meeting held on September 22, 2021, HMPC members were given the time and opportunity to review newly recommended action items and modify them as necessary to better suit Talbot County and its communities. Notes for this meeting, as well as other stakeholder meetings, are available in *Appendix D: Meeting Notes* and on the project website: www.talbothazardplan.org. In addition to the expertise and guidance of stakeholders, results from the public survey (see *Appendix I: Public Survey Results*) were considered in the development of mitigation action items. The public indicated a strong desire for continued and increased communication and education, and as such, multiple mitigation projects include these components.

11.2.2 MITIGATION ACTION ITEM WORKSHOP

Stakeholders attended the Mitigation Action Item Workshop on November 19, 2021. During this workshop, stakeholders were divided into groups based upon Talbot County's Community Pillars (i.e., Health/Safety/Welfare, Economic Stability, Education, Infrastructure, and Environmental). Small groups worked to update and complete the mitigation action item project sheets included in this chapter. HMPC members were asked to review and modify the pre-populated mitigation action items project sheets. Small-group members were tasked with completing their pre-populated project sheets and were then provided the opportunity to report to the larger stakeholder group. Mitigation action item projects were fully developed and refined before prioritizing each action item via a ranking exercise, as described below.

Twelve (12) of the thirty action items were rated as "high" priority by the HMPC and stakeholders via a ranking exercise. The exercise asked stakeholders to consider the following six questions in relation to each mitigation action item and answer with, Yes/No/or Null:

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/Municipalities 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 its Municipalities?

6. Is this project consistent with environmental goals?

Members of Talbot County's HMPC **review** and **update** mitigation action item project sheets during the Mitigation Action Item Workshop, held on November 19, 2021.

Upon completion of the mitigation action item project sheets, HMPC members completed a ranking exercise in order to prioritize the action items.

11.2.3 MITIGATION ACTION ITEM PROJECT SHEETS

The following pages provide detailed information on each mitigation action item, including: associated hazard(s), impacted location(s), project title, background/issue, ideas for integration, responsible agency, partners, potential funding, cost estimate, benefits (losses avoided), timeline, and associated goals and objectives. In total, twelve (12) of the thirty (30) mitigation action items were ranked as "high" priority by stakeholders. High priority action items are listed in the following table and are provided in order of most highly prioritized to least highly prioritized. These action items are also denoted as "HIGH" on their project sheet. Note: the following mitigation action item project sheets are not presented in order of importance.

Table 11-1. High Priority Mitigation Action Items

HIGH Priority Mitigation Action Item Projects	Project Number
Winter Weather Education via Media	5
Update the County's Cold Weather Plan	4
Culvert Mitigation	24
Disaster Recovery Planning for Economic Development	15
Mass Emergency Communication Strategy	20
Maintain Current CRS Rating	1
Debris Management Plan Maintenance	9
COVID-19 After Action Report	13
Update County Code for Well Head Elevation	23
Pillar and overall stakeholder groups to continue to meet annually	25
Flood Mitigation Non-Substantial Improvements for Businesses	14
Flood Prevention & Stormwater Management Best Practices	19

Table 11-2. MITIGATION PROJECT # 1 (HIGH)	
Hazard:	Flood
Location(s):	County and Municipalities
Project Title/Mitigation Action Item	**Maintain Current FEMA CRS Rating** Action Item: Continue to participate in FEMA Community Rating System activities with the goal of maintaining the county's current CRS rating, Class 7.
Background/Issue:	The FEMA Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP). Over 1,500 communities participate nationwide. In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts that address the three goals of the program: 1. Reduce and avoid flood damage to insurable property. 2. Strengthen and support the insurance aspects of the National Flood Insurance Program. 3. Foster comprehensive floodplain management. Talbot County's CRS rating has improved from a Class 8 to a Class 7 rating since 2016. Property owners within the SFHA receive a 15% discount and property owners outside the SFHA receive a 5% discount. The Town of Oxford is rated as a CRS Class 7 community; property owners in Oxford also receive a discount to their flood insurance rates (15% within the SFHA/5% outside the SFHA). If the County wants to improve its rating further, thus increasing resident's flood insurance savings, they need to dedicate staff and time to continue FEMA-approved community floodplain management practices. **The Coordinator's Manual** is the guidebook for the Community Rating System. The Coordinator's Manual explains how the program operates, how credits are calculated, what documentation is required, and how class ratings are determined. It also acts as guidance for communities in enhancing their flood loss reduction and resource protection activities.
Ideas for Integration:	• Create a streamlined timeline of when Permits and Inspections reaches out to County and Municipalities with annual information for their reporting. • Create a checklist for County and Municipalities on activities they can perform to assist in maintaining the current CRS rating. • Create a timeline that County and Municipalities receive annually to help in CRS reporting. • Annual meeting for all county and municipal stakeholders to discuss CRS program for the upcoming year.
Responsible Agency:	Planning and Zoning, Emergency Services, Municipal Governments
Partners:	Floodplain Coordinator
Potential Funding:	FEMA Flood Mitigation Assistance Grant Program, Hazard Mitigation Grant Program, Building Resilient Infrastructure and Communities program (BRIC)
Cost Estimate:	Administration of CRS activities: staff-time at the County and Municipal level. The cost of

Table 11-2. MITIGATION PROJECT # 1 (HIGH)	
	developing and implementing projects to earn CRS credit is highly dependent upon the type of project.
Benefits (Losses Avoided):	• Mitigation of damages caused by natural hazards such as flooding. • Reduction in the cost of flood insurance for property owners.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 1- Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. 1.2 Create awareness among residents and businesses of the potential hazards associated with floodplain areas and how they can protect themselves and their properties from flood events. 1.8 Continue to participate in Community Rating System activities to reduce the cost of flood insurance within Talbot County. 1.11 Encourage property owners within the FEMA Special Flood Hazard Area to purchase flood insurance.

Table 11-3. MITIGATION PROJECT # 2	
Hazard:	Flood
Location(s):	Streams in high-risk hazard areas throughout Talbot County.
Project Title/Mitigation Action Item	**Drainage Corridor Assessments to Determine the Status of Gray Infrastructure.** Action Item: Conduct drainage corridor assessments to determine the status of bridges, culverts, pipes, failing channelization, debris blockages, and other issues that may increase the severity of flood events.
Background/Issue:	The County currently has a culvert assessment/database (Point of Contact: Mark Cohoon). Assessments can be conducted for gray infrastructure that has not been evaluated recently by Public Works, Roads Department, and/or State Highway Administration. Green infrastructure alternatives should be considered where appropriate while assessing the status of current gray infrastructure. Link for more information: www.dnr.maryland.gov/education/Pages/StreamCorridorAssessment.aspx
Ideas for Integration:	Complete action items of culvert assessment, amend any government codes.
Responsible Agency:	Applicable Public Works and Planning Departments
Partners:	General maintenance departments and impacted property owners.
Potential Funding:	Grants and capital improvement projects.
Cost Estimate:	$35-50k +/- $250,000 (project dependent)
Benefits (Losses Avoided):	Infrastructure failures and flooding avoided.
Timeline:	1–5-year cycle with ongoing maintenance.
Goals & Objectives:	**Goal 1 - Minimize damage caused by flooding.** **Goal 3 - Minimize damage caused by erosion.** 3.1 Provide flood protection while reducing erosion and sedimentation.

Table 11-4. MITIGATION PROJECT # 3	
Hazard:	Coastal
Location(s):	County and Municipalities
Project Title/Mitigation Action Item	**Public Outreach to Increase Support for Barrier Islands (Green Infrastructure)** Action Item: Green infrastructure can help protect coastal communities from impacts associated with coastal hazards, such as flooding from hurricane storm surge, sea-level rise, and shoreline erosion. Barrier island restoration is a type of green infrastructure that can protect shorelines from storm surge and erosion. Public outreach should be conducted to increase public support for ongoing barrier island projects at the municipal level as well as proposed barrier island projects in Talbot County's Green Infrastructure Plan (Cleaner, Greener Talbot). Action Item: Restore barrier islands to provide protection for Talbot County's shorelines from wave action.
Background/Issue:	According to NOAA/NOS, Barrier Islands form as waves repeatedly deposit sediment parallel to the shoreline. As wind and waves shift according to weather patterns and local geographic features, these islands constantly move, erode, and grow. They can even disappear entirely. They are generally separated from the mainland by tidal creeks, bays, and lagoons. Beaches and sand dune systems form on the side of the island facing the bay, ocean, or other primary water body; the side facing the shore often contains marshes, tidal flats, and maritime forests. These islands are critical to protecting coastal communities and ecosystems from extreme weather. Beach dunes and grasses on barrier islands absorb wave energy before the wave hits the mainland. This generally means smaller storm surge and less flooding on the coast. According to the Journal of Coastal Research, barrier islands protect about 10 percent of coastlines worldwide. When hurricanes and storms make landfall, these strands absorb much of their force, reducing wave energy and protecting inland areas.[1] A man-made offshore structure constructed parallel to the shore is called a breakwater. In terms of coastal morphodynamics, it acts similarly to a naturally occurring barrier island by dissipating and reducing the energy of the waves and currents impacting the coast. **Regional Perspective:** <u>Ocean City, Maryland</u> Ocean City, which is located at the southern end of Fenwick Island along Maryland's eastern shore, has been a popular beach resort for a long time. In the 1920's, several large hotels were built there, and by the 1950's, development boomed dramatically and lasted almost 30 years. In the 1970's, ecological concerns about the island were raised, and laws were enacted to halt dredging of channels and filling in wetlands. A hurricane opened the Ocean City Inlet in 1933 (the inlet separates Fenwick Island from Assateague Island to the south). To keep the channel navigable to the mainland, the U.S. Army Corps of Engineers constructed two rock jetties. Although the jetties stabilized the inlet, they altered the normal north-to-south sand transport by the longshore currents. The result is that sand built up behind the north jetty and the sand below the south jetty

Table 11-4. MITIGATION PROJECT # 3	
	was quickly eroded. The accelerated erosion has shifted Assateague Island almost one-half mile (.8 km) inland. In a very short time, human interventions have permanently altered the barrier island profile. **Local Perspective:** <u>Oxford</u> Design for a Living Shoreline with small marsh islands to reduce wave energy along the Strand Shoreline. Garnering public support for a major change is an obstacle. The Town of Oxford is waiting on State/Federal permit approval and State/Federal funding secured for construction. Anticipated completion date: 2022-2023 Dept. Emergency Services – Delayed, unsure if this project is occurring.
Ideas for Integration:	Integrate into "Cleaner, Greener Talbot" green infrastructure plan.
Responsible Agency:	County, Municipalities
Partners:	ShoreRivers, Maryland Department of the Environment, U.S. Department of Agriculture, neighborhood groups, homeowner's associations.
Potential Funding:	NOAA grant funding, FEMA grants.
Cost Estimate:	• ~$96k per acre of restored beach/island. ○ Based on the following Louisiana projects: Project #1: $57 million for 510 acres of restored beach and dune, Project #2: ~$47 million for 586 acres. 1 acre is equal to 43,560 square feet. Roughly $111,764.70 per acre or $80,204.78 per acre (on average $95,984 per acre of restoration). • Poplar Island cost: $1.4 billion for 1,515 acres of island. Or, $816,326.5 per acre.
Benefits (Losses Avoided):	• Protect coastal communities from storms by reducing wave energy and storm surge, thus lessening costs associated with damages and recovery over time.
Timeline:	Outreach can co-occur with construction, which will take multiple years and phases to complete. Timeline is largely dependent upon project size, location, and support. Example: the restoration of Poplar Island to its original 1,150-acre footprint took 23 years of construction – and the island is planned to receive dredge material until 2032.
Goals & Objectives:	**Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 9 – Promote sustainable development to improve the quality of life.** 9.1 Provide for the conservation and protection of working lands and natural resources, such as wetlands, forests, and critical areas. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.1 Prioritize infrastructure improvements based on their role in supporting Talbot County's five Community Pillars: (1) Health, Safety, Welfare, (2) Economic Stability, (3) Education, (4) Infrastructure, and (5) Environmental.

Table 11-5. MITIGATION PROJECT # 4 (HIGH)	
Hazard:	Winter Storm
Location(s):	County-wide
Project Title/Mitigation Action Item	**Update the County's Cold Weather Plan.**
Background/Issue:	Cold Weather Plans include actions to be taken during the following: (1) before the onset of winter, (2) when a winter storm is imminent and/or damaging cold temperatures are expected, and (3) after a winter storm and/or prolonged cold weather event. Important elements for consideration: • Accountability for overall implementation, including pre-winter inspections. • Defined roles and responsibilities for outlined activities and responses. • Initial and annual training, as needed. • Annual review of plan to identify effectiveness and improvement opportunities. Cold Weather Plans are not the same as Snow Emergency Plans, which are declared by the Maryland State Police with input from the Maryland Department of Transportation. Snow Emergency Plans require the following precautions, by law: • Prohibited parking on roads and streets designated as snow emergency routes; and, • The use of snow tires/chains (most cars now use all weather tires, so changing to "snow" tires is unnecessary) Ideally, the County's Cold Weather Plan will coordinate with existing warming centers and shelters, which may be coordinated by the Health Department.
Ideas for Integration:	• Department of Emergency Services can create a one-pager plan of thresholds, communication, and resources needed to open warming centers. • Annual winter preparedness conversation with partners, including the cold weather plan and thresholds into that conversation.
Responsible Agency:	Department of Emergency Services
Partners:	Public Works, Health Department, Planning and Zoning, Talbot County Free Library, Department of Social Services
Potential Funding:	Planning projects can be done in-house by the responsible agency.
Cost Estimate:	Staff-time
Benefits (Losses Avoided):	Increased accountability for implementation of winter and cold-weather related precautions and mitigation actions, provides guidance to county and municipal organizations regarding resources (e.g., warming centers) available during winter weather related hazards.
Timeline:	1 year
Goals & Objectives:	**Goal 2 – Minimize the impacts of winter storms on County residents.** 2.1 Ensure residents are forewarned to be prepared with supplies to face winter storms. **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. 8.2 Ensure County residents are aware of evacuation procedures.

Table 11-6. MITIGATION PROJECT # 5 (HIGH)	
Hazard:	Winter Storm
Location(s):	County-wide
Project Title/Mitigation Action Item	**Winter Weather Education via Media** Action Items: - Promote winter weather survival tips to citizens throughout the fall and winter seasons on the County's website and social media. - Provide educational material on the County's website, including the MDOT's "The Three P's of Safe Winter Driving" and FEMA's "Emergency Supply List."
Background/Issue:	The County will continue to promote winter weather education to the public on the County's website and social media. FEMA's Ready.gov includes a multitude of information, toolkits, and guides that would be useful for aiding in educating the public on this topic.
Ideas for Integration:	Maintain effective communication and adopt relevant new technologies for regional storm monitoring.
Responsible Agency:	Department of Emergency Services
Partners:	Health Department, Shelters, County government, Municipalities, Businesses.
Potential Funding:	Annual/Ongoing.
Cost Estimate:	Staff-time, many free resources and toolkits are available.
Benefits (Losses Avoided):	An educated and trained public can better protect themselves from risk associated with all natural disasters, including winter storms.
Timeline:	Alerts can be pushed on an as-needed basis, while general winter storm information can be provided regularly throughout the year.
Goals & Objectives:	**Goal 2 – Minimize the impacts of winter storms on County residents.** 2.2 Ensure residents are forewarned to be prepared with supplies to face winter storms. 2.3 Increase community awareness of public warming centers and cold weather shelters. **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.2 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills.

Table 11-7. MITIGATION PROJECT # 6	
Hazard:	Tornado, High Wind and Thunderstorm
Location(s):	County-wide
Project Title/Mitigation Action Item	**Tornado Risk Public Outreach** Action Item(s): - Conduct public outreach activities to increase awareness of tornado risk. Activities may include educating the public via media outlets, conducting tornado drills in schools and public buildings, and distributing tornado safety materials. - Promote severe wind risk awareness to the public. Public outreach activities might include informing residents of shelter locations and evacuation routes, educating homeowners on the benefits of wind retrofits (e.g., shutters, hurricane clips), ensuring school officials are aware of the best area of refuge in school buildings, and/or instructing property owners on how to install wind protection systems prior to a storm event.
Background/Issue:	Throughout the year, and particularly before severe storms are expected, information regarding tornado risk (what to do before, during, and after) can be supplied to Talbot County's residents via media and social media channels. In partnership with NOAA/NWS, all Maryland residents may partake in a statewide tornado drill as part of Severe Storm Awareness Week in April, which is also Maryland's Flood Awareness Month. This is a good opportunity for residents to review their evacuation plan and for the County to promote tornado and high wind related information. Talbot County Public Schools conducts severe weather drills twice a year to prepare students for such events. Students are required to move to areas of refuge that are safe from windows and other building vulnerabilities in a severe weather event. FEMA's ready.gov provides a "Severe Weather Safety Social Media Toolkit" that has severe weather safety and preparedness messages that local governments can share to their social media channels. These messages can be copied directly or customized depending upon the audience.
Ideas for Integration:	Maintain effective communication and adopt relevant new technologies for regional storm monitoring.
Responsible Agency:	Department of Emergency Services
Partners:	FEMA, firms and universities with research departments/capabilities to aid in decision making.
Potential Funding:	Staff-time/Ongoing.
Cost Estimate:	Staff-time, many free resources and toolkits are available.
Benefits (Losses Avoided):	An educated and trained public can better protect themselves from risk associated with all natural disasters, including tornados.
Timeline:	Alerts can be pushed on an as-needed basis, while general tornado information can be provided regularly throughout the year.
Goals & Objectives:	**Goal 5 – Reduce exposure of structures to wind hazards.** **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. 8.2 Ensure County residents are aware of evacuation procedures. 8.4 Promote the use of Talbot County's Citizen Alert System (Everbridge) and/or other texting/email/phone call alert systems when communicating weather-related alerts with the public.

Table 11-8. MITIGATION PROJECT # 7	
Hazard:	Tornado
Location(s):	County-wide
Project Title/Mitigation Action Item	**Promoting the construction of tornado and high-wind safe structures.** Action Item: Promote the proper construction and use of safe rooms in homes, new schools, shelters, or other vulnerable public structures.
Background/Issue:	A safe room is a hardened structure specifically designed to meet the FEMA criteria and provide near-absolute protection in extreme wind events, including tornadoes and hurricanes. Near-absolute means that, based on our current knowledge of tornadoes and hurricanes, the occupants of a safe room built in accordance with FEMA guidance will have a very high probability of being protected from injury or death. Building owners, schools, hospitals, neighborhood associations and others responsible for public safety should consider building a community safe room if they are in areas subject to extreme-wind events.
Ideas for Integration:	• Public outreach opportunities with schools and higher education institutions, public workshops. • The County's Department of Permits and Inspections could help streamline the approval process to increase/promote construction of safe rooms.
Responsible Agency:	• Varies, dependent upon where the safe room is constructed. • Department of Emergency Services may be responsible for public education and outreach opportunities.
Partners:	Department of Permits and Inspections, building owners, schools, health facilities, neighborhood associations.
Potential Funding:	• Safe Room Funding is available to county governments, provided through the state, via Hazard Mitigation Assistance funding. • Residential funding opportunities are available for individuals wishing to build a residential safe room, as well. More funding info available at fema.gov.
Cost Estimate:	• A small, 10-square-foot, residential, prefabricated safe room may cost as little as $3,000. Larger prefabricated safe rooms (such as those that are 8 feet by 8 feet) typically cost about the same as site-built safe rooms. • Installation costs for prefabricated safe rooms may vary depending on the distance that the installer must travel to deliver the safe room and any foundation or geotechnical work that may be required to install the safe room on an adequate foundation.
Benefits (Losses Avoided):	Safe rooms can help provide near-absolute protection for residents from injury and death related to extreme winds.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 5 – Reduce exposure of structures to wind hazards.** 5.1 Consider actions for wind mitigation wherever appropriate. **Goal 10 – Maintain high construction standards through the adoption of current International Building Codes-Building Performance Standards.** **Goal 13 – Ensure that there are an adequate number of shelters in the County.**

Table 11-9. MITIGATION PROJECT # 8	
Hazard:	High Wind & Thunderstorm
Location(s):	County-wide, including County and Municipal-owned facilities.
Project Title/Mitigation Action Item	**Protect Infrastructure from High Wind & Thunderstorm Risks** Action Items: - Protect Power Lines and Infrastructure by continuing regular maintenance and upkeep of utilities. Examples of strategies include tree pruning around lines, inspection of utility and power line poles to determine their structural integrity and burying power lines to provide uninterrupted power after severe winds. - Retrofit public buildings and critical facilities to reduce future wind damage. Examples include improving roof coverings (e.g., no pebbles, removal of ballast roof systems), anchoring of roof-mounted HVAC systems, and protecting traffic lights and other traffic controls from high winds.
Background/Issue:	Every year, natural disasters threaten infrastructure and human life. The greatest damage (measured in repair dollars) is caused by storms. It is not only the high winds of thunderstorms, but rain and hail that cause the damage. Hurricanes and flooding are the second and third most destructive natural event, respectively. The solution to protecting infrastructure from natural disasters is building more resilient infrastructure, including the buildings we live and work in. The National Institute of Building Sciences has released data that shows there is a significant savings for spending money on designing buildings beyond code. For example, for every dollar spent designing a building to mitigate against storm surges, it yields $7 in cost savings when responding to the natural disaster. Wind and flood have a payback ratio of 5:1 and fires and earthquakes have a payback ratio of 4:1. Regular maintenance and retrofitting of buildings and infrastructure is an important step towards making Talbot County more resilient. The County could consider adopting a Critical Infrastructure Protection Plan, which is a strategy to make critical infrastructure more resilient.
Ideas for Integration:	Include in design of rehab and new construction of infrastructure.
Responsible Agency:	Infrastructure owners and Talbot County Permits and Inspections.
Partners:	Owners and general contractors
Potential Funding:	Building owners, private funding, grants, and tax revenue.
Cost Estimate:	Project dependent – planning projects can be done in-house (staff time) or contracted through a third party.
Benefits (Losses Avoided):	Protection and continuation of services provided to citizens, businesses, and visitors of Talbot County.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 5 – Reduce exposure of structures to wind hazards.** 5.1 Consider actions for wind mitigation wherever appropriate. **Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. **Goal 10 – Maintain high construction standards through the adoption of current International Building Codes-Building Performance Standards.**

Table 11-10. MITIGATION PROJECT # 9 (HIGH)	
Hazard:	High Wind & Thunderstorm
Location(s):	County-wide
Project Title/Mitigation Action Item	**Debris Management Plan Maintenance** Action item: Update, implement, and maintain the current draft of Talbot County's Debris Management Plan.
Background/Issue:	Sometimes local governments must respond to disasters that destroy large numbers of homes. They may need to demolish partially destroyed homes and manage debris generated by a disaster event. In general, a debris management plan establishes a framework for which the County will respond and coordinate the management and removal of debris generated by potential man-made and natural disasters, such as extreme high wind and/or thunderstorm events. The plan also may address the potential role that state and federal agencies and other groups may assume during a debris management operation. "Guidance about Planning for Natural Disaster Debris" is available on the EPA's website; they also have several publications aimed at helping communities update their present debris management plan to address environmental issues. FEMA also offers guidance in the form of their "Public Assistance Debris Monitoring Guide" which provides guidance on monitoring debris removal operations and eligibility requirements associated with necessary work and reasonable costs to carry out a debris monitoring program.
Ideas for Integration:	• Finalization of the County's Debris Management Plan. • Tabletop Exercise/Round Table with all partners regarding debris and debris management. • Secure annual contracts with vendors to support Debris Management efforts in Talbot County.
Responsible Agency:	Department of Emergency Services, Department of Public Works, Roads Department.
Partners:	Municipalities and Utilities.
Potential Funding:	Hazard mitigation assistance grants are available through FEMA (e.g., the Hazard Mitigation Grant Program and Building Resilient Infrastructure and Communities program). Planning efforts such as planning documents may be completed in-house, requiring staff-time and resources to complete.
Cost Estimate:	Staff-time via planning costs and tabletop exercise facilitation.
Benefits (Losses Avoided):	A debris management plan serves to guide responsible agencies to better protect human health, comply with regulations, conserve disposal capacity, reduce injuries, and minimize or prevent environmental impacts after a hazard event that produces debris.
Timeline:	1-2 years (planning process). Debris management on an as needed basis after a storm/hazard event.
Goals & Objectives:	**Goal 5 – Reduce exposure of structures to wind hazards.** 5.1 Consider actions for wind mitigation wherever appropriate.

Table 11-11. MITIGATION PROJECT # 10	
Hazard:	Drought & Extreme Heat
Location(s):	County Facilities
Project Title/Mitigation Action Item	**Promoting Water Saving Practices Across Talbot County** Action Item(s): - Conduct audits of County facilities to determine whether infrastructure upgrades would improve efficient water use. - Promote water saving tips for homeowners and businesses throughout the year on the County's website and social media.
Background/Issue:	Steps for conducting a water audit at any location-type: 1 Identify all the water-using fixtures and estimate their monthly use. • Bathroom sinks, toilets urinals, showers, cooking sinks, washing machines, dishwashers, irrigation. 2 Compare your estimates with actual water and sewer bills. 3 Do walk-arounds, checking flow rates, the meter, and for leaks. 4 Act: fix leaks, change water use behavior, retrofit fixtures, reuse water, and minimize irrigation. WaterSense has developed *WaterSense at Work*, a compilation of water-efficiency best management practices (BMPs), to help commercial and institutional facilities understand and manage their water use, help facilities establish an effective water management program, and identify projects and practices that can reduce facility water use. More information is available at: www.epa.gov/watersense/best-management-practices. Informational webinars have also been developed by the EPA to address different sectors and uses of water both indoors and outdoors. Topics include: water management, water reuse, irrigation, partnerships, and more.
Ideas for Integration:	Public outreach and educational handouts.
Responsible Agency:	Facility/Department dependent.
Partners:	Homeowners, Utility owners, local government
Potential Funding:	WaterSMART Water and Energy Efficiency Grants
Cost Estimate:	Nominal; based upon outreach practices.
Benefits (Losses Avoided):	Public education and saving water resources.
Timeline:	Ongoing outreach.
Goals & Objectives:	**Goal 6 – Minimize loss due to drought.** **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.**

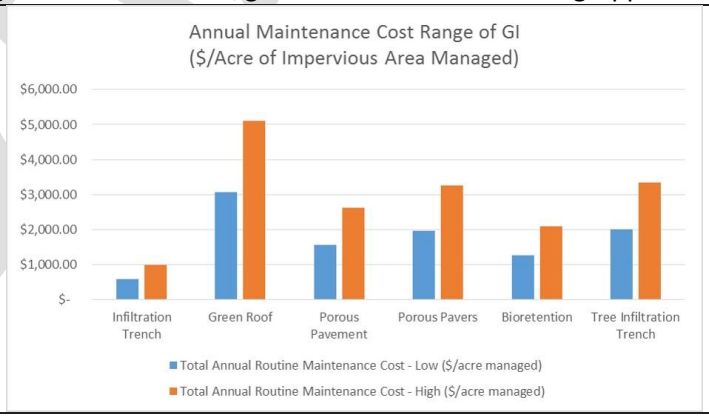
Table 11-12. MITIGATION PROJECT # 11	
Hazard:	Drought & Extreme Heat
Location(s):	County-wide
Project Title/Mitigation Action Item	**Community Greening Inventory** Action Item: Encourage community greening activities and collect data on community greening activities such as rain gardens and bioretention areas. Guidance from the "Cleaner, Greener Talbot" Plan will be helpful in site selection. Populate countywide community greening inventory using the data gathered following assessment.
Background/Issue:	Greening America's Communities (formerly known as Greening America's Capitals) is an EPA program to help cities and towns develop an implementable vision of environmentally friendly neighborhoods that incorporate innovative green infrastructure and other sustainable design strategies. EPA provides design assistance to help support sustainable communities that protect the environment, economy, and public health and to inspire local and state leaders to expand this work elsewhere.2 EPA has helped 33 communities with sustainable design strategies through either the former Greening America's Capitals Program or the newer Greening America's Communities Program. According to the APA, The Green Communities program advances practices that improve environmental quality, address climate change, and reduce development impacts on natural resources. Research efforts focus on projects and policies that prioritize green/blue infrastructure, green energy, and green transportation.
Ideas for Integration:	• Public outreach, greening program (planting). • Integration with "Cleaner, Greener Talbot" green infrastructure plan.
Responsible Agency:	Community-driven
Partners:	Local governments, environmental non-government organizations, non-profits, and property owners.
Potential Funding:	Greening America's Communities, via the EPA (list of available federal grants available at www.epa.gov/green-infrastructure/green-infrastructure-funding-opportunities).
Cost Estimate:	

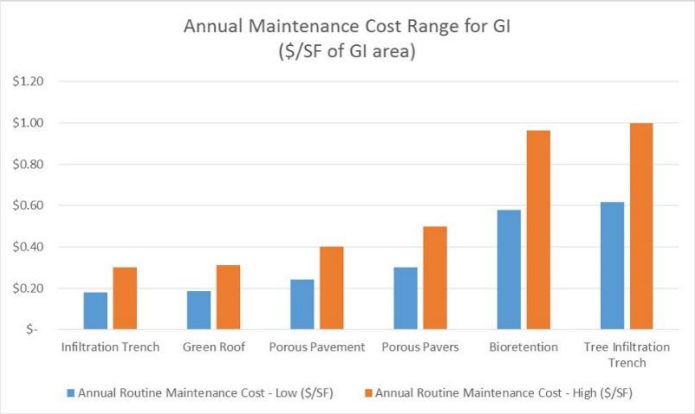
Table 11-12. MITIGATION PROJECT # 11	
	 Image Source: stormwater.wef.org/2015/12/real-cost-green-infrastructure/
Benefits (Losses Avoided):	Reduce flooding, increased water supply, smog and heat mitigation, health benefits, reduction to infrastructure costs, and quality of life improvements.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 9 – Promote sustainable development to improve the quality of life.** **9.1 Provide for the conservation and protection of natural resources.**

Table 11-13. MITIGATION PROJECT # 12	
Hazard:	Emerging Infectious Diseases
Location(s):	County-wide
Project Title/Mitigation Action Item	**Emerging Infectious Diseases Community Preparedness Outreach** Action Items: - 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. - Continue to provide information on Talbot County's website and social media platforms about pandemic and emerging infectious diseases risk and vulnerability. Information may be pulled directly from the Emerging Infectious Disease chapter of the Hazard Mitigation and Resilience Plan. - 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.
Background/Issue:	The CDC has many toolkits and existing messages that can be tailored to the county or municipal level. A social media toolkit consists of pre-approved information and resources geared towards improving the public's knowledge regarding emerging infectious diseases. The toolkit may also include approved messages for alerting the public of health-related risks. This type of information can be posted at regular intervals on social media, or as often as the County and its municipalities deem necessary. Generally, health preparedness information shared via social media or online should be well-informed, coordinated, and accessible to different groups. The CDC website has many helpful resources, including guides on best practices related to: social media policy, Facebook guide, Twitter guide, social media security mitigations, and a social media toolkit.
Ideas for Integration:	• Municipal websites and social media can also be utilized to spread coordinated messages relating to emerging infectious diseases. • COVID19 After Action report
Responsible Agency:	Talbot County Health Department
Partners:	Department of Emergency Services, Talbot County, and Municipalities.
Potential Funding/Cost Estimate	Staff-time
Benefits (Losses Avoided):	Increased and/or sustained public outreach and health announcements will create a better-prepared community in terms of emerging infectious diseases hazards. Ensuring that health-related outreach and announcements are accessible to all groups (e.g., dispersed in multiple formats and languages) will also help raise community awareness and increase equity while decreasing vulnerability.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.1 Regularly review and integrate the best available projections for sea level rise, flooding, precipitation, and other hazards into county planning.

Table 11-14. MITIGATION PROJECT # 13 (HIGH)	
Hazard:	Emerging Infectious Disease
Location(s):	County-wide
Project Title/Mitigation Action Item	**COVID-19 After Action Report** Action Item: Develop an After-Action Report (AAR) 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.
Background/Issue:	An After-Action Review is a powerful tool that can help local jurisdictions reflect, assess, learn, and improve. Jurisdictions can use the review retrospectively to assess previous work or activities, or it can serve as a useful tool to guide in-action reviews of ongoing work or activities. There are toolkits available specifically tailored with COVID-19 in mind, one of which is provided by Mathematica.org. They define the after-action review as answering three basic questions: 1. What was expected to happen during a certain activity or process? 2. What actually happened and why? 3. How can we learn from the experience and improve moving forward? More info: www.mathematica.org/features/covid-19-after-action-review-toolkit
Ideas for Integration:	Contract for a robust planning process.
Responsible Agency:	Talbot County Health Department, Department of Emergency Services
Partners:	Talbot County and Municipalities
Potential Funding:	FEMA Preparedness Grants, including: Emergency Management Performance Grant.
Cost Estimate:	Cost is variable and dependent upon the robustness of the plan. The responsible agency will want to consider hiring a contractor to complete the after-action report.
Benefits (Losses Avoided):	After Action Reports and Improvement Plans provide an effective means to capture and analyze the management or response to an incident, exercise, or event by identifying strengths to be maintained and built upon. By determining what was learned from an event and how efforts can be improved in the future should the event occur again, organizational efficiency is increased, and vulnerability is decreased.
Timeline:	Formal After-Action Reports take more time because they are conducted by a leader or facilitator, whereas informal reports take less time because they are conducted by internal staff. Depending upon the responsible agency, an AAR may take anywhere from 1-2 days to multiple weeks.
Goals & Objectives:	**Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.** 14.1 Clearly define roles of, and improve intergovernmental coordination between planners, emergency managers, engineers, and other staff, and municipal and regional partners in improving disaster resilience. **Goal 15 – Organize effectively and address resilience risks and priorities.** 15.2 Address Infrastructure dependencies and cascading effects in system failures. 15.4 Regularly review and integrate the best available projections for sea level rise, flooding, precipitation, and other hazards into county planning.

Table 11-15. MITIGATION PROJECT # 14 (HIGH)	
Hazard:	Flood
Location(s):	Countywide
Project Title/Mitigation Action Item	**Flood Mitigation Non-Substantial Improvements for Businesses**
Background/Issue:	Proposed improvements are "non-substantial" if the costs of all improvements are less than 50% of the market value of the building. Although owners are not required to bring their existing building into compliance, elevation modification is the best way to reduce vulnerability. There are many other things owners can do to reduce future flood damage: • Use flood resistant material, for example tile, closed-cell wall insulation, and polyvinyl wall coverings. • Raise air conditioning equipment, heat pump, furnace, hot water heater, and other appliances on platforms. • Install electrical outlets higher above the floor. • Move ductwork out of crawlspaces. • Retrofit crawlspaces with flood openings. • Fill in below-grade crawlspaces/utility space. • Raise windowsills and entryways above Base Flood Elevation (BFE) for businesses located in floodplains.
Ideas for Integration:	• Informational brochures provided by insurance agencies. • Pre-disaster mitigation and planning for businesses. • Federal Emergency Management Agency (FEMA) Brochures. • Integrate into possible future Flood Mitigation Plan. • Eastern Shore Economic Recovery Project
Responsible Agency:	Business Owners, Talbot County Department of Planning and Zoning
Partners:	Insurance Agencies, Department of Economic Development, Department of Tourism
Potential Funding:	Possible insurance cost reduction, FEMA funding, U.S. Small Business Administration.
Cost Estimate:	Dependent upon proposed improvement.
Benefits (Losses Avoided):	Improvements will reduce or eliminate property damage caused by flooding.
Timeline:	Dependent upon proposed improvement.
Goals & Objectives:	**Goal 1 - Minimize damage caused by flooding.** 1.2 Create awareness among residents of the potential hazards associated with floodplain areas and how they can protect themselves and their properties from flood events. 1.3 At a minimum, protect the critical facilities in the 100-year floodplain. In addition, the 2015 FEMA Flood Risk Management Standard recommends protection of critical facilities to the 0.2% chance (500-year) flood elevation as an added margin of error against climate risk. Consider the most appropriate flood control measures such as acquisition and relocation, elevation, dry/wet flood proofing, etc. 1.11 Encourage property owners within the FEMA Special Flood Hazard Area to purchase flood insurance. **Goal 7 - Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. **Goal 8 - Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 11 - Improve communication between municipalities and partners.** 11.2 Develop a distribution plan for public outreach materials and other relevant information.

Table 11-16. MITIGATION PROJECT # 15 (HIGH)	
Hazard:	Multi-hazard
Location(s):	Countywide
Project Title/Mitigation Action Item	**Disaster Recovery Planning for Economic Development**
Background/Issue:	Small business owners invest a tremendous amount of time, money and resources to make their ventures successful, therefore it is important that they properly plan and prepare for disaster situations. According to the Institute for Business and Home Safety, an estimated **25 percent** of businesses do not reopen following a major disaster. You can protect your business by identifying the risks associated with natural and man-made disasters, and by creating a plan for action should a disaster strike. By keeping those plans updated, you can help ensure the survival of your business. The resources provided below will get you started on the process of advance planning. • Small Business Disaster Preparedness Guide Offers information to help prepare your business for a disaster and apply for a disaster loan from the SBA. • PrepareMyBusiness.Org Agility Recovery Solutions offers business continuity planning tips for small businesses. • Emergency Management Guide for Business and Industry Gives step-by-step advice on how to create and maintain a comprehensive emergency management plan. • Protect Your Business from Disaster Supplies information on how to protect your property from natural disasters. Getting Back in Business: Disaster Recovery Before a disaster strikes, it is important to preserve your equipment and the business records you will need to help your business get back on track. • Protecting Your Tax and Financial Records Gives tips and advice from the IRS on protecting your tax and financial records. • Standard Checklist Criteria for Business Recovery Offers a checklist of creating a business recovery manual for medium to large businesses. **BUSINESS CONTINUITY WORKSHOP** The Maryland Department of Emergency Management offers FEMA business continuity workshops. Talbot County may host a workshop for local businesses. **EASTERN SHORE ECONOMIC RECOVERY PROJECT** The Eastern Shore Economic Recovery Project is an effort that brings local economic and workforce development professionals together with data visualization specialist to create data-driven tools. The two-year project was launched in July 2020 in response to the COVID-19 pandemic and will deliver a suite of tools to assist decision makers in their recovery efforts. It is funded by the Economic Development Administration and managed by the Mid-Shore Regional Council and the Tri-County Council for the Lower Eastern Shore of Maryland.

Table 11-16. MITIGATION PROJECT # 15 (HIGH)	
Ideas for Integration:	• Recovery plans for all towns and county • Eastern Shore Economic Recovery Project
Responsible Agency:	• County & Municipal Economic Development Offices • Chamber of Commerce • Emergency Management
Partners:	County & Municipal Economic Development Offices, Chamber of Commerce/Emergency Management
Potential Funding:	• Small Business Administration • Pre-Disaster Mitigation Loan Program
Cost Estimate:	Dependent upon recovery plan
Benefits (Losses Avoided):	• Reduces disruption of a business' function and resources • Provide critical services to citizens post disaster
Timeline:	Less than one (1) year for planning
Goals & Objectives	**Goal 1 - Minimize damage caused by flooding.** 1.2 Create awareness among residents of the potential hazards associated with floodplain areas and how they can protect themselves and their properties from flood events. **Goal 8 - Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills.

Table 11-17. MITIGATION PROJECT # 16	
Hazard:	Multi-hazard
Location(s):	County Schools
Project Title/Mitigation Action Item	**County Schools Flood Evacuation Destinations**
Background/Issue:	The following schools and their primary and secondary evacuation destination are listed below for fire and bomb threats. However, an evacuation destination listing for flood events has not been created. The listing below would not be utilized for flood events considering several of the facilities are in the hurricane evacuation zones and/or the Special Flood Hazard Area (SFHA). **White Marsh Elementary School** – Flood Zone X Primary: Trappe Fire House – Flood Zone X Secondary: Easton High School – Flood Zone X **Chapel Elementary School** – Flood Zone X Primary: Cordova Fire House – Flood Zone X Secondary: Easton High School – Flood Zone X **Tilghman Elementary School – Located in Evacuation Zone 1** Primary: Tilghman Fire House **- Located in Evacuation Zone 1** Secondary: St. Michael's Elementary **- Located in Evacuation Zone 3** **St. Michaels Elementary School – Located in Evacuation Zone 3** Primary: Maritime Museum **– Located in Flood Zone AE: Flood Depth – 1.7'** Secondary: Easton High School – Flood Zone X **St. Michael's Middle/ High School – Located in Evacuation Zone 3** Primary: Maritime Museum **– Located in Flood Zone AE: Flood Depth –1.7'** Secondary: Easton High School – Flood Zone X **Easton Elementary Campus** – Flood Zone X Primary: Moton Park (Walk) – Flood Zone X Secondary: Easton High School – Flood Zone X **Easton Middle School** – Flood Zone X Primary: YMCA (Walk) – Flood Zone X Secondary: Easton High School – Flood Zone X **Easton High School** – Flood Zone X Primary: EHS Stadium (Walk) – Flood Zone X Secondary: St. Marks Church in Easton – Flood Zone X
Ideas for Integration:	• Incorporate into the Talbot County Emergency Operations Plan. • Integrate into possible future Flood Mitigation Plan. • Update evacuation locations in the respective school's crisis plan and discuss at annual school crisis meetings.
Responsible Agency:	Talbot County Public Schools, Talbot County Department of Emergency Services
Partners:	Fire Companies
Potential Funding:	N/A
Cost Estimate:	Staff-time.
Benefits (Losses Avoided):	Ensures a safe location and avoids possible child endangerment.
Timeline:	Less than one (1) year for planning.

Table 11-17. MITIGATION PROJECT # 16	
Goals & Objectives:	**Goal 7 - Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. 7.2 Design new critical facilities with resilience against conditions (i.e., sea levels, flood risk, precipitation, and temperatures that are projected throughout the lifetime of the facility. **Goal 8 - Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.2 Ensure County residents are aware of evacuation procedures. **Goal 11 - Improve communication between local jurisdictions.** 11.3 Promote GIS technology for updating and exchanging of data, countywide. **Goal 13 - Ensure that there are an adequate number of shelters in the County.** 13.1 Ensure that facilities designated as shelters have adequate back-up power (correctly sized for facility) and are structurally sufficient.

Table 11-18. MITIGATION PROJECT # 17	
Hazard:	Multi-Hazard (Flood-focused)
Location(s):	Talbot County
Project Title/Mitigation Action Item	**Environmental Education and Resilience Opportunity**
Background/Issue:	Flood Resilience Mitigation via Habitat Restoration (Seagrasses/Riparian Buffers) • Provide opportunities for students to help restore/create habitats that help increase flood resilience. Chesapeake Bay Program • Environmental Literacy • Goal: Enable students in the region with the knowledge and skills to act responsibly to protect and restore their local watershed. Environmental Literacy Planning outcome: Each participating Bay jurisdiction should develop a comprehensive and systemic approach to environmental literacy for all students in the region that includes policies, practices and voluntary metrics that support the environmental literacy Goals and Outcomes of this Agreement.
Ideas for Integration:	Apply student service-learning hours and environmental literacy standards.
Responsible Agency:	Talbot County Public Schools
Partners:	• Children in Nature • Maryland Association of Environmental and Outdoor Education (MAEOE) • Chesapeake Bay Trust • North American Association of Environmental Education (NAAEE) • LEA Environmental Literacy (Point-of-Contact for Talbot County: William Keswick wkeswick@tcps.k12.md.us) • Phillips Wharf • Pickering Creek
Potential Funding:	Chesapeake Bay Trust, Chesapeake Bay Program, Maryland Department of Natural Resources.
Cost Estimate:	Dependent upon resources necessary to complete project.
Benefits (Losses Avoided):	Protects coastal communities from flooding, erosion, and storm surge impacts.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 3 – Minimize damage caused by erosion**. 3.3 Encourage the education and use of living shorelines in appropriate locations for shore stabilization. **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 9 – Promote sustainable development to improve the quality of life.** 9.1 Provide for the conservation and protection of working lands and natural resources, such as wetlands, forests, and critical areas

Table 11-19. MITIGATION PROJECT # 18	
Hazard:	Multi-hazard
Location(s):	Countywide
Project Title/Mitigation Action Item	**Design Resilience into Capital Investments**
Background/Issue:	Ensure new infrastructure or significant improvements to infrastructure are designed for flood, extreme temperature, and precipitation conditions that are expected during the facility's full lifetime (i.e., if the wastewater treatment plant is expected to function for 50 years, it should be designed to cope with 2 feet of sea level rise and greater stormwater flows). For all capital investment projects, develop guidelines that ensure projects are adequately designed for the environmental conditions they will encounter during their full lifetimes.
Ideas for Integration:	• Building Codes • Comprehensive Plan • Land Use Policies • Design Specifications (reference CoastSmart design guidelines)
Responsible Agency:	Talbot County Department of Public Works
Partners:	Municipal Public Works, Maryland Department of Transportation, Maryland Sea Grant, Maryland Department of Natural Resources, National Oceanic and Atmospheric Administration, Maryland Department of Environment.
Potential Funding:	Staff-time for research.
Cost Estimate:	Dependent upon project design.
Benefits (Losses Avoided):	• May lower maintenance and repair costs over lifetime. • Will reduce downtime during/after a disaster. • Prevent loss of service at critical times.
Timeline:	Dependent upon project design.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.4 Review, revise and update local floodplain ordinances, as appropriate. 1.5 Prepare stormwater management plans for various areas in the County. 1.9 Continue to enforce Floodplain Ordinance to locate new development outside the floodplain. **Goal 9 – Promote sustainable development to improve the quality of life.** 9.3 Use smart growth planning techniques to conserve land and reduce exposure to hazards. **Goal 10 – Maintain high construction standards through the adoption of current International Building Codes-Building Performance Standards.** 10.1 Ensure current building codes and standards follow FEMA's basic guidelines and are properly enforced.

Table 11-20. MITIGATION PROJECT # 19 (HIGH)	
Hazard:	Flood
Location(s):	Countywide
Project Title/Mitigation Action Item	**Flood Prevention & Stormwater Management Best Practices**
Background/Issue:	• Review regulations to evaluate whether current stormwater management regulations/Best Management Practices (BMP) designs are adequate to address climate change and larger, more frequent rain events. (i.e., 100-year storm event and/or greater-500 year storm event) • Look at projections for increases in precipitation intensity and frequency and ensure that policies and regulations can adapt accordingly, especially as it relates to stormwater BMPs, infrastructure (e.g., bridges, culverts, ditches) maintenance/replacement that considers future conditions, and floodplain management. • Incentivize a reduction in impervious surfaces via removal or replacement with pervious materials. • Incentivize incorporation of green infrastructure on private property.
Ideas for Integration:	• Building Codes • Comprehensive Plan • Stormwater Management Regulations • Land Use Policies • Floodplain Ordinance • Creation of a working group for best practice round table discussion (every other year) • Integrate into possible future Flood Mitigation Plan.
Responsible Agency:	Talbot County Department of Public Works
Partners:	• Regional collaboration via Eastern Shore Climate Adaption Partnership (ESCAP) – The partnership has cooperated with a University of Maryland researcher to apply for a National Oceanic and Atmospheric Administration (NOAA) grant (decision from NOAA in spring 2017) to research increases in extreme precipitation events on the Eastern Shore. A key outcome would be an evaluation of whether "design-storm" guidance for infrastructure, stormwater management practices, and floodplain management is adequate for current and future rainfall scenarios. • Maryland Department of Natural Resources • National Oceanic and Atmospheric Administration • Non-Governmental Organization Watershed Groups
Potential Funding:	Maryland Department of Natural Resources (CoastSmart Grant), Chesapeake Bay Trust
Cost Estimate:	Project Dependent/Staff-time
Benefits (Losses Avoided):	• Analysis could inform Watershed Implementation Plan (WIP) activities. • Better water quality due to less water quantity. • May lower maintenance and repair costs over lifetime. • Will reduce downtime during/after a disaster. • Prevent loss of service at critical times. • Decrease grey infrastructure by increasing green infrastructure.
Timeline:	Ongoing and project dependent.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. 1.4 Review, revise and update local floodplain ordinances, as appropriate. 1.5 Prepare stormwater management plans for various areas in the County.

Table 11-20. MITIGATION PROJECT # 19 (HIGH)	
	1.6 Reduce road closures, specifically evacuation routes and protect public infrastructure from flood damage. **Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. 7.2 Design new critical facilities with resilience against conditions (i.e., sea levels, flood risk, precipitation, and temperatures that are projected throughout the lifetime of the facility. **Goal 10 – Maintain high construction standards through the adoption of current International Building Codes-Building Performance Standards.** 10.1 Ensure current building codes and standards follow FEMA's basic guidelines and are properly enforced. **Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.** 14.1 Integrate hazard mitigation and resilience into areas such as land use, transportation, climate change, natural and cultural resource protection, water resources, and economic development. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.2 Address Infrastructure dependencies and cascading effects in system failures. 15.3 Determine customized long-term resilience initiatives.

Table 11-21. MITIGATION PROJECT # 20 (HIGH)	
Hazard:	Multi-hazard
Location(s):	Countywide
Project Title/Mitigation Action Item	**Mass Emergency Communication Strategy** Action Item(s): - Develop an educational plan for updates on emergency preparedness, including communications, evacuation, traffic, area closures, visitor controls, damage assessment, clean up, etc. - Ensure that all public communications, outreach efforts, signage, etc. is multi-language or provides means to translate. - Promote the Citizen Alert System (Everbridge) via social media.
Background/Issue:	When crafting any communication strategies meant for a public audience, it is important to create messages that are detailed, yet understandable. When developing the emergency communication strategy, it is important to incorporate both alert and warning. An alert is meant to grab people's attention and make them aware that an emergency is occurring, and that important information will soon follow. The warning message that follows instructs, clearly and succinctly, what actions residents should take. Standard guidelines should be developed for each outlet utilized for communication (e.g., print media, radio, social media, etc.). • Craft messages to convey how important it may be to evacuate. • Create a "Communication Tree" designed for businesses and residents.
Ideas for Integration:	• Informational Video • Talbot County Citizen Alert Messaging
Responsible Agency:	Talbot County Department of Emergency Services
Partners:	Talbot County Roads Department, Maryland Department of Transportation
Potential Funding:	Maryland's Community Resilience Grant Program
Cost Estimate:	Staff-time.
Benefits (Losses Avoided):	Effective messaging will mitigate the possibility of injury or loss of life.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.2 Ensure County residents are aware of evacuation procedures. **Goal 11 – Improve communication between municipalities and partners.** 11.2 Develop a distribution plan for public outreach materials and other relevant information.

Table 11-22. MITIGATION PROJECT # 21	
Hazard:	High Wind & Thunderstorm
Location(s):	Oxford, St. Michaels, Tilghman Island, and the areas of Royal Oak, Sherwood, Bozman, and Whitman
Project Title/Mitigation Action Item	**Upgrades to Communication Infrastructure**
Background/Issue:	Install high speed broadband using installation standards that ensure strong communication infrastructure in high-risk areas in order to build community resilience. Using FEMA flood zones, high risk areas include: Oxford, St. Michaels, Tilghman Island, and the areas of Royal Oak, Sherwood, Bozman, and Whitman. Improve cell Wi-Fi on local towers and install backup generators. According to high wind events data, areas frequently affected include Bozman and Tilghman Island.
Ideas for Integration:	• Installation of "dark fiber" infrastructure (unused optical fiber that is available for use in fiber-optic communication) at time of other utility install and repair. • Modify local code to require backup generator for community facilities (towers, communication buildings, etc.)
Responsible Agency:	Talbot County Department of Public Works
Partners:	Easton Utilities, Breezeline, Delmarva Power
Potential Funding:	N/A
Cost Estimate:	Project Dependent
Benefits (Losses Avoided):	Ensures critical services to citizens before and after disaster event.
Timeline:	1-2 years
Goals & Objectives:	**Goal 2 – Minimize the impacts of winter storms on County residents.** 2.2 Protect utilities, so that they may not be impacted and interrupted from exposure to hazards such as hail, icy conditions, high winds, etc. **Goal 5 – Reduce exposure of structures to wind hazards.** 5.1 Improve the County's ability to identify structures that are vulnerable to high winds. 5.2 Consider actions for wind mitigation wherever appropriate. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.3 Determine customized long-term resilience initiatives.

Table 11-23. MITIGATION PROJECT # 22	
Hazard:	Flood
Location(s):	Countywide
Project Title/Mitigation Action Item	**Well Head Protection**
Background/Issue:	Wells are direct access routes to drinking water aquifers. If a well is flooded, floodwaters will get into the aquifer, creating a polluted water supply. If floodwaters reach a well or the top of a well casing, assume the well is contaminated. Water from the well should not be used for drinking, cooking, or brushing teeth. Well head elevations should be inventoried and where feasible raised above the Federal Emergency Management Agency (FEMA) base flood elevation. Well head covers may also be utilized as a preventative measure to mitigate flood contamination. An example of a well cap is shown to the right. Standard well caps usually have bolts around the side of the cap that hold the cap onto the top of the casing. Note: a watertight cap is needed. 
Ideas for Integration:	Include in public outreach materials for floodplain management and health related disaster information.
Responsible Agency:	Talbot County Health Department
Partners:	Department of Housing and Mental Hygiene, Maryland Department of the Environment, MD Geological Survey, Talbot County Environmental Health Office, Talbot County Planning and Zoning, Talbot County Floodplain Management.
Potential Funding:	Department of Housing and Mental Hygiene, Hazard Mitigation Assistance.
Cost Estimate:	$150K/County for inventory. Cost for a standard well cap – $20-$50 (supplier dependent). $2,500 Public Information Campaign.
Benefits (Losses Avoided):	Maintenance of Drinking Water Supply
Timeline:	Inventory: 1 year Retrofit: 1-2 years
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. 1.2 Create awareness among residents of the potential hazards associated with floodplain areas and how they can protect themselves and their properties from flood events. **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 11 – Improve communication between municipalities and partners.** 11.2 Develop a distribution plan for public outreach materials and other relevant information.

Table 11-24. MITIGATION PROJECT # 23 (HIGH)	
Hazard:	Flood
Location(s):	Countywide
Project Title/Mitigation Action Item	**Update County Code for Well Head Elevation**
Background/Issue:	Due to well contamination from flood waters, require that new well heads be installed at least two feet above base flood elevation. Wells contaminated with flood waters pose a health risk. Wells that may become contaminated from flooding need to be tested and disinfected. Water cannot be used until this is done. Often a professional well driller is needed to clean out any sediment and debris. Using the well pump to flush out the well could ruin the pump. Also, wells will need to be disinfected and tested several times to ensure the well is free of bacterial contamination. This requirement is currently ongoing and actively encouraged throughout the community. Outreach efforts should be prioritized for retrofitting older wells. 
Ideas for Integration:	• Municipal Codes • Comprehensive Plan
Responsible Agency:	Talbot County Department of Planning and Zoning
Partners:	Talbot County Department of Environmental Health, Maryland Department of Environment.
Potential Funding:	N/A
Cost Estimate:	Staff-time.
Benefits (Losses Avoided):	Eliminates the possibility of well contamination and ensures drinking water supply to homeowners.
Timeline:	1-2 years.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. 1.2 Create awareness among residents of the potential hazards associated with floodplain areas and how they can protect themselves and their properties from flood events. 1.4 Review, revise and update local floodplain ordinances, as appropriate. **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-term initiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 10 – Maintain high construction standards through the adoption of current International Building Codes-Building Performance Standards.** 10.1 Ensure current building codes and standards follow FEMA's basic guidelines and are properly enforced. **Goal 11 – Improve communication between municipalities and partners.** 11.2 Develop a distribution plan for public outreach materials and other relevant information. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.2 Address Infrastructure dependencies and cascading effects in system failures. 15.3 Determine customized long-term resilience initiatives.

Table 11-25. MITIGATION PROJECT # 24 (HIGH)	
Hazard:	Flood, Coastal Hazards
Location(s):	Countywide
Project Title/Mitigation Action Item	**Culvert Mitigation**
Background/Issue:	Talbot County Culvert Evaluators and the Talbot County – List of Priority 1 Culverts provides the top 20 culverts in need of mitigation. These culverts have been ranked as High, Medium, and Low. Six culverts were listed as "High Priority" and descriptions of culvert issues are as follows: • #209 – Three culverts are located side-by-side. Severe erosion and headwall collapsed. Two of the three culverts are completely clogged with sediment. • #54 – Culvert failed. Upper side entirely filled with sand; end of culvert pipe is crushed. Severe erosion of embankment behind headwall. • #17 – Four-foot section separated from lower end of culvert. Riprap and separated culvert section eroding and severe scour/entrenchment below outfall. • #220 – Collapsed and eroded culvert with sedimentation. • #7 – Small depression in the road alongside culvert. Culvert is partially submerged and likely collapsed. • #300 – Under cutting of road with exposed culvert and eroding embankment. Severe erosion and scour at outfall. Please see the map in *Chapter 5: Flood*, page 5-29, depicting these high priority culverts.
Ideas for Integration:	• Approach armoring and overflow management (road profile modifications to provide emergency spillway) • Continuous ongoing evaluations • Inventory streams to determine State/Federal jurisdiction • Possible integration with "Cleaner, Greener Talbot" green infrastructure plan.
Responsible Agency:	Talbot County Department of Public Works, Talbot County Roads Department
Partners:	Maryland Department of Transportation, Municipalities, Maryland Department of Environment
Potential Funding:	Hazard Mitigation Grant Program
Cost Estimate:	$15-20k to replace a pipe or culvert, and an additional $10-30k to remove sediment, repair embankments, and repair the channel as necessary.
Benefits (Losses Avoided):	Improve stormwater infrastructure. Reduction of debris in flood prone areas.
Timeline:	Project dependent.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.6 Reduce road closures, specifically evacuation routes and protect public infrastructure from flood damage. **Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. **Goal 11 – Improve communication between municipalities and partners.**

Table 11-25. MITIGATION PROJECT # 24 (HIGH)	
	11.1 Promote partnerships among the municipalities and the County to develop a countywide approach to mitigation activities and resilience initiatives. **Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.** 14.1 Integrate hazard mitigation and resilience into areas such as land use, transportation, climate change, natural and cultural resource protection, water resources, and economic development. 14.2 Solicit participation and offer opportunities for various departments to work together on a regular basis. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.2 Address Infrastructure dependencies and cascading effects in system failures. 15.3 Determine customized long-term resilience initiatives.

Table 11-26. MITIGATION PROJECT # 25 (HIGH)	
Hazard:	Multi-hazard
Location(s):	Hazard Mitigation Planning Committee
Project Title/Mitigation Action Item	**Pillar and overall stakeholder groups to continue to meet annually.**
Background/Issue:	To ensure continuity of each pillar group and overall stakeholder group's goal and objectives defined within the Hazard Mitigation and Resilience Plan, the groups will need to continue meeting on an annual basis. The purpose of the meeting is to: • Evaluate the goals and objectives to ensure they address current and expected conditions. • Determine if the nature or magnitude of hazard risks have changed. • Evaluate whether current resources are adequate for implementing the plan. • Discuss mitigation projects and their progress. • Overall discussions on current projects and accomplishments.
Ideas for Integration:	• Invite additional agencies or organizations to join the annual meeting. • Choose annual meeting to add mitigation to establish with LEPC.
Responsible Agency:	Talbot County Department of Emergency Services
Partners:	County Departments: Planning and Zoning, Public Works, Health Department, Public Schools, Facilities Maintenance, Economic Development and Tourism, Information Technology, Sheriff's Office Municipalities: Easton, Oxford, Queen Anne, St. Michaels, and Trappe State: Maryland Department of Emergency Management, Department of Natural Resources Utilities: Delmarva Power, Easton Utilities Eastern Shore Land Conservancy
Potential Funding:	N/A
Cost Estimate:	Committee Member's time.
Benefits (Losses Avoided):	Meeting annually provides the committee the opportunity to discuss current projects and accomplishments.
Timeline:	Ongoing.
Goals & Objectives:	**Goal 11 – Improve communication between municipalities and partners.** 11.1 Promote partnerships among the municipalities and the County to develop a countywide approach to mitigation activities and resilience initiatives. 11.2 Develop a distribution plan for public outreach materials and other relevant information. **Goal 12 – Enhance performance of staff to become competent in reducing vulnerability and improving community resilience.** 12.1 Encourage County and municipal staff to attend hazard mitigation and resilience related training programs to enhance performance of their existing job functions. **Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.** 14.2 Solicit participation and offer opportunities for various departments to work together on a regular basis. 14.3 Cleary define roles of, and improve intergovernmental coordination between planners, emergency managers, engineers, and other staff, and municipal and regional partners in improving disaster resilience. **Goal 15 – Organize effectively and address resilience risks and priorities**. 15.1 Prioritize infrastructure improvements based on their role in supporting Talbot County's five Community Pillars: (1) Health, Safety, Welfare, (2) Economic Stability, (3) Education, (4) Infrastructure, and (5) Environmental. 15.2 Address Infrastructure dependencies and cascading effects in system failures. 15.3 Determine customized long-term resilience initiatives.

Table 11-27. MITIGATION PROJECT # 26	
Hazard:	Multi-hazard
Location(s):	Small Communities
Project Title/Mitigation Action Item	**Power Generators at Essential Facilities**
Background/Issue:	During significant storm events, many small communities are isolated without basic services such as electric, and/or water and sewer services. It is necessary for essential facilities, such as Town Halls or Fire Stations, to have reliable sources of sustained electrical power to achieve continued operations for citizens to seek shelter during these events.
Ideas for Integration:	• Inventory vulnerable communities and inventory existing facilities that could function as resilience centers; example: Town Halls, Fire Stations, or schools. • Full inventory of generators (and backups). ○ Prioritize based on function of building. • Outreach – annual survey/reminder to facilities for generator maintenance.
Responsible Agency:	Talbot County Department of Emergency Services
Partners:	Talbot County Public Schools, Volunteer Fire Departments, Non-Governmental Organizations, Municipalities.
Potential Funding:	Hazard Mitigation Grant Program
Cost Estimate:	Project dependent.
Benefits (Losses Avoided):	Provides shelter and safety for those in need during a significant storm event.
Timeline:	1-2 years
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. **Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. 7.2 Design new critical facilities with resilience against conditions (i.e., sea levels, flood risk, precipitation, and temperatures that are projected throughout the lifetime of the facility. **Goal 11 – Improve communication between municipalities and partners.** 11.2 Develop a distribution plan for public outreach materials and other relevant information. **Goal 13 – Ensure that there are an adequate number of shelters in the County.** 13.1 Ensure that facilities designated as shelters have adequate back-up power (correctly sized for facility) and are structurally sufficient.

Table 11-28. MITIGATION PROJECT # 27	
Hazard:	Coastal Hazards
Location(s):	Talbot County Shorelines
Project Title/Mitigation Action Item	**Restore barrier islands to provide protection for Talbot County's shorelines from wave action.**
Background/Issue:	Due to the lack of barrier island protection, specifically, the disappearance of Sharps Island, places like Tilghman Island, St. Michaels and Oxford are battered by waves causing shoreline erosion and increased tidal flooding. Without the protection of barrier islands, the shorelines are eroding at an increased rate, as well as increasing the flooding risk for the Towns of Oxford and St. Michaels. An example of a barrier island restoration project is the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island, which involves the use of approximately 68 million cubic yards of dredge material from the approach channels of the Baltimore Harbor and Channels Federal navigation project areas. This project will restore 1,715 acres of remote island habitat, consisting of 840 acres of upland habitat at an elevation up to +25 feet, 737 acres of wetland habitat divided into low marsh and high marsh, and approximately 138 acres of open water embayment. Another example of shoreline protection mitigation measures involves various techniques designed to decrease or halt shoreline erosion. One technique would utilize rock revetments, which are applied directly to the eroding shoreline. Other techniques include segmented breakwaters and wave-damping fences. These are placed in the adjacent open water to decrease a wave's energy before it hits the shoreline and promote sediment buildup. Through Section 204 of the Water Resources Development Act of 1992, the U.S. Army Corps of Engineers has the authority for Environmental Restoration Projects in Connection with Dredging. According to Section 204, "this allows the Corps to restore, protect, and create aquatic and wetland habitats in connection with construction or maintenance dredging of an authorized project. The project costs are identified as those more than the least costly plan that accomplishes the disposal of dredge material from a navigation project." The costs of the project would be shared between federal and non-federal funds, 75% and 25% respectively. To restore barrier islands and protect Talbot County shorelines, begin with coordination between Talbot County, the State of Maryland and Federal agencies. The next step is a written request for a Section 204 feasibility study provided to the U.S. Army Corps of Engineers.
Ideas for Integration:	• Work with allied agencies to determine extent of shoreline erosion from wave action. • Possible integration with "Cleaner, Greener Talbot" green infrastructure plan.
Responsible Agency:	U.S. Army Corps of Engineers (USACE), Maryland Department of Transportation Port Administration, Talbot County Department of Emergency Services, Talbot County Municipalities, Watershed Groups.
Potential Funding:	Section 204 Funding, Hazard Mitigation Program Grant, Emergency Advance Measures for Flood Prevention.
Cost Estimate:	75% Federal and 25% Non-Federal of total costs
Benefits (Losses Avoided):	Barrier islands protect coastlines by absorbing the force of storms, reducing wave energy, and protecting inland areas. They shelter environments and enable estuaries and marshes to form behind them.
Timeline:	Project Dependent
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. 1.7 Restore barrier islands to provide protection for Talbot County's shorelines from wave action. **Goal 3 – Minimize damage caused by erosion.** 3.1 Provide flood protection while reducing erosion and sediment at the Choptank River, East Wye, Miles, Tred Avon Rivers, and other vulnerable rivers **Goal 9 – Promote sustainable development to improve the quality of life.** 9.1 Provide for the conservation and protection of working lands and natural resources.

Table 11-29. MITIGATION PROJECT # 28	
Hazard:	Flood, Coastal Hazards
Location(s):	Countywide
Project Title/Mitigation Action Item	**Mitigate Flood Prone Properties** Action Item: Utilizing FEMA Flood Mitigation Assistance (FMA grant), develop a Flood Mitigation Plan, targeting those properties and communities which are most at-risk to the impacts of flood and coastal hazards.
Background/Issue:	Consider the acquisition, reconstruction, relocation, and/or elevation of the most vulnerable flood-prone properties within the County, including but not limited to repetitive loss properties. This acquisition process would include: contacting the property owner and determining the willingness to sell, obtaining property assessment information, and eventually applying for funding. Once property is acquired, the County should ensure the removal of all structures located on the property and remains as open space in perpetuity. Green infrastructure could be incorporated on the acquired property. This would assist water management with protecting, restoring, or mimicking the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life. In the right circumstances, Talbot County would support acquisition, reconstruction, relocation, and/or elevation of the most vulnerable flood-prone properties within the County.
Ideas for Integration:	• Increase awareness of flooding potential by expanding outreach projects. • Integrate into possible future Flood Mitigation Plan.
Responsible Agency:	Talbot County Department of Planning & Zoning
Partners:	Talbot County Department of Public Works, Talbot County Department of Emergency Services, Maryland Department of Emergency Management, Municipalities.
Potential Funding:	Hazard Mitigation Grant Program, Flood Mitigation Assistance.
Cost Estimate:	Median Price of Similar Properties in the Community plus $10,000-20,000 for additional costs.
Benefits (Losses Avoided):	Reduced flood insurance premiums. Increase preparedness and understanding of flood risks in flood prone areas.
Timeline:	1-2 years.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. 1.11 Encourage property owners within the FEMA Special Flood Hazard Area to purchase flood insurance. **Goal 3 – Minimize damage caused by erosion.** 3.3 Encourage the education and use of living shorelines in appropriate locations for shore stabilization. **Goal 8 – Increase public understanding, support, and demand for hazard mitigation and resilience efforts.** 8.1 Develop a public awareness campaign that will be a long-terminitiative, providing consistent educational opportunities to advance the community's knowledge and skills. **Goal 10 – Maintain high construction standards through the adoption of current International Building Codes-Building Performance Standards.** 10.1 Ensure current building codes and standards follow FEMA's basic guidelines and are properly enforced. **Goal 11 – Improve communication between municipalities and partners.** 11.2 Develop a distribution plan for public outreach materials and other relevant information. **Goal 14 – Integrate plan and policies across disciplines and agencies within the County through the consideration of potential hazards and future development.** 14.1 Integrate hazard mitigation and resilience into areas such as land use, transportation, climate change, natural and cultural resource protection, water resources, and economic development. **Goal 15 – Organize effectively and address resilience risks and priorities.** 15.3 Determine customized long-term resilience initiatives.

Table 11-30. MITIGATION PROJECT # 29	
Hazard:	Flood
Location(s):	Windmill P – 1131 S. Washington Street, Easton MD North PS – 405 Bay Street, Easton MD Aurora PS – 229 N. Aurora Street, Easton MD
Project Title/Mitigation Action Item	**Sanitary Sewer Pump Station Relocation Project**
Background/Issue:	During significant rain events, such as tropical storms and hurricanes, the above listed sanitary sewer pump stations are overwhelmed by floodwaters, limiting the sewer system's capacity to pump raw sewage to the wastewater treatment plant. If the pump station is inundated by floodwater, raw sewage can back-up into residences and buildings and cause raw sewage to be released into the environment. Goals and objectives specific to this project include: plan, design, and construct new pump stations to be located out of floodways and flood prone areas.
Ideas for Integration:	Relocate existing pump stations out of the floodway and flood prone areas.
Responsible Agency:	Easton Utilities (EU)
Partners:	Talbot County and impacted property owners.
Potential Funding:	Local/State/Federal grants.
Cost Estimate:	$8.5 million.
Benefits (Losses Avoided):	• Uninterrupted sanitary sewer services for residents/businesses during severe storm events. • Public health and environmental health risk mitigated from preventing sanitary sewer overflows.
Timeline:	2-7 years.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. **Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. 7.2 Design new critical facilities with resilience against conditions (i.e., sea levels, flood risk, precipitation, and temperatures that are projected throughout the lifetime of the facility.

Table 11-31. MITIGATION PROJECT # 30	
Hazard:	Flood
Location(s):	Easton Utilities (EU) Head End Building – 405 Bay Street, Easton MD
Project Title/Mitigation Action Item	**Flood-proofing EU Head End Building Project**
Background/Issue:	During significant rain events, such as tropical storms and hurricanes, Easton Utilities Head End building can become inundated with floodwaters – risking damage to critical cable and communications equipment. Goals and objectives specific to this project include: planning, design, and construction of a new Head End building to be relocated out of the floodplain/flood prone area or increased flood-proofing structures at and around the building.
Ideas for Integration:	Relocate the Head End building out of the floodplain/flood prone area or improve flood-proofing structures at and around the building.
Responsible Agency:	Easton Utilities
Partners:	Talbot County and Municipal Governments as necessary.
Potential Funding:	Local/State/Federal grants.
Cost Estimate:	$1.5 million.
Benefits (Losses Avoided):	Uninterrupted communication services, i.e., internet and cable tv, for emergency services, residents, and businesses.
Timeline:	2-7 years.
Goals & Objectives:	**Goal 1 – Minimize damage caused by flooding.** 1.1 Ensure that existing structures in the floodplain are resistant to flood damage. **Goal 7 – Ensure adequate protection and resilience of critical facilities and infrastructure throughout the County.** 7.1 Reduce the possibility of damage and loss to existing community assets including addressable structures, critical facilities and infrastructure due to flooding and other hazard events. 7.2 Design new critical facilities with resilience against conditions (i.e., sea levels, flood risk, precipitation, and temperatures that are projected throughout the lifetime of the facility.

[1] J. of Coastal Research, 27(2):207-222 (2011). https://doi.org/10.2112/09-1190.1
[2] www.epa.gov/smartgrowth/greening-americas-communities

Chapter 12:
Municipal Synopsis & Perspective

PLAN UPDATE

- A "*Public Perspective*" section was added for each municipality. Results from the public survey were incorporated for each municipality; responses from the survey were specific to each municipality.
- Repetitive Flood Issues sections have been updated as necessary for each municipality.
- Mitigation and Resilience Projects have been updated for each municipality with ongoing and continued mitigation activities.
- Areas of High Risk and Vulnerability sections have been updated for each municipality as needed.
- Mapping products for each municipality have been updated; each municipality and its critical facilities and structures have been mapped in relation to the FEMA Special Flood Hazard Area.

CHAPTER 12: MUNICIPAL SYNOPSIS & PERSPECTIVE

Talbot County Municipalities

1. Town of Easton
2. Town of Oxford
3. Town of Queen Anne
4. Town of St. Michaels
5. Town of Trappe

Talbot County is home to the charming towns of Easton, Oxford, Queen Anne, St. Michaels, and Trappe. To obtain specific information from the municipal perspective, each of the five municipalities were invited to serve on the Hazard Mitigation Planning Committee (HMPC).

In addition, municipalities were sent a "municipal questionnaire" with the goal of gathering updates pertaining to completed and ongoing mitigation and resilience projects, as well as current capabilities (i.e., planning and regulatory, administrative and technical, financial, and education/outreach).

Information gathered from both the municipal questionnaire and meetings are presented within this chapter. Mapping products are included for each town, displaying important information from the towns' perspective, rather than county-wide, as is the case in other chapters of the Plan. Finally, information from each municipality specific to hazards, impacts, issues, and potential mitigation and resilience action items have been included.

12.1 TOWN OF EASTON SYNOPSIS & PERSPECTIVE

Town of Easton
"Small-Town Comfort, Big-City Fun"

Deemed the "big city" of Talbot County, Easton is as sophisticated as it is lively. Featuring a world-class theater, renowned art galleries and impeccably curated museums, it's the heart of the Shore's arts and culture scene. This mini metropolis draws international artists, musicians and cultural connoisseurs to a series of acclaimed festivals each year. This art lovers' retreat is rated among the Top Ten Best Small Towns and Top 100 Small Arts Communities in America.

Source: www.tourtalbot.org/talbot-county/Easton/

12.1.1 HAZARDS

Natural hazards identified within this Plan that impact, or have the potential to impact, the Town of Easton include: Coastal Hazards, Flood, Winter Storm, Tornado, High Wind, Thunderstorm, Drought, Extreme Heat, and Emerging Infectious Diseases. The highest risk hazards to Easton are winter storms and high wind.

Public Perspective

Public survey results from respondents that indicated they live in Easton show levels of concern for natural hazards. Citizens of Easton are most concerned with emerging infectious diseases (73 responses), followed by extreme heat (36 responses), and coastal hazards (34 responses).

According to the survey, citizens are least concerned with thunderstorm, drought, and tornado.

In terms of social vulnerability, responses from the survey indicate that Easton residents perceive the following groups to be particularly at risk from the impacts of emerging infectious diseases, extreme heat, and coastal hazards: (1) medical issues/disability, (2) age, and (3) socioeconomic status.

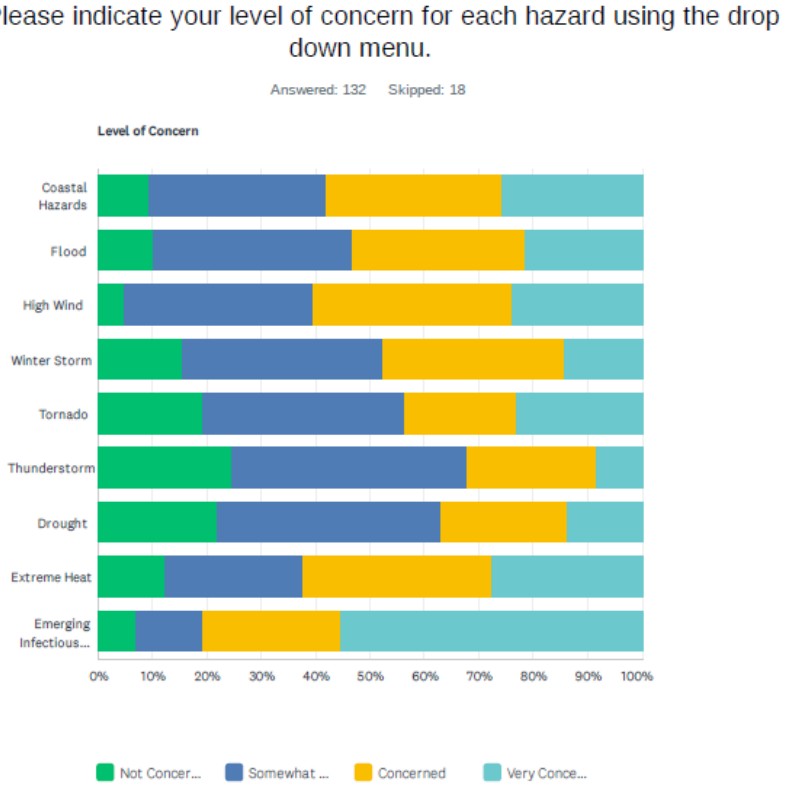


Figure 13-1: Results from Question 3 of the public survey. Responses from Easton residents only.

12.1.2 REPETITIVE FLOOD ISSUES

Areas of concern within Easton that experience repetitive flood issues include:

- Earle Avenue;
- Commerce/ Brooks Drive; and,
- South Washington Street.

12.1.3 TOWN OF EASTON MITIGATION & RESILIENCE PROJECTS

The Town of Easton identified two (2) new projects during the Plan development process.

1. The Town has active stream restoration projects and storm drain upgrade projects. There are also pumping station relocation projects in the planning stage to remove the stations from hazard areas.
2. Easton plans to relocate the Windmill Pumping Station as an elevation project.

12.1.4 TOWN OF EASTON CAPABILITIES

The Town of Easton completed a municipal questionnaire to determine current capabilities and ongoing mitigation projects. Results of the questionnaire indicate the following hazard mitigation and resilience capabilities:

Planning and Regulatory

- ✓ Easton is currently in the process of updating its Comprehensive Plan
- ✓ The Town has a Continuity of Operations Plan associated with COVID19 Pandemic, initiated on 3/23/2020.
- ✓ Easton utilizes the 2018 International Building, Residential Energy, Mechanical and Plumbing Codes, and the 2018 National Electric Code.
- ✓ The Town has land use authority and the ability to issue building permits.

- ✓ Easton has adopted its own floodplain ordinance in 2013 which was updated in 2016. Freeboard is included for the AO Zone only.
- ✓ The Town has acquired land for open space and public recreation.

Administrative and Technical

The Town of Easton has the following departmental and staff resources available.

Table 12-1. Town Of Easton Departments and Staff Resources

Land Use Authority	Land Use/Development Planning		Public Works & Engineering		Emergency Services (e.g., 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
Yes	Yes	4	Yes	47	Yes	56	Yes	1	Yes	1	Yes	9	Yes	6

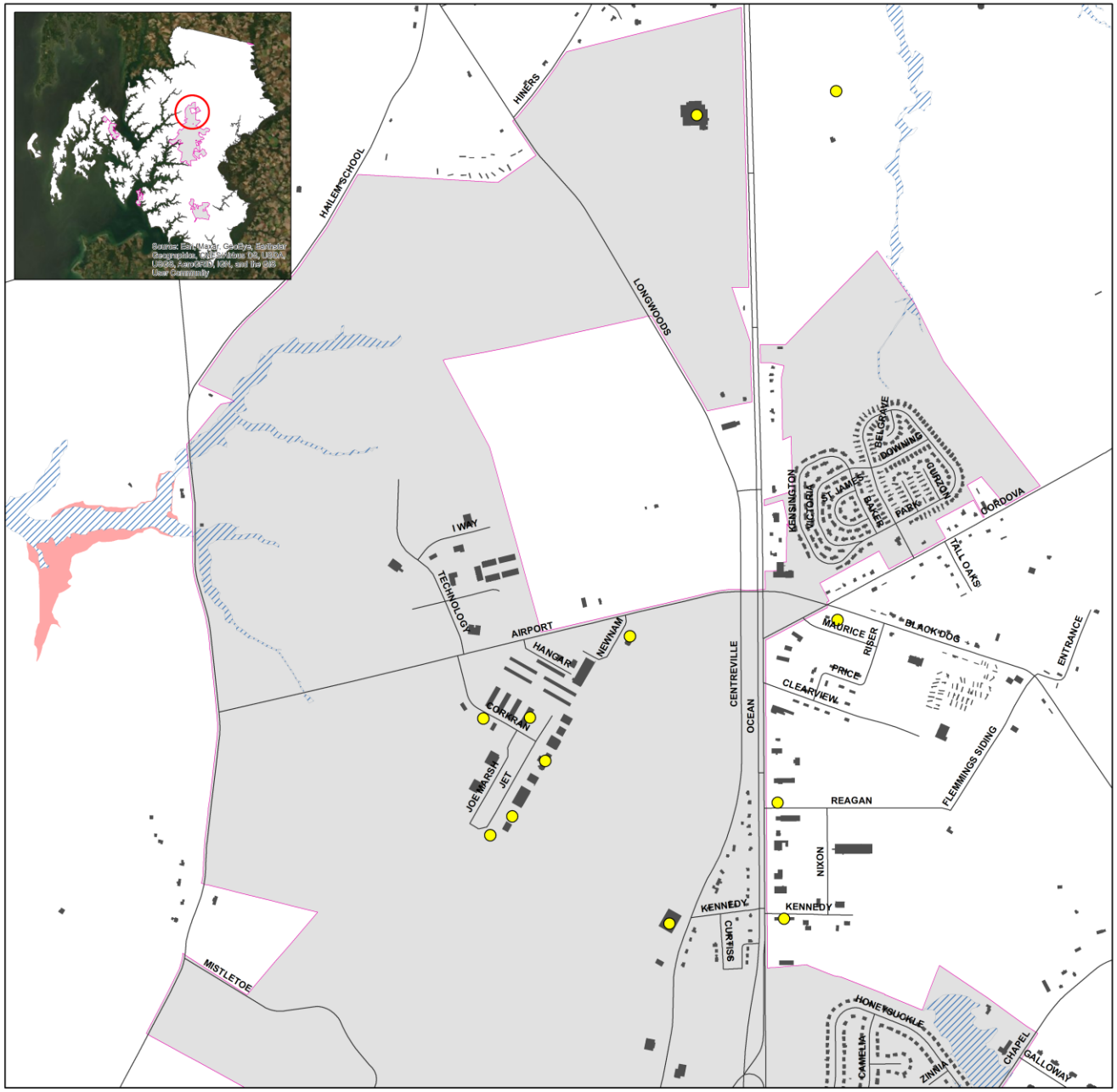
Financial

- ✓ The Town has active stream restoration projects and storm drain upgrade projects. There are also pumping station relocation projects in the planning stage to remove the stations from hazard areas.
- ✓ The Town of Easton can levy taxes for specific purposes, this has been done during the annexation process to reduce the initial cost of connection to water and wastewater systems. Currently West Kennedy Street is the only special taxing district within the Town of Easton.
- ✓ Easton has utilized CDBG funding to assist community aspects such as the Talbot Commerce Park extension of water and sewer, Critchlow Adkins Children Center in the Easton Elementary School, Channel Marker Mental Health Support Services renovation and Housing on the Hill workforce housing project.
- ✓ Easton plans to relocate the Windmill Pumping Station as an elevation project.

Education and Outreach

- ✓ The Town has worked with the Department of Natural Resources, National Oceanic Atmospheric Association, Eastern Shore Land Conservancy, Chesapeake Conservancy, University of Maryland Sea Grant Extension and Chesapeake Bay Foundation.

Municipal Synopsis - Town of Easton (Area 1)



2022 Critical and Public Facilities

Building Footprints

1-Percent Annual Chance Flood Zone

0.2-Percent Annual Chance Flood Zone

Centerlines

Municipalities

Talbot County

Town of Easton's Municipal Perspective:

Hazard Vulnerability:
- Flood
- Winter Storm
- High Wind

Areas of Concern:
- Earle Avenue
- Commerce Drive/Brooks Drive
- South Washington Street

Critical and Public Facilities in FEMA Special Flood Hazard Areas:
Within this portion of Easton, there are no Critical or Public Facilities located within the FEMA SFHA.

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.

N

0 0.125 0.25 0.5 Miles

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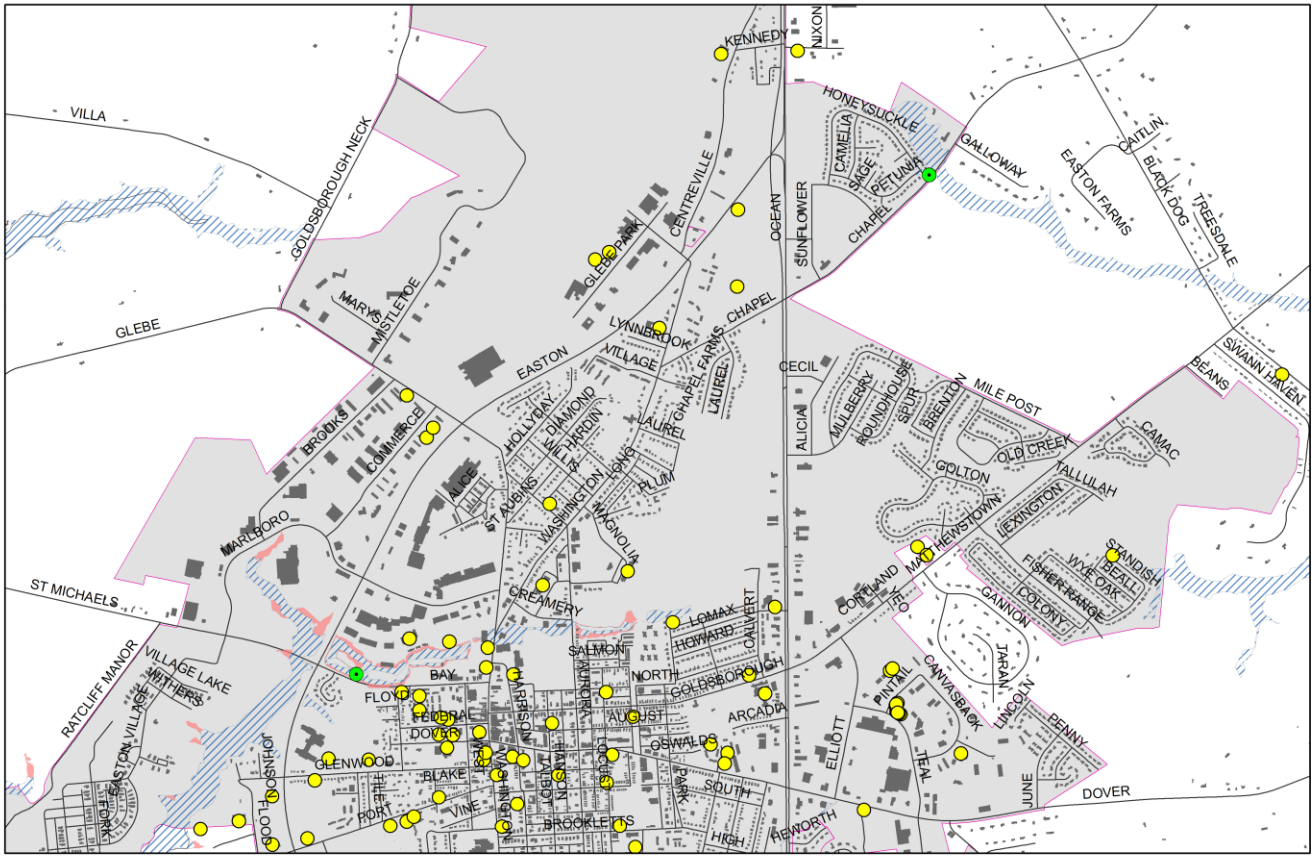
Municipal Synopsis - Town of Easton (Area 2)



Town of Easton's Municipal Perspective:

Hazard Vulnerability:
- Flood
- Winter Storm
- High Wind

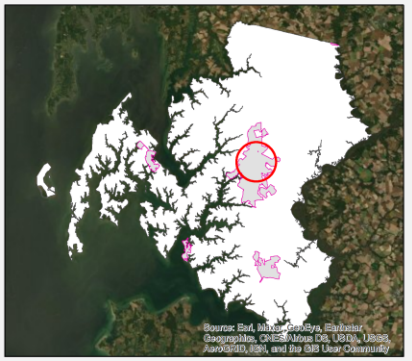
Areas of Concern:
- Earle Avenue
- Commerce Drive/Brooks Drive
- South Washington Street

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

1.) Pumping Station on Honeysuckle Drive
2.) Easton Utilities Cable on Bay Street

- 2022 Critical and Public Facilities
- CF and PF within the 1-Percent Zone
- Building Footprints
- 1-Percent Annual Chance Flood Zone
- 0.2-Percent Annual Chance Flood Zone
- Centerlines
- Municipalities
- Talbot County

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.



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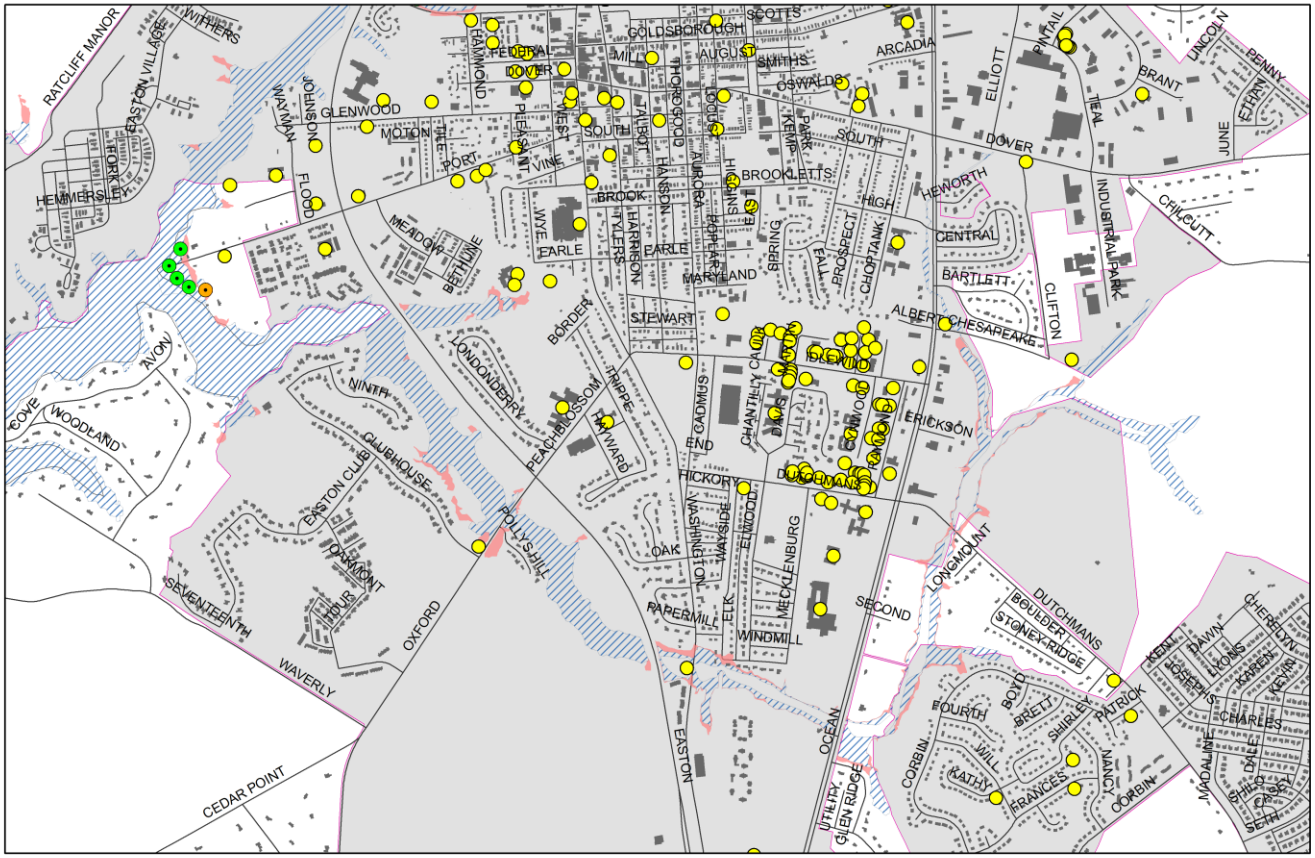
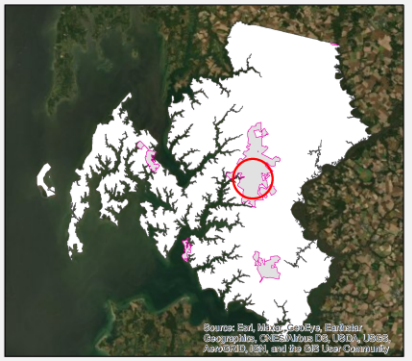
Municipal Synopsis - Town of Easton (Area 3)



2022 Critical and Public Facilities
CF and PF within the 1-Percent Zone
CF and PF within the 0.2-Percent Zone
Building Footprints
1-Percent Annual Chance Flood Zone
0.2-Percent Annual Chance Flood Zone
Centerlines
Municipalities
Talbot County

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.



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0 0.2 0.4 0.8 Miles

Town of Easton's Municipal Perspective:

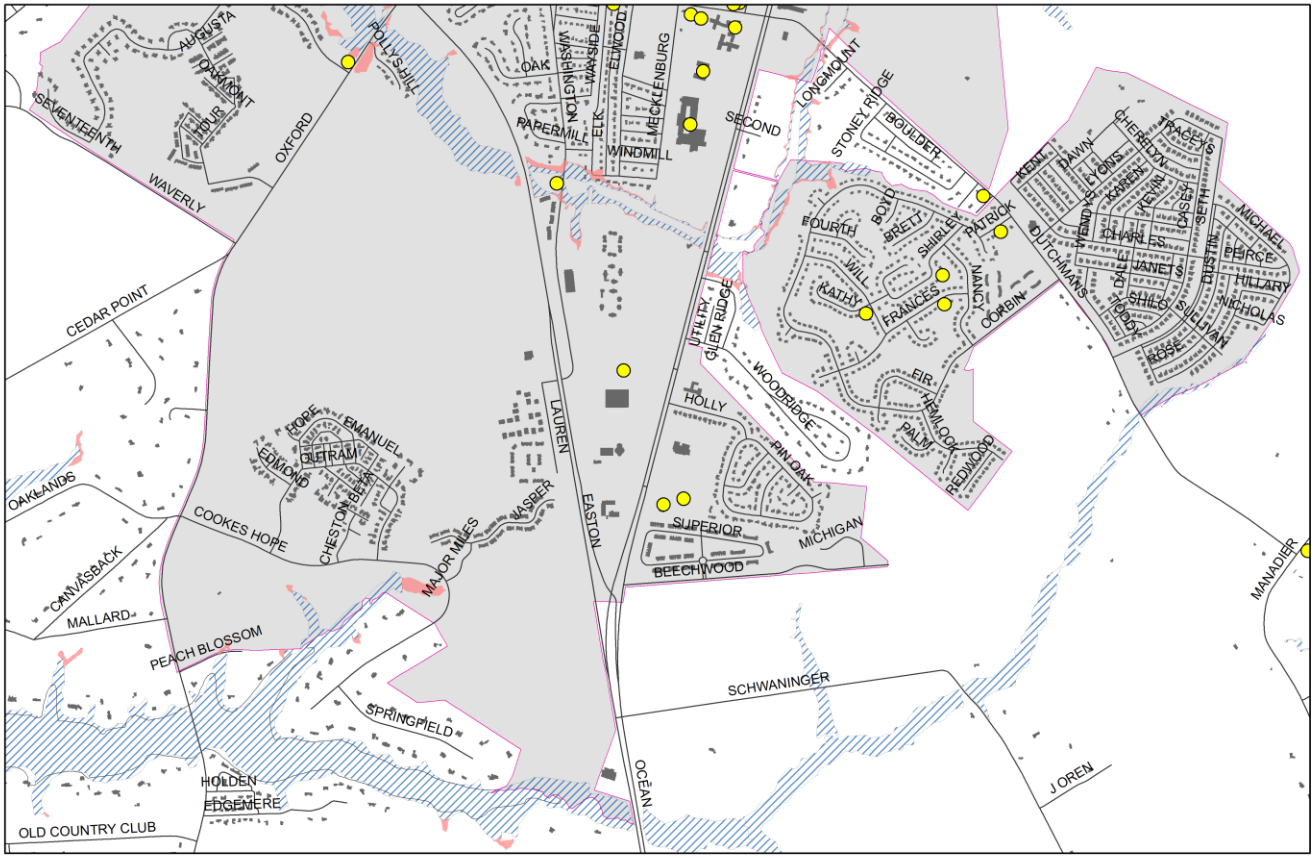
Hazard Vulnerability:
- Flood
- Winter Storm
- High Wind

Areas of Concern:
- Earle Avenue
- Commerce Drive/Brooks Drive
- South Washington Street

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

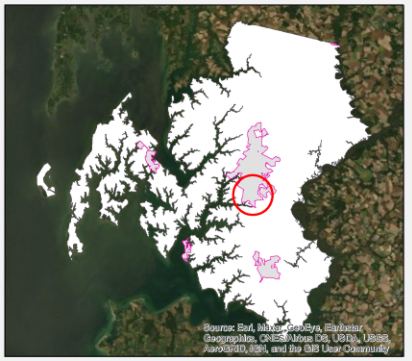
Within this portion of Easton, there are no Critical or Public Facilities located within the FEMA SFHA.

Municipal Synopsis - Town of Easton (Area 4)



2022 Critical and Public Facilities
CF and PF within the 1-Percent Zone
CF and PF within the 0.2-Percent Zone
Building Footprints
1-Percent Annual Chance Flood Zone
0.2-Percent Annual Chance Flood Zone
Centerlines
Municipalities
Talbot County

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.



N

0 0.2 0.4 0.8 Miles

Town of Easton's Municipal Perspective:

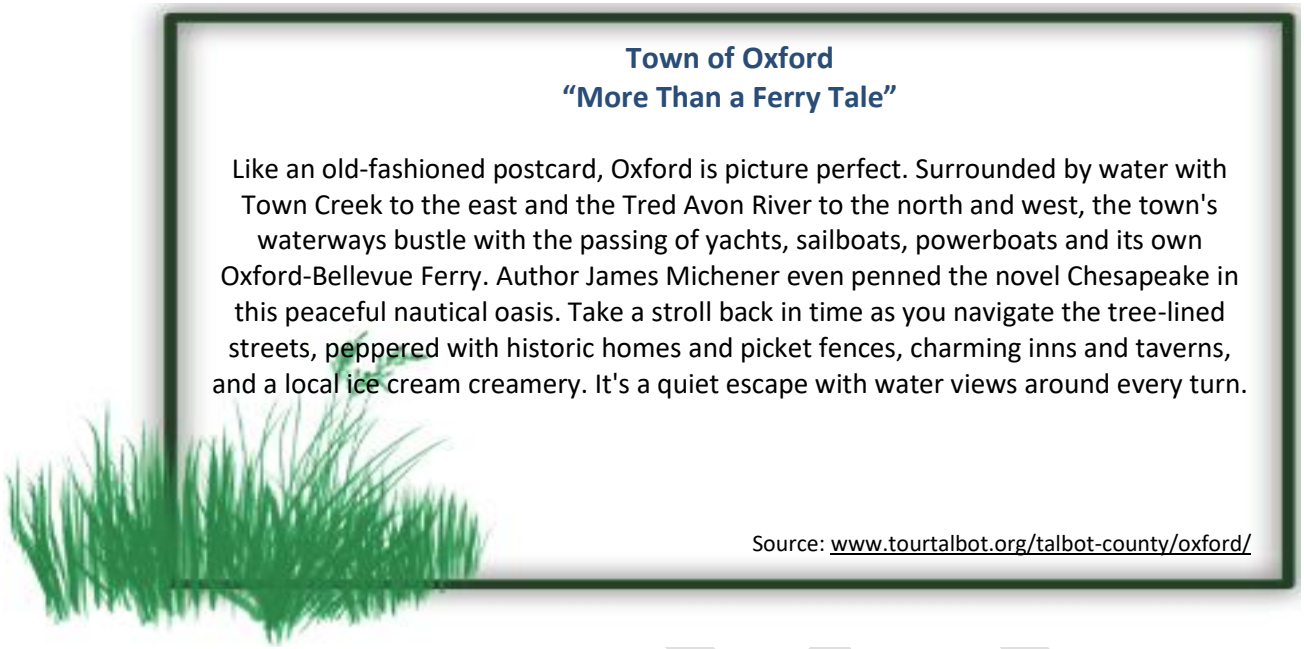
Hazard Vulnerability:
- Flood
- Winter Storm
- High Wind

Areas of Concern:
- Earle Avenue
- Commerce Drive/Brooks Drive
- South Washington Street

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

Within this portion of Easton, there are no Critical or Public Facilities located within the FEMA SFHA.

12.2 TOWN OF OXFORD SYNOPSIS & PERSPECTIVE



Town of Oxford
"More Than a Ferry Tale"

Like an old-fashioned postcard, Oxford is picture perfect. Surrounded by water with Town Creek to the east and the Tred Avon River to the north and west, the town's waterways bustle with the passing of yachts, sailboats, powerboats and its own Oxford-Bellevue Ferry. Author James Michener even penned the novel Chesapeake in this peaceful nautical oasis. Take a stroll back in time as you navigate the tree-lined streets, peppered with historic homes and picket fences, charming inns and taverns, and a local ice cream creamery. It's a quiet escape with water views around every turn.

Source: www.tourtalbot.org/talbot-county/oxford/

12.2.1 HAZARDS

Natural hazards identified within this Plan that impact, or have the potential to impact, the Town of Oxford include: Coastal Hazards, Flood, Winter Storm, Tornado, High Wind, Thunderstorm, Drought, Extreme Heat, and Emerging Infectious Diseases. The highest risk hazards to the Oxford are flood, coastal hazards, winter storms, thunderstorms, and high wind.

The following excerpt from Oxford's *Adverse Weather Emergency Operations Plan (2022)* further highlights the town's hazard vulnerabilities:

> "Oxford is vulnerable to adverse weather and coastal flooding. The town has experienced the impacts of ice, snow, wind, flooding, and surge inundation, and these are known conditions that can have an impact on the town in the future. Because of these vulnerabilities, precautions must be taken to ensure minimal impact to the residents, staff and visitors, protecting persons and property."

Public Perspective

Public survey results from respondents that indicated they live in Oxford show levels of concern for natural hazards. Citizens of Oxford are most concerned with emerging infectious diseases (19 responses), followed by coastal hazards (18 responses), and flood (18 responses). Residents of Oxford feel that coastal hazards and flood particularly impact their community. According to the survey, citizens are least concerned with tornado, winter storm, and thunderstorm.

In terms of social vulnerability, responses from the survey indicate that residents perceive the following groups to be particularly at risk from the impacts of emerging infectious diseases, flood, and coastal hazards: (1) age, (2) medical issues/disability, and (3) socioeconomic status.

Q3 Please indicate your level of concern for each hazard using the drop down menu.

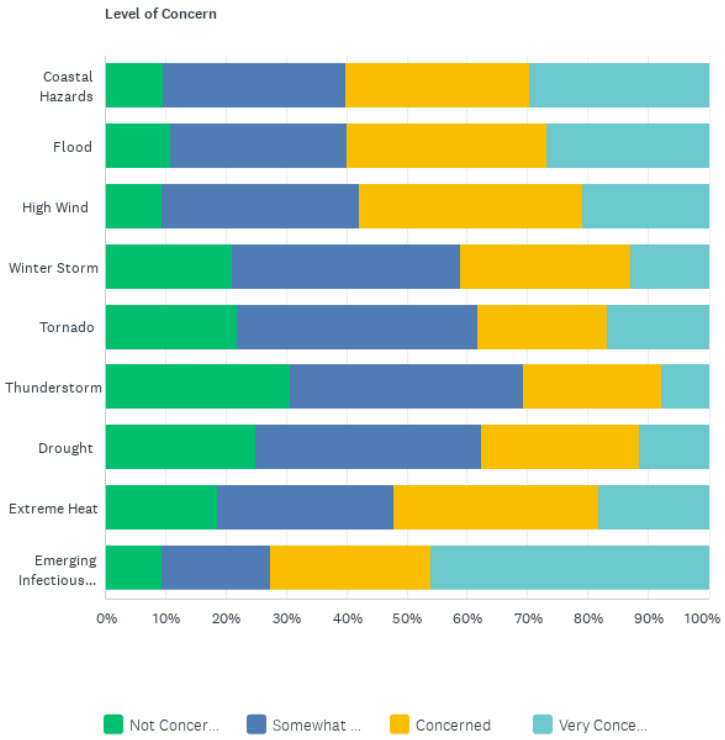


Figure 13-2: Results from Question 3 of the public survey. Responses from Oxford residents only.

12.2.2 REPETITIVE FLOOD ISSUES

Areas of concern within Oxford that experience repetitive flood issues include:

Oxford Causeway: MD Rt 333/South Morris Street/Caroline Street

Tidal water due to high, high tides, exceed the height of the State Road as often as monthly, creating nuisance flooding. Flooding from extreme tidal events in this area take over the roadways and the stormwater infrastructure and fill the connecting roads at this intersection, known as the pin cushion, which essentially cuts 50% of the town off from the mainland, severely limiting access to first responders and the ability of residents to evacuate.

Extreme tidal events also overtake stormwater infrastructure and shoreline bulkheads flooding roads in the following areas:

- South Morris Street at Pleasant Street
- West Pier Street
- South Morris Street at Willows Avenue and Riverview Avenue
- Second Street at Pleasant Street
- Tilghman Street at Stewart Street, Norton Street and Mill Street
- Bank Street at Market Street and Factory Street

Nuisance Flooding is a fairly regular event in these areas, whereas severe flooding in all the above areas, which can impact homes and businesses, on an average, happens every 2 – 3 years, although there is concern this is happening more frequently.

12.2.3 AREAS OF HIGH FLOOD RISK AND VULNERABILITY

There are four neighborhoods within Oxford that are particularly vulnerable to flooding:

- Market Street, Bank Street, Tilghman Street area, including Stewart, Norton, and Mill Streets.
- The Causeway, including North Morris Street at Caroline Street and South Morris Street at Pleasant Street.
- East Pier Street and South Morris Street at Willows and Riverview Avenues, and to a lesser degree East Pier Street to Second Street.
- Bonfield Avenue at East Division Street and Town Creek.

These neighborhoods are most impacted during increasingly intense rain events during high tides, allowing intrusion from tidal waters while preventing release of stormwater.

12.2.4 TOWN OF OXFORD MITIGATION & RESILIENCE PROJECTS

The Town of Oxford identified several new and ongoing mitigation efforts during the Plan development process:

1. Oxford entered the Community Rating System as a Class 7 community in 2020. Maintaining and improving the CRS rating is important to the Town.
2. Oxford has a strong vested interest in stormwater and flood mitigation planning and infrastructure implementation. They have established a Community Resilience Committee to organize and manage efforts related to planning, studies, projects, and other future endeavors to retain and build on these efforts.
3. Continued identification of new stormwater improvements and strategies to reduce impacts from tidal water and stormwater flooding on town roads and in coordination with State Highway Administration (SHA) to reduce flooding on Route 333.
    a. The town is in the process of investigating possible improvements to areas of town that are experiencing increased tidal and stormwater flooding, utilizing federal and state infrastructure funding, with the intent to incorporate infrastructure and improve tide gates that will reduce street flooding. The Causeway (Route 333) is still an area of concern, but it is difficult to address locally as a State-owned road. State intervention is required to fix the flooding issues experienced on this section of roadway.
4. Shoreline improvement projects along the northern unprotected shoreline of the town are in the final stages of permitting and construction is expected to begin in 2022.
5. Improvements to high-speed internet continues in Talbot County, with an expected expansion to the utility in the unincorporated area between Easton and Oxford. It is expected that this utility will eventually be expanded into the Town of Oxford.
6. Oxford has made improvements to their main pump station and elevated their wastewater treatment plant providing resilience.
    a. The wastewater treatment plant has completed an $18 million upgrade, which included 8 feet of elevation, in 2022. The treatment plant was mapped outside of the SFHA in 2016.
    b. The town will need to continue upgrade efforts in wastewater conveyance to develop mitigation improvements or consider relocation for the four existing sewer pumping stations, Bank Street, Bachelors Point, Causeway, Bonfield.
7. The Town continues to investigate culvert and tide gate improvements to reduce the impacts of tidal and stormwater flooding, with the intention of future incorporation of elevated discharge pipes and pump stations to address resilience in the face of climate change.

8. Oxford is actively seeking a method to incorporate a generator for the Town Office/Police Department Building. Generators are available to support public works infrastructure in the town as needed.

12.2.5 TOWN OF OXFORD CAPABILITIES

The Town of Oxford completed a municipal questionnaire to determine current capabilities and ongoing mitigation projects. Results of the questionnaire indicate the following hazard mitigation and resilience capabilities:

Planning and Regulatory

- ✓ The Town has updated its "Oxford Adverse Weather Emergency Operations Plan" (adopted August 2021).
- ✓ The Town utilizes current (2021) International Building Codes.
- ✓ The Town has Planning and Zoning authority.
- ✓ The Town updated its floodplain ordinance in 2016, which includes 3 foot of freeboard for all new construction and substantial improvements.
- ✓ Oxford participates in the Community Rating System and is currently a Class 7.
- ✓ The Town has a large amount of public land, 90% of which is open space.

Administrative and Technical

The Town of Oxford has the following departmental and staff resources available.

Table 12-2. Town of Oxford Departments and Staff Resources

Land Use Authority	Land Use/Development Planning		Public Works & Engineering		Emergency Services (e.g., 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
Yes	Yes	1	Yes	6	Yes	3	Yes	1	No	0	Yes	1	Yes	1

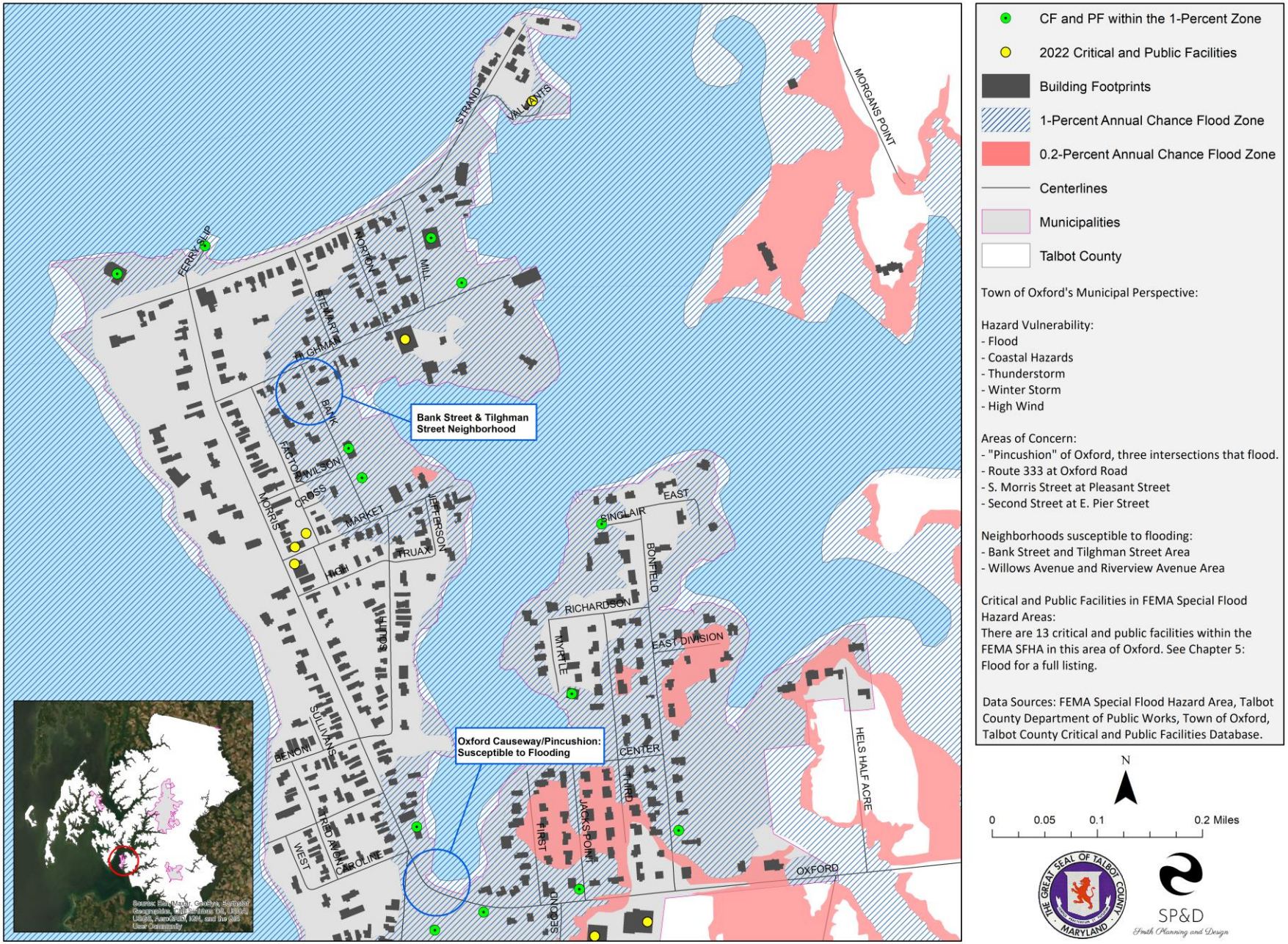
Financial

- ✓ The Town has been awarded grant funding for green infrastructure and living shoreline improvements.
- ✓ The Town aims to acquire additional grant funding over the next five years for the continuation of these green infrastructure projects.
- ✓ Additional grant funding is being sought to support stormwater infrastructure improvements.
- ✓ The town has numerous privately funded property elevation projects. The Town is interested in acquiring access to FEMA funding for property elevation projects to aid interested property owners.
- ✓ With strong local support, Oxford utilizes a stormwater utility, the Stormwater Management and Shoreline Protection Fund, which sets aside a portion of real estate taxes annually to support stormwater and shoreline mitigation projects and the ongoing maintenance required.

Education and Outreach

- ✓ Oxford is represented on the Eastern Shore Climate Adaptation Partnership (ESCAP) and the Town is also involved with the Talbot County Local Emergency Planning Committee (LEPC) and the "Cleaner, Greener Talbot" planning committee.
- ✓ The Town has implemented the Oxford Community Resilience Committee to assure continuity within their long-term resilience goals.
- ✓ The Town holds bi-annual Town Hall meetings at the Community Center to provide citizens with updates related to emergency preparedness, mitigation projects, and resilience initiatives.
- ✓ The Town promotes responsible water use, fire safety, household emergency preparedness, and environmental education on their website and social media (i.e., Facebook).

Municipal Synopsis - Town of Oxford (Area 1)



- CF and PF within the 1-Percent Zone
- 2022 Critical and Public Facilities
- Building Footprints
- 1-Percent Annual Chance Flood Zone
- 0.2-Percent Annual Chance Flood Zone
- Centerlines
- Municipalities
- Talbot County

Town of Oxford's Municipal Perspective:

Hazard Vulnerability:
- Flood
- Coastal Hazards
- Thunderstorm
- Winter Storm
- High Wind

Areas of Concern:
- "Pincushion" of Oxford, three intersections that flood.
- Route 333 at Oxford Road
- S. Morris Street at Pleasant Street
- Second Street at E. Pier Street

Neighborhoods susceptible to flooding:
- Bank Street and Tilghman Street Area
- Willows Avenue and Riverview Avenue Area

Critical and Public Facilities in FEMA Special Flood Hazard Areas:
There are 13 critical and public facilities within the FEMA SFHA in this area of Oxford. See Chapter 5: Flood for a full listing.

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Town of Oxford, Talbot County Critical and Public Facilities Database.

N

0 0.05 0.1 0.2 Miles

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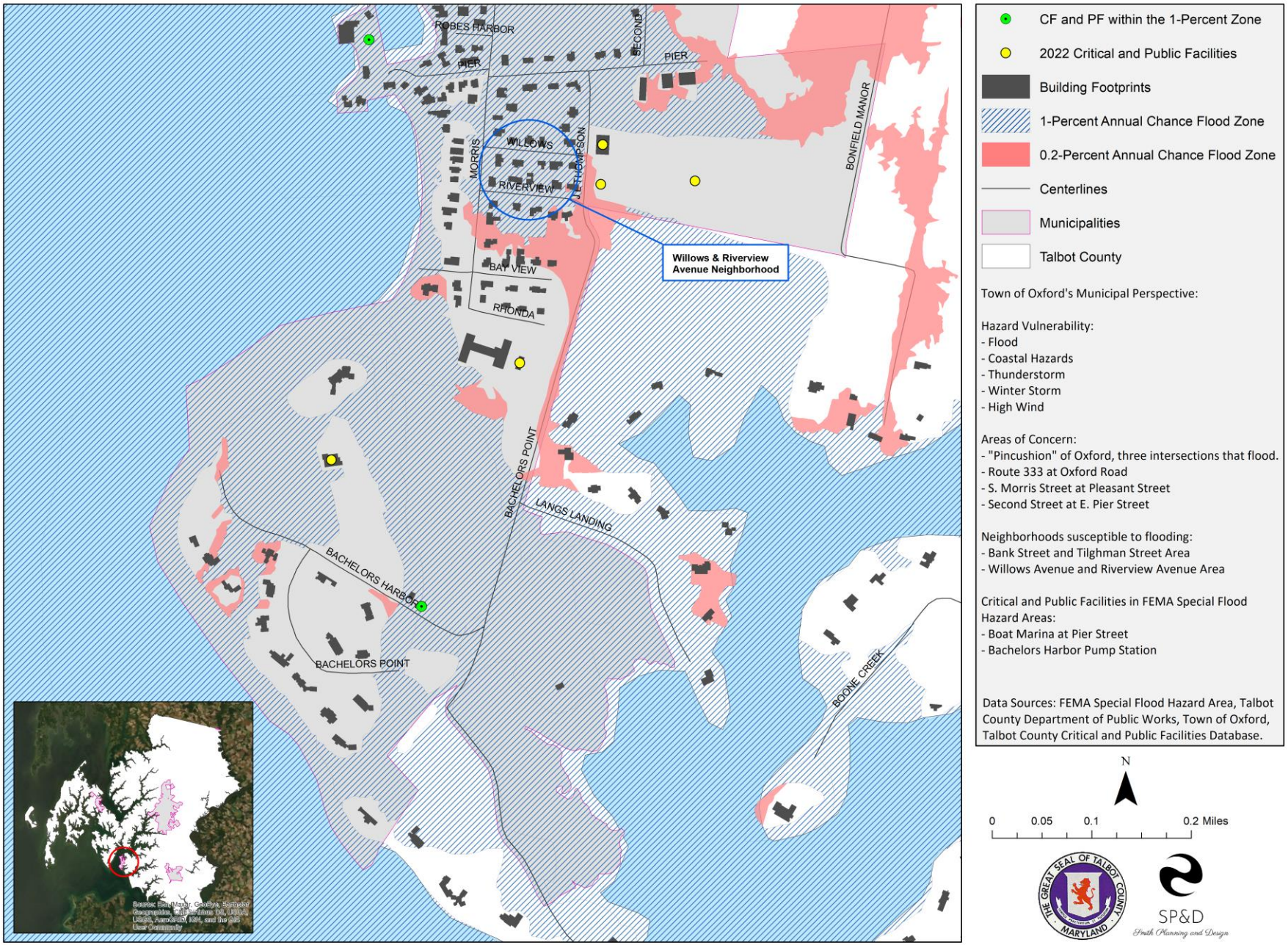
Municipal Synopsis - Town of Oxford (Area 2)



12.3 TOWN OF QUEEN ANNE SYNOPSIS & PERSPECTIVE

Town of Queen Anne
"From Farm to Community Hub"

In 1878, the railroad purchased a site for a station on Tuckahoe Creek in Queen Anne's County, and, quite logically, named it Queen Anne when the station was finally put into service about 1882. That was the genesis of the town known today as Queen Anne. It grew quickly, becoming an important commercial center for the Maryland, Delaware and Virginia Railroad. Queen Anne today is a pleasant town of residences and local rural commerce. It is situated in two counties, Queen Anne's and Talbot, and borders on Caroline County.

Source: www.qac.org/1166/Town-Plans

The borders between Talbot County and Queen Anne's County runs through the middle of town. Tuckahoe Creek passes by the town. A municipal questionnaire was not completed for the town; however, municipal mapping and data was collected during the plan update process.

12.3.1 HAZARDS

Natural hazards identified within this Plan that impact, or have the potential to impact, the Town of Queen Anne include: Flood, Winter Storm, Tornado, High Wind, Thunderstorm, Drought, Extreme Heat, and Emerging Infectious Diseases. The highest risk hazards to the Town of Queen Anne are flood, winter storms, thunderstorms, and high wind.

Public Perspective

Public survey results from respondents that indicated they live in Queen Anne show levels of concern for natural hazards. Citizens of Queen Anne are most concerned with emerging infectious diseases and high wind. Residents of Queen Anne feel that emerging infectious diseases, high wind, and thunderstorm particularly impact their community. According to the survey, citizens are least concerned with coastal hazards, tornado, drought, and extreme heat.

Q3 Please indicate your level of concern for each hazard using the drop down menu.

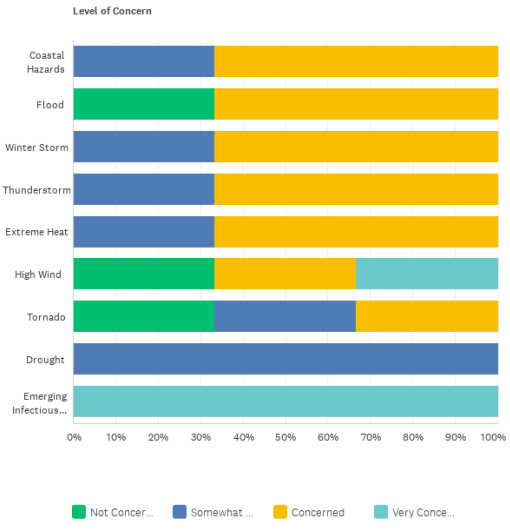
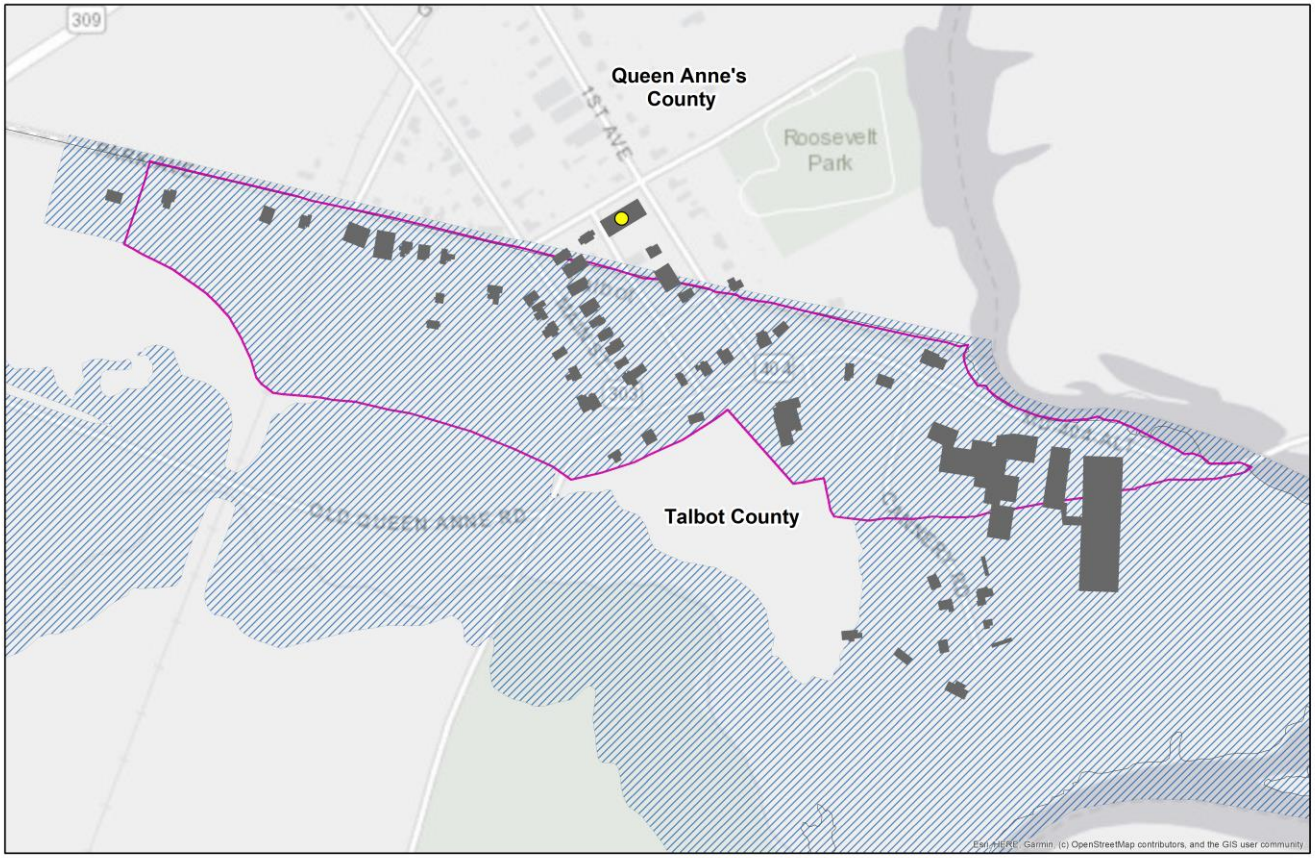


Figure 13-3: Results from Question 3 of the public survey. Responses from Queen Anne residents only.

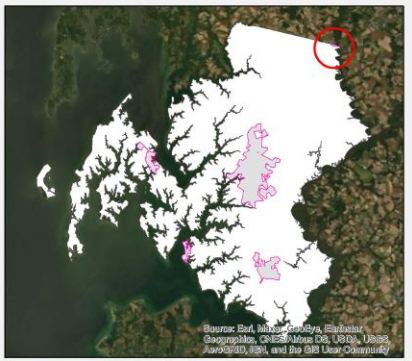
In terms of social vulnerability, responses from the survey indicate that residents perceive the following groups to be particularly at risk from the impacts of emerging infectious diseases and high wind: (1) medical issues/disability, (2) English language proficiency, (3) age, and (4) socioeconomic status.

Municipal Synopsis - Town of Queen Anne



2022 Critical and Public Facilities
Building Footprints
1-Percent Annual Chance Flood Zone
0.2-Percent Annual Chance Flood Zone
Municipalities
Talbot County

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.



N

0 0.05 0.1 0.2 Miles

Town of Queen Anne's Municipal Perspective:

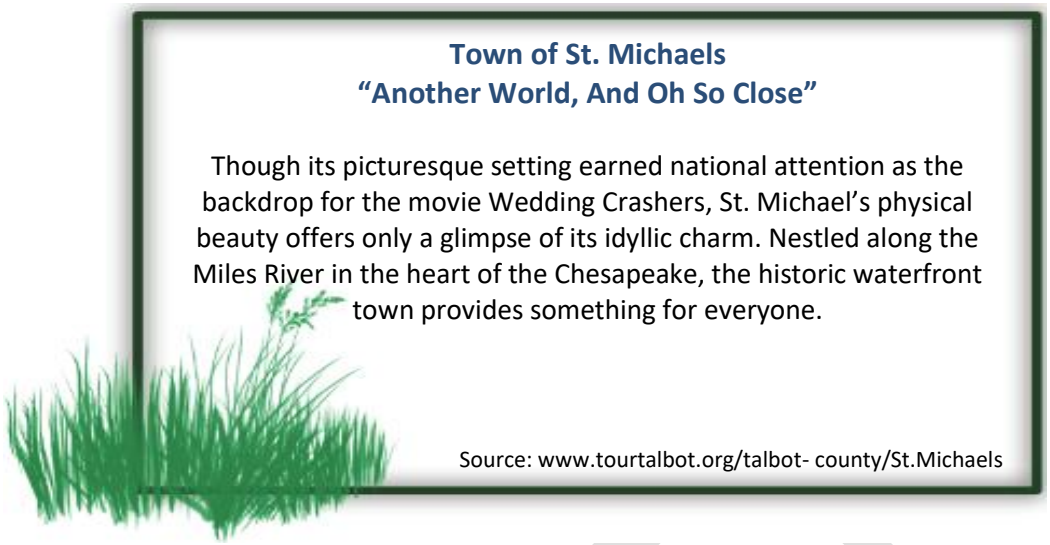
Hazard Vulnerability:
- Flood
- Thunderstorm
- Winter Storm
- High Wind

Areas of Concern:
- Areas around Tuckahoe Creek

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

There are no critical or public facilities located in the Talbot County portion of Queen Anne.

12.4 TOWN OF ST. MICHAELS SYNOPSIS & PERSPECTIVE



12.4.1 HAZARDS

Natural hazards identified within this Plan that impact or have the potential to impact the Town of St. Michaels include: Coastal Hazards, Flood, Winter Storm, Tornado, High Wind, Thunderstorm, Drought, Extreme Heat, and Emerging Infectious Diseases. The highest risk hazard, by a significant margin, is flood. Both tidal flooding and heavy rains result in flood issues. The projected sea level rise forecasted by NOAA in the next 30 years will augment these flooding issues and negatively impact all properties adjacent to the St. Michaels waterfront.

Public Perspective

Public survey results from respondents that indicated they live in St. Michaels show levels of concern for natural hazards. Citizens of St. Michaels are most concerned with flood (12 responses), coastal hazards (11 responses), and emerging infectious diseases (11 responses). Residents of St. Michaels feel that flood and coastal hazards particularly impact their community. According to the survey, citizens are least concerned with drought, extreme heat, and thunderstorm.

In terms of social vulnerability, responses from the survey indicate that residents perceive the following groups to be particularly at risk from the impacts of flood, coastal hazards, and emerging infectious diseases: (1) age, (2) medical issues/disability, and (3) socioeconomic status.

Q3 Please indicate your level of concern for each hazard using the drop down menu.

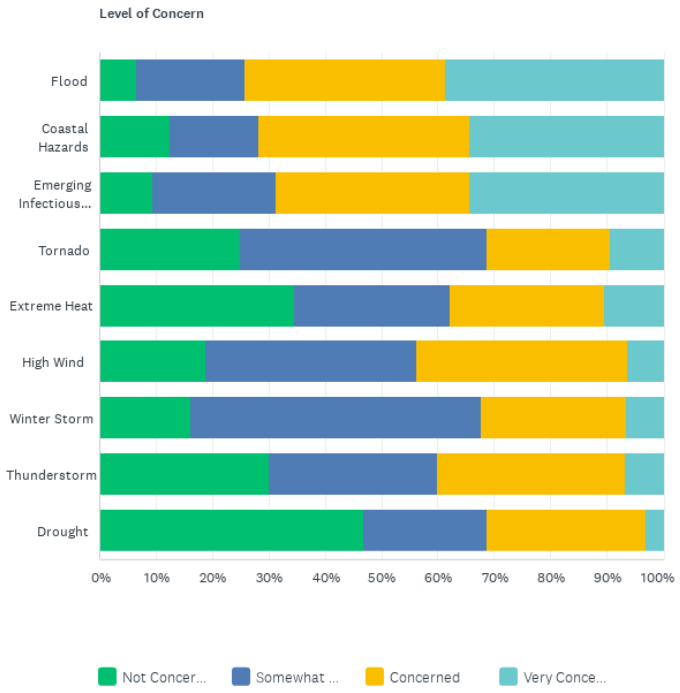


Figure 13-4: Results from Question 3 of the public survey. Responses from St. Michaels residents only.

12.4.2 REPETITIVE FLOOD ISSUES

Areas of concern within St. Michaels that experience repetitive flood issues include:

- Talbot Street (Route 33)* – Heavy Rains
- Church Street/Muskrat Park – Heavy Rains
- Mulberry Street & Mill Street – Tidal Flooding
- W. Harbor Road/E. Chew Avenue – Tidal Flooding

*Note: The Town of St. Michaels is very concerned with major storm flooding on Talbot Street (Route 33). In an emergency, Route 33 is the only route from St. Michaels and the Bay Hundred peninsula to Easton and Talbot County's Emergency Shelter at the Easton High School. St. Michaels fully supports Talbot County's request to the State Highway Administration on the urgency of raising Route 33 to address this flooding. The urgency of this request will continue to increase with the projected sea level rise and forecasts for more frequent, larger storms and flooding in the future.

12.4.3 AREAS OF HIGH FLOOD RISK AND VULNERABILITY

The Town of St. Michaels completed a *Stormwater and Harbor Infrastructure Assessment* in 2020. The resulting Climate Change/Sea Level Rise Commission (CC/SLRC) identified the following eight (8) areas as "at risk" around the Town:

1. E. Chew at end of the harbor.
2. W. Harbor Road along boat slips and boat ramps.
3. Mulberry Street, as it ends at the harbor.
4. Waterfront homes along Water Street.
5. Muskrat Park and Church Street.

6. Cherry Street and Honeymoon Bridge.
7. Mill Street and associated culvert.
8. Burns Street access to the Chesapeake Bay Maritime Museum (CBMM) and Crab Claw.

12.4.4 TOWN OF ST. MICHAELS MITIGATION & RESILIENCE PROJECTS

The Town of St. Michaels identified new and ongoing mitigation and resilience projects during the Plan development process.

- The stormwater system – the stormwater system is the town's most important infrastructure. The continued maintenance and operation of the distribution system, water towers and wells are a priority for the town.
- The Town of St. Michaels completed a Stormwater and Harbor Infrastructure Assessment in 2020. This assessment resulted in the creation of a Climate Change/Sea Level Rise Commission with the purpose of creating an action plan for the next 15 years. Mitigation action items outlined in that plan include:
    - Project A: Combine E. Chew and W. Harbor Road Projects (estimated design cost: $75,000)
    - Project B: Combine Cherry Street and Honeymoon Bridge, Mill Street Culvert, and Burns Street
        - Cherry Street and Honeymoon Bridge (estimated design cost: $33,000)
        - Mill Street and Creek/Culvert (estimated design cost: $72,000)
        - Burns Street Visioning Study (estimated design cost: $60,000)
    - Project C: Mulberry Street, Rain Garden Design (estimated design cost: $30,000)
    - Project D: St. Michaels Westside Harbor Residents, Berm and Cistern Design (estimated design cost: $28,000)
    - Project E: Muskrat Park, Raise Bulkhead and Berm and Cistern Design (estimated design cost: $28,000)
    - The goal is to have basic plans in place for all the above projects and strategies by the end of 2025 and have completed some of the initial mitigation projects by 2030.
- There is an ongoing State Highway Administration project that will bring all sidewalks and crosswalks along Talbot Street into ADA compliance. This project began in 2021 and will be a multi-year project.
- Increase Volunteer First Responder Membership – the need for new members is an increasing problem county-wide.
- The Town has performed a Needs Assessment and Deficiency Study for the Town Office and Police Department buildings. The Town will be working to bring these offices to a level that will be sustainable and help provide for Town resilience, using green technology, meeting the standards for ADA compliance, incorporating up to date IT technology, and providing appropriate public safety standards for the buildings.
- St. Michaels hired a consultant who has completed an initial study of parking, Police Station relocation, and new Town Office/relocation related to flooding, sea level rise, and the deficiencies outlined above. St Michaels is proceeding with the planning for the potential relocation of the Town Office and the Police Station.
- The Town is very interested in partnering and working with Talbot County in relation to stormwater upgrades/maintenance and emergency response.

12.4.5 TOWN OF ST. MICHAELS CAPABILITIES

The Town of St. Michaels completed a municipal questionnaire to determine current capabilities and ongoing mitigation projects. Results of the questionnaire indicate the following hazard mitigation and resilience capabilities:

Planning and Regulatory

- ✓ The Town's Comprehensive Plan contains *Chapter 14: Climate Resilience*. The Comprehensive Plan was adopted in 2015 and will receive in update within the next 2-3 years.
- ✓ The Town of St. Michaels partners with the Talbot County Emergency Operations Team and the Town Manager as well as the Police Chief to attend Emergency Operations meetings.
- ✓ In terms of Continuity of Operations, the Town coordinates with Talbot County during a natural hazard event.
- ✓ St. Michaels utilizes the International Building Code (IBC), 2021 edition.
- ✓ St. Michaels has land use authority and may issue building permits.
- ✓ The Town adopted a floodplain ordinance in 2013; it was amended in its entirety in 2016.
- ✓ St. Michaels has numerous open space parks throughout the Town. Three parks are waterfront: Hollis Park, Backcreek Park, and Muskrat Part. The Town also has a nature trail.
- ✓ The Town notifies the community of certain issues via "Constant Contact", an email service.

Administrative and Technical

The Town of St. Michaels has the following departmental and staff resources available.

Table 12-3. Town of St. Michaels Departments and Staff Resources

Land Use Authority	Land Use/Development Planning		Public Works & Engineering		Emergency Services (e.g., 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
Yes	Yes	3	Yes	6	Yes	9	Yes	1	No	0	Yes	1	Yes	5

Financial

- ✓ The Town's Climate Change/Sea Level Rise Committee has proposed to the Town Commissioners several mitigation projects to address the high-risk areas identified within the Harbor and Stormwater Infrastructure Study (see section 13.4.3, pages 13-16 & 13-17).
- ✓ St. Michaels has utilized Community Development Block Grant in the past, most recently in 2019 for a roof replacement at the Community Center.

Education and Outreach

- ✓ The Town of St. Michaels works with the Eastern Shore Land Conservancy (ESLC).
- ✓ Ongoing public education and outreach programs include "Coffee with a Cop" and "St. Michaels Youth & Law Enforcement" (SMYLE).

Municipal Synopsis - Town of St. Michaels (Area 1)

- 2022 Critical and Public Facilities
- CF and PF within the 1-Percent Zone
- Building Footprints
- 1-Percent Annual Chance Flood Zone
- 0.2-Percent Annual Chance Flood Zone
- Centerlines
- Municipalities
- Talbot County

Town of St. Michael's Municipal Perspective:

Hazard Vulnerability:
- Flood (Tidal)
- Coastal Hazards
- Heavy Rain Event Flooding

Areas of Concern:
- Church Street - impacted by heavy rain events
- Mulberry & Mill Street - impacted by tidal flooding
- Town Hall - bulkheads breaching
- Cherry Street - Victoriana Inn impactedby flooding

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

There are 5 critical and public facilities within the FEMA SFHA in this area of St. Michaels:
- Chesapeake Bay Maritime (multiple facilities)
- Higgins Yacht Yard

See Chapter 5: Flood for a full listing.

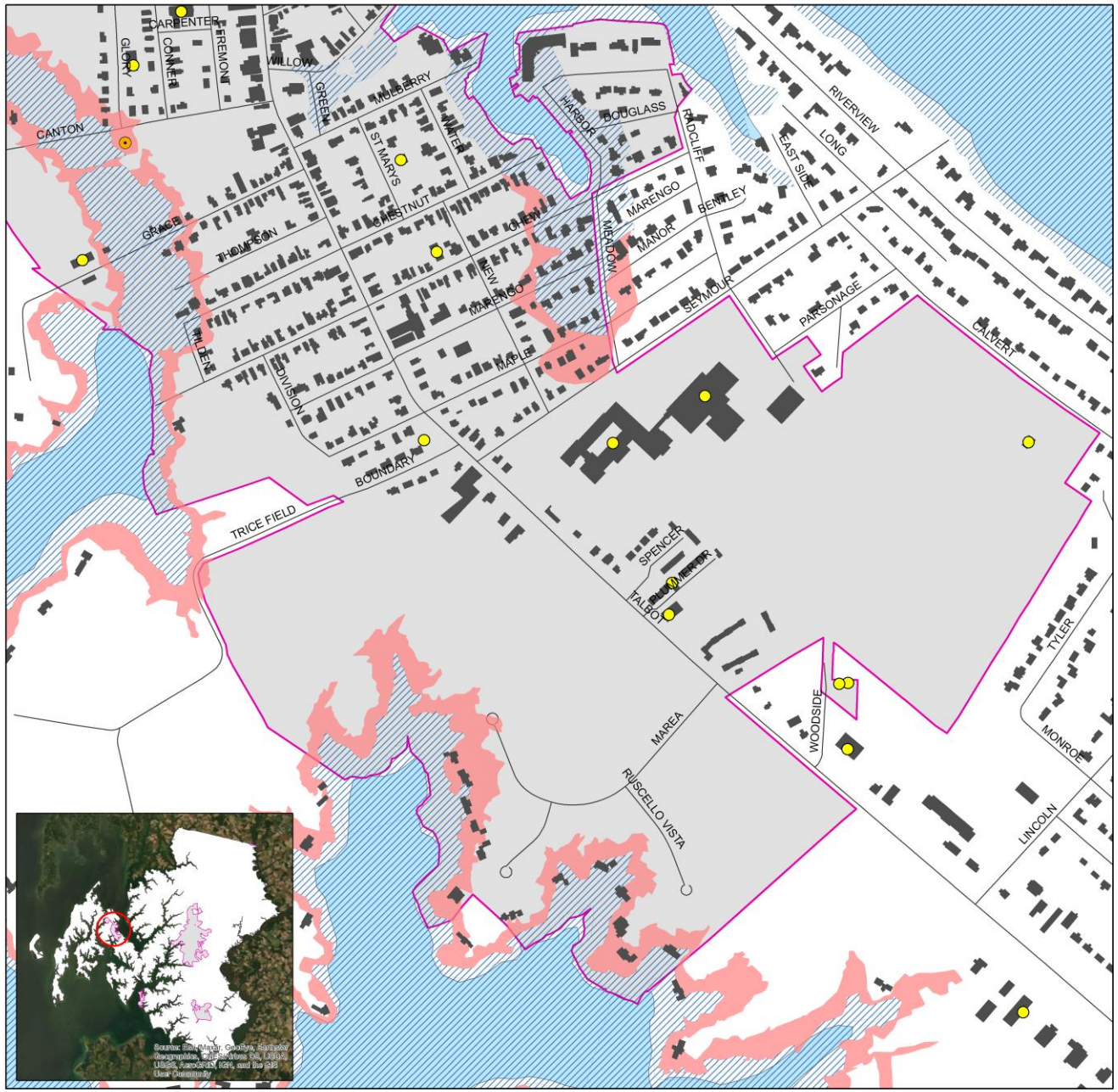
Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.

N

0 0.05 0.1 0.2 Miles

SP&D
Smith Planning and Design

Municipal Synopsis - Town of St. Michaels (Area 2)



2022 Critical and Public Facilities

CF and PF within the 0.2-Percent Zone

Building Footprints

1-Percent Annual Chance Flood Zone

0.2-Percent Annual Chance Flood Zone

Centerlines

Municipalities

Talbot County

Town of St. Michael's Municipal Perspective:

Hazard Vulnerability:
- Flood (Tidal)
- Coastal Hazards
- Heavy Rain Event Flooding

Areas of Concern:
- Church Street - impacted by heavy rain events
- Mulberry & Mill Street - impacted by tidal flooding
- Town Hall - bulkheads breaching
- Cherry Street - Victoriana Inn impactedby flooding

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

There is one (1) critical and public facility within the FEMA SFHA in this area of St. Michaels:
- Delmarva Power and Light on Meeting House Road.

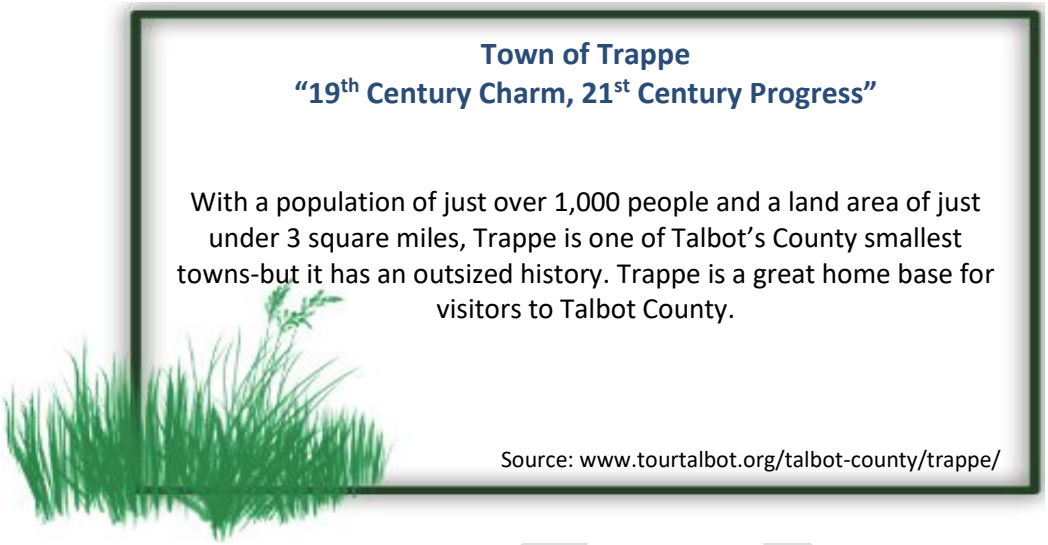
Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.

N

0 0.05 0.1 0.2 Miles

SP&D
Smith Planning and Design

12.5 TOWN OF TRAPPE SYNOPSIS & PERSPECTIVE



12.5.1 HAZARDS

Natural hazards identified within this plan that impact or have the potential to impact the Town of Trappe include: Coastal Hazards, Flood, Winter Storm, Tornado, High Wind, Thunderstorm, Drought, Extreme Heat, and Emerging Infectious Diseases. The highest risk hazards are flash floods, winter storm, high wind, and thunderstorms.

Public Perspective

Public survey results from respondents that indicated they live in Trappe show levels of concern for natural hazards. Citizens of Trappe are most concerned with drought (7 responses), followed by emerging infectious diseases (7 responses), and high wind (5 responses). Residents of Trappe feel that drought, extreme heat, high wind, and thunderstorm particularly impact their community. According to the survey, citizens are least concerned with thunderstorm, coastal hazards, winter storm, and flood.

In terms of social vulnerability, responses from the survey indicate that residents perceive the following groups to be particularly at risk from the impacts of drought, emerging infectious diseases, and high wind: (1) medical issues/disability, (2) socioeconomic status, and (3) age.

Q3 Please indicate your level of concern for each hazard using the drop down menu.

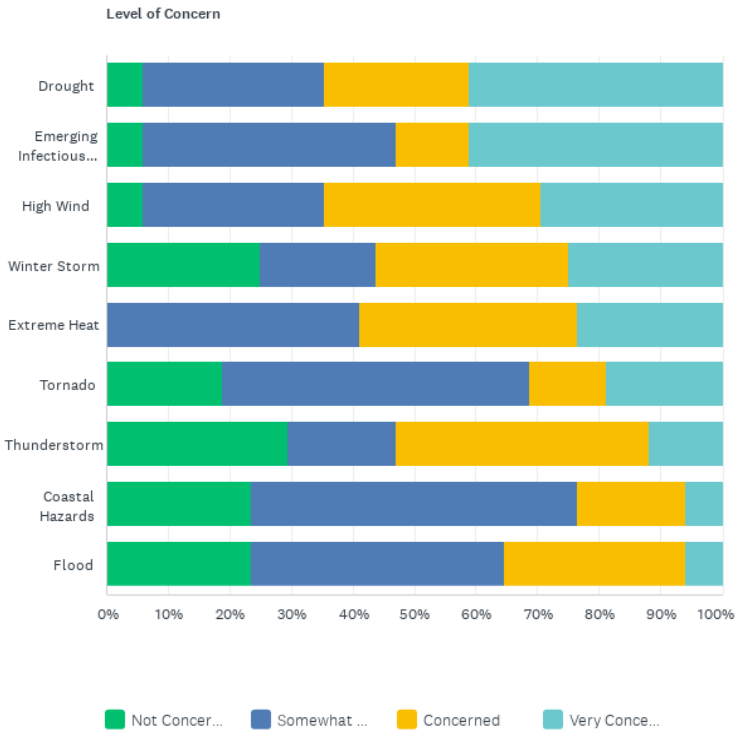


Figure 13-5: Results from Question 3 of the public survey. Responses from Trappe residents only.

12.5.2 REPETITIVE FLOOD ISSUES

Areas that experience repetitive flood issues impacting the Town of Trappe include:

- Route 50 at Barber Road-Undersized Culvert.
- Route 50 at Maple Avenue-dip in the road that occurred during the construction of the High's Gas Station.
- Five-point intersection (Greenfield & Main) at the Trappe Post Office – there is a low point with poor drainage.

12.5.3 TOWN OF TRAPPE MITIGATION & RESILIENCE PROJECTS

The Town of Trappe identified three (3) ongoing projects during the Plan development process.

1. Sidewalk Completion on MD 565 (old Trappe Road) – MD 565 leads into town, particularly to White Marsh Elementary School and the Post Office. The existing portions of sidewalk were installed intermittently. Installation of a new sidewalk and the maintenance of the existing portions of sidewalk is difficult due to the road being maintained by the town, county, and state.
    a. This is a safety issue and there have been various accidents along this stretch of road involving pedestrians being struck by vehicles. MD 565 is an evacuation route for White Marsh Elementary.
2. Installation of Town wells – Trappe currently operates two wells, which supply water for the existing population. These wells are at capacity and will not be adequate to accommodate additional development. In addition, both wells are old. A backup town well is currently being installed; however, there are limited options for any future wells due to lack of town-owned property.

12.5.4 TOWN OF TRAPPE CAPABILITIES

The Town of Trappe completed a municipal questionnaire to determine current capabilities and ongoing mitigation projects. Results of the questionnaire indicate the following hazard mitigation and resilience capabilities:

Planning and Regulatory

- ✓ The Town of Trappe's Comprehensive Plan was updated in 2020.
- ✓ The Town utilizes the International Building Code (IBC), 2021 edition.
- ✓ Trappe has land use authority and can issue building permits.
- ✓ The Town has acquired land for open space and public recreation.

Administrative and Technical

The Town of Trappe has the following departmental and staff resources available.

Table 12-4. Town of Trappe Departments and Staff Resources

Land Use Authority	Land Use/Development Planning		Public Works & Engineering		Emergency Services (e.g., 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
Yes	Yes	3	Yes	2	No	0	No	0	No	0	Yes	1	Yes	5

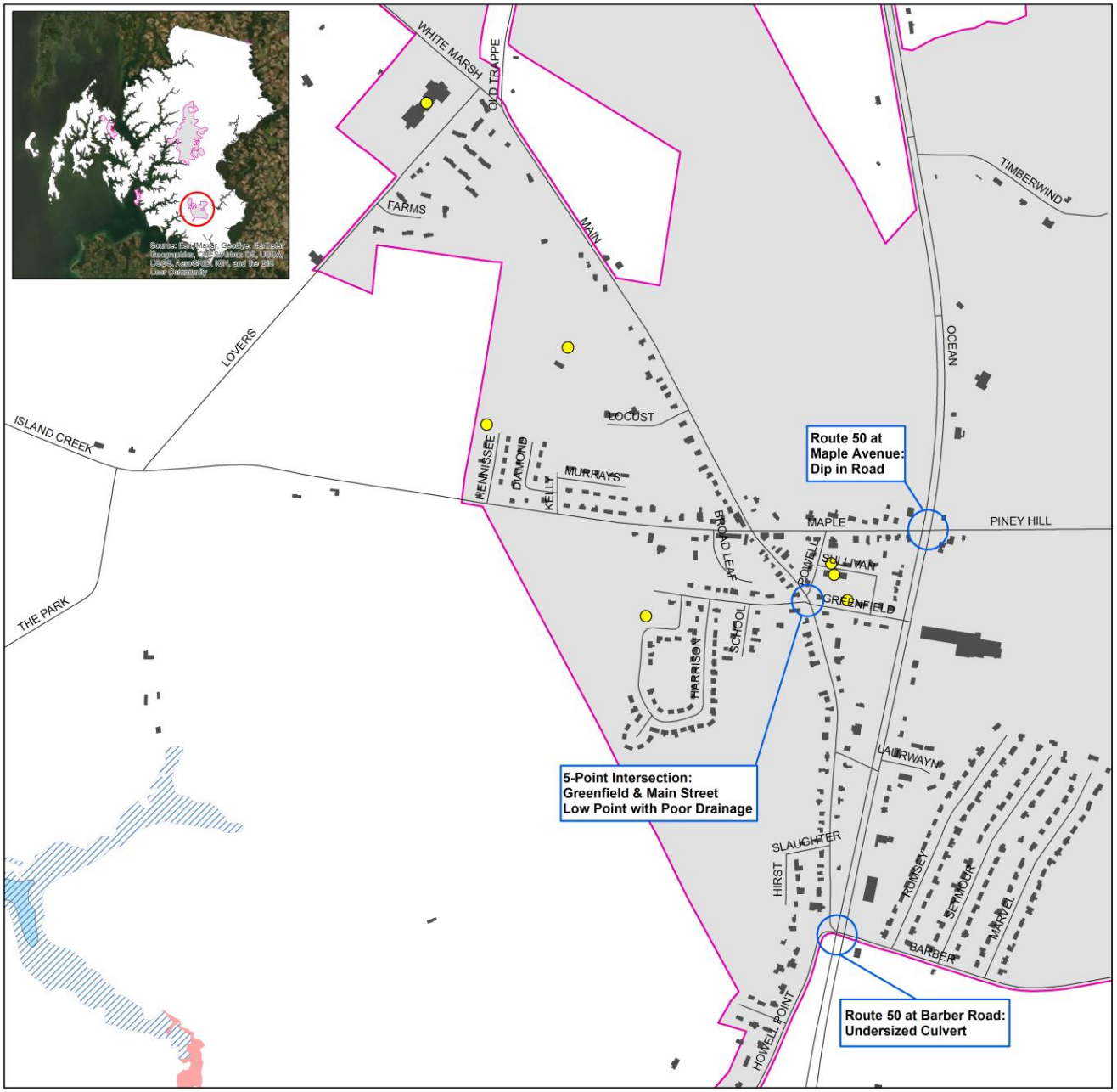
Financial

- ✓ The Town of Trappe does not plan to expend funding, including grant funding, on hazard mitigation and resilience projects within the next 5 years.
- ✓ Trappe is interested in utilizing Community Development Block Grant funding should the need arise; they have not utilized this funding within the last 5-year period.

Education and Outreach

- ✓ Trappe sends out information regarding responsible water use and other information is shared via social media channels (e.g., Facebook) for public education purposes.

Municipal Synopsis - Town of Trappe



2022 Critical and Public Facilities

Building Footprints

1-Percent Annual Chance Flood Zone

0.2-Percent Annual Chance Flood Zone

Centerlines

Municipalities

Talbot County

Town of Trappe's Municipal Perspective:

Hazard Vulnerability:
- Flash Flood
- Thunderstorm
- Winter Storm
- High Wind

Areas of Concern:
- Route 50 at Barber Road - undersized culvert
- Route 50 at Maple Avenue - dip in road created during construction of High's Gas Station.
- Five-point Intersection (Greenfield & Main) at Trappe Post Office - low point with poor drainage.

Critical and Public Facilities in FEMA Special Flood Hazard Areas:

There are no critical and public facilities within the FEMA SFHA in the Town of Trappe.

Data Sources: FEMA Special Flood Hazard Area, Talbot County Department of Public Works, Talbot County Critical and Public Facilities Database.

N

0 0.1 0.2 0.4 Miles

SP&D
Smith Planning and Design

Chapter 13:
Plan Implementation & Monitoring

PLAN UPDATE

- Page 1 – Updated the text in Section 13.1 to reflect the current mitigation action items that were developed during this plan update process.
- Page 1 – Modified text in Section 13.2 to update the present Hazard Mitigation Planning Committee (HMPC).
- Page 2 – The Funding Sources Table provided in Section 13.4 has been updated to reflect program changes since 2017.
- Page 8 – Table 13-2. Mitigation Action Items Implementation Matrix has been updated to reflect the projects developed during the 2022 Plan Update. In total, 30 mitigation action item projects were developed; 12 of these deemed high priority.

CHAPTER 13: PLAN IMPLEMENTATION & MONITORING

13.1 BRINGING THE PLAN TO LIFE

This Plan document is Talbot County's road map for evaluating hazards, identifying resources and capabilities, selecting appropriate actions, and developing and implementing mitigation and resilience measures to eliminate or reduce future impacts from those hazards to protect the health, safety, and welfare of the residents in the community. Implementation of the plan is a critical component of strengthening the resilience of Talbot County.

The implementation of the plan includes the completion of the thirty (30) mitigation and resilience actions that were identified by the Hazard Mitigation Planning Committee's (HMPC) and stakeholders throughout the plan update process and during the mitigation action item workshop geld on November 19, 2021 (refer to *Section 11.2.2 Mitigation Action Item Workshop* for further details). An extensive listing of potential funding sources available to assist in the implementation of the identified mitigation and resilience actions has been included at the end of this chapter for reference.

13.2 MONITORING, EVALUATING, AND UPDATING THE PLAN

Monitoring, evaluating, and updating the Plan are critical to maintaining its relevance. Effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section identifies who will be responsible for monitoring, evaluating, and updating the Plan, and what those responsibilities entail. This section also lays out the method and schedule of these and describes how the public will be involved on a continuing basis.

Talbot County's Department of Emergency Services will be the permanent entity responsible for maintaining the Plan and for monitoring, evaluating, and updating it. The HMPC identified the need to continue to meet annually, therefore a mitigation project action item was discussed and included in *Chapter 11* (refer to Project #25, ranked high). This committee will continue to meet annually, at a minimum. The County's Department of Emergency Services will lead the meeting in conjunction with the County's Director of Emergency Services.

The HMPC will oversee the progress made on the implementation of the identified mitigation and resilience actions and update the Plan, as needed, to reflect changing conditions. The HMPC will therefore serve as the focal point for coordinating countywide mitigation and resilience efforts. The HMPC will serve in an advisory capacity to the Talbot County Department of Emergency Services.

The HMPC will monitor the mitigation activities by reviewing reports from the agencies identified for implementation of the different mitigation actions and the County Capital Improvement Planning process for partnering opportunities. During the 2022 Plan Update process, various new infrastructure projects were identified. These identified infrastructure projects provide opportunities for Talbot County and the State to incorporate green and gray flood mitigation strategies into the scope of work for maintenance and repair projects.

To facilitate and capture the review and status of the mitigation and resilience implementation actions, an Implementation Matrix has been developed (page 13-9). This matrix should be viewed in a large format and printed on ledger paper, 11X17. HMPC members will be able to view the identified actions,

along with the associated hazards, responsible agency, completion timeframe, costs (if known), and designated high priority actions. In addition, the matrix includes a yearly status completion box to be populated, as appropriate, during the annual review process.

The Department of Emergency Services will distribute an annual report to the HMPC. HMPC members will have an opportunity to provide their feedback prior to widespread distribution. Copies of these status reports will be made available to the public on the County's website under the Department of Emergency Services.

Evaluation of the plan should include not only be checking on whether mitigation and resilience actions have been implemented, but also assessing their degree of effectiveness. This would be done through a review of the qualitative and quantitative benefits (or avoided losses) of the mitigation activities. These would then be compared to the goals and objectives that this Plan was intended to achieve. The HMPC will also need to evaluate mitigation projects to see if they need to be modified or discontinued considering new developments during their annual meetings.

The Plan will be updated every five years, as required by the Disaster Mitigation Act of 2000, or following a disaster. The Department of Emergency Services will oversee and facilitate the update of the Plan. The updated Plan will account for any new developments in the County or special circumstances (post-disaster). Issues that come up during monitoring and evaluation, which require changes in mitigation strategies and projects should be incorporated in the Plan at this stage.

13.3 PUBLIC INVOLVEMENT

The Department of Emergency Services in cooperation with the HMPC will involve the public during the evaluation and update of the Plan through annual public education activities, public workshops, and public hearings. The County's website will serve as a means of communication by providing information about mitigation and resilience initiatives.

13.4 FUNDING SOURCES

The following is a list of Federal and State Grants that may assist in implementing local All Hazard Mitigation Plans.

This information is subject to change at any time, contact the federal or state agency for current grant status.

Table 13-1. Funding Sources

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Federal Emergency Management Agency, Hazard Mitigation Grant Program (HMGP)	Maryland Department of Emergency Management 5401 Rue Saint Lo Drive Reisterstown, MD 21136	All Hazards Mitigation Planning. Acquisition, relocation, elevation and flood-proofing of flood-prone insured properties, flood mitigation planning, wind retrofit, stormwater	Federal - 75% Non-Federal - 25%	Local government must follow the National Flood Insurance Program to be eligible. Projects must be cost effective, environmentally sound and solve a problem. Repetitive loss properties are a high priority.	After a Presidential Disaster Declaration

Table 13-1. Funding Sources

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
		improvements, education and awareness.			
Federal Emergency Management Agency, Building Resilient Infrastructure and Communities (BRIC)	Maryland Department of Emergency Management 5401 Rue Saint Lo Drive Reisterstown, MD 21136	Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.	Federal - 75% Non-Federal - 25%	PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.	Annual-Spring/Summer
Federal Emergency Management Agency, Flood Mitigation Assistance Program (FMA)	Maryland Department of Emergency Management 5401 Rue Saint Lo Drive Reisterstown, MD 21136	Assist States and communities to implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program.	RL: Federal - 90% Non-Federal - 10% SRL: Federal - 100% Non-Federal - 0%	Available once a Flood Mitigation Plan has been developed and approved by FEMA.	Annual-Spring/Summer
National Flood Insurance Program (NFIP)	Maryland Department of Emergency Management 5401 Rue Saint Lo Drive Reisterstown, MD 21136	Provides financial protection by enabling persons to purchase insurance against floods, mudslide or flood related erosion.	Varies	Includes Federally backed insurance against flooding, available to individuals and businesses that participate in the NFIP	Anytime
Increased Cost of Compliance	Maryland Department of Emergency Management 5401 Rue Saint Lo Drive Reisterstown, MD 21136	ICC coverage provides payment to help cover the cost of mitigation activities that will reduce the risk of future flood damage to a building. If a Flood Insurance Policy Holder suffers a flood loss and is declared to be substantially or repetitively damaged, ICC will pay up to 30,000 to bring the building into compliance with State or community floodplain management laws or ordinances. Usually this means elevating or relocating the building so that it is above the base flood elevation (BFE).	Varies	Once the local jurisdiction determines the building is substantially or repetitively damaged, the policy holder can contact insurance agent to file an ICC claim.	Anytime
U.S. Economic Development Administration, Economic Adjustment Program	U.S. Department of Commerce Economic Development Administration Curtis Center, 601 Walnut Street, Ste 140 South Philadelphia, PA 19106-3323 215-597-4603	Improvements and reconstruction of public facilities after a disaster or industry closing. Research studies designed to facilitate economic development.	Federal - 50%-70% Local- 30%-50%	Documenting economic distress, job impact and proposing a project that is consistent with a Comprehensive Economic Development Strategy are important funding selection criteria.	Anytime
U.S Economic Development Administration, Public Works and Development Facilities	U.S. Department of Commerce Economic Development Administration Curtis Center, 601 Walnut Street, Ste 140 South Philadelphia, PA 19106-3323 215-597-4603	Water and sewer, Industrial access roads, rail spurs, port improvements technological and related infrastructure	Federal - 50%-70% Local- 30%-50%	Documenting economic distress, job impact and projects that is consistency with a Comprehensive Economic Development Strategy are important funding selection criteria.	Quarterly Basis
Small Business Administration (SBA) Pre-disaster Mitigation Loan Program	James Rivera, Office of Disaster Assistance, Small Business Administration, 409 3rd Street, SW, STE 6050	Activities done for the purpose of protecting real and personal property against disaster related damage.	No information	The mitigation measures must protect property or contents from damage that may be caused by future disasters and must conform to the priorities and	

Table 13-1. Funding Sources

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
	Washington, DC 20416 202-205-6734			goals of the state or local government's mitigation plan.	
Community Development Block Grants / States Program	U.S Department of Housing and Urban Development, Office of Block Grant Assistance, 451 7th Street SW., Washington, DC 20410-7000 202- 708-1112	Used for long-term recovery needs, such as: rehabilitation residential and commercial building; homeownership assistance, including down-payment assistance and interest rate subsidies; building new replacement housing; code enforcement; acquiring, construction, or reconstructing public facilities.	No information	Citizen participation procedures must be followed. At least 70 percent of funds must be used for activities that principally benefit persons of low and moderate income. Formula grants to States for non-entitlement communities.	After a Presidential Disaster Declaration
Fire Suppression Assistance Program	Infrastructure Division, Response and Recovery Directorate, FEMA, 500 C Street SW., Washington DC 20024 202-646-2500	Provides real-time assistance for the suppression of any fire on public (non- Federal) or privately owned forest or grassland that threatens to become a major disaster.	Federal - 70% Local - 30%	The State must first meet annual floor cost (if percent of average fiscal year fire costs) on a single declared fire. After the State's out-of- pocket expenses exceed twice the average fiscal year costs, funds are made available for 100 percent of all costs for each declared fire.	Funds from President's Disaster Relief Fund for use in a designated emergency or major disaster area.
Historic Preservation: Repair and Restoration of Disaster- Damaged Historic Properties	Infrastructure Division, Response and Recovery Directorate, FEMA, 500 C Street SW., Washington DC 20024 202-646-4621	To evaluate the effects of repairs to, restoration of, or mitigation hazards to disaster-damaged historic structures working in concert with the requirements of the Stafford Act.	Federal - 75% Local - 25%	Eligible to State and local governments, and any political subdivision of a State. Also, eligible are private non-profit organizations that operate educational, utility, emergency, or medical facilities.	After a Presidential Disaster Declaration
Transportation: Emergency Relief Program	Federal Transit Authority, FHWA, DOT, 1200 New Jersey Avenue Washington, DC 20590 202-366-4043	Provides aid for the repair of Federal-aid roads and roads on Federal lands.	Federal - 100%	Application is submitted by the State department of transportation for damages to Federal-aid highway routes, and by the applicable Federal agency for damages to roads on Federal lands.	After serious damage to Federal-aid roads or roads on Federal lands caused by a natural disaster or by catastrophic failure.
Animals: Emergency Haying and Grazing	Emergency and Non-insured Assistance Programs, FSA, USDA, 1400 Independence Ave, SW, Washington, DC 20013 202-720-4053	To help livestock producers in approved counties when the growth and yield of hay and pasture have been substantially reduced because of a widespread natural disaster.	No information	Assistance is provided by the Secretary of Agriculture to harvest hay or graze cropland, or other commercial use of forage devoted to the Conservation Reserve Program (CRP0 in response to a drought or other similar emergency.	Anytime
Emergency Watershed Protection Program	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	Implementing emergency recovery measures for runoff retardation and erosion prevention to relieve imminent hazards to life and property created by a natural disaster that causes a sudden impairment of a watershed.	Federal - 75% Local - 25%	It cannot fund operation and maintenance work or repair private or public transportation facilities or utilities. The work cannot adversely affect downstream water rights and funds cannot be used to install measures not essential to the reduction of hazards.	TBD
Watershed Protection and Flood Prevention Program	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	To provide technical and financial assistance in carrying out works of improvement to protect, develop, and utilize the land and water resources in watersheds.	Varies due to project type.	Watershed area must not exceed 250,000 acres. Capacity of a single structure is limited to 25,000 acre-feet of total capacity and 12,500 acre- feet of floodwater detention capacity.	TBD

Table 13-1. Funding Sources

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Watershed Surveys and Planning	Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	To provide planning assistance to Federal, State, and local agencies for the development of coordinated water and related programs in watersheds and river basins. Emphasis is on flood damage reduction, erosion control, water conservation, preservation of wetlands and water quality improvements.	No information	These watershed plans form the basis for installing needed works of improvement and include estimated benefits and costs, cost- sharing, operation and maintenance arrangements, and other information necessary to justify the need for Federal assistance in carrying out the plan.	Anytime
Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314 202-761-0011	To perform activities prior to flooding or flood fight that would assist in protecting against loss of life and damages to property due to flooding.	No information	There must be an immediate threat of unusual flooding present before advance measures can be considered. Any work performed under this program will be temporary in nature and must have a favorable benefit cost ratio.	Governor of State must request assistance
Emergency Streambank and Shoreline Protection	USACE 441 G Street, NW, Washington DC 20314 202-761-0011	Authorizes the construction of emergency streambank protection measures to prevent damage to highways, bridge approaches, municipal water supply systems, sewage disposal plants, and other essential public works facilities endangered by floods or storms due to bank erosion.	No information	Churches, hospitals, schools, and other non- profit service facilities may also be protected under this program. This authority does not apply to privately-owned property or structures.	TBD
Small Flood Control Projects	USACE 441 G Street, NW, Washington DC 20314 202-761-0011	Authorizes the construction of small flood control projects that have not already been specifically authorized by Congress.	No information	There are two general categories of projects: structural and nonstructural. Structural projects may include levees, floodwalls, diversion channels, pumping plants, and bridge modifications. Nonstructural projects have little or no effect on water surface elevations, and may include flood proofing, the relocation of structures, and flood warning systems.	TBD
Flood: Emergency Advance Measures for Flood Prevention	USACE 441 G Street, NW, Washington DC 20314 202-761-0011	To mitigate, before an event, the potential loss of life and damages to property due to floods.	No information	Assistance may consist of temporary levees, channel cleaning, preparation for abnormal snowpacks, etc.	Governor of State must request assistance
Continuing Authorities Program (CAP)	USACE 441 G Street, NW, Washington DC 20314 202-761-0011	Initiates a short reconnaissance effort to determine Federal interest in proceeding. If there is interest, a feasibility study is performed.	Federal - 65% Local - 35%	A local sponsor must identify the problem and request assistance. Small flood control projects are also available.	Anytime
Hazardous Materials: State Access to the Oil Spill Liability Trust Fund	Director, USCG National Pollution Funds Center, U.S. Coast Guard Stop 7605. 2703 Martin Luther King Jr. Avenue, SE Washington, DC 20593-7605 202-795-6000	To encourage greater State participation in response to actual or threatened discharges of oil.	No information	Eligible to States and U.S. Trust Territories and possessions.	Anytime

Table 13-1. Funding Sources

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
Emergency Management Assistance (EMA)	Maryland Emergency Management Agency 5401 Rue Saint Lo Drive Reisterstown, MD 21136	Funds may be used for salaries, travel expenses, and other administrative cost essential to the day-to-day operations of State and Local emergency management agencies. Program also includes management processes that ensure coordinated planning, accountability for progress, and trained qualified staffing.	Federal - 50%	EMA funded activities may include specific mitigation management efforts not otherwise eligible for Federal funding. Management Assistance program funds may not be used for construction, repairs, equipment, materials or physical operations required for damage mitigation projects for public or private buildings, roads, bridges, or other facilities.	Anytime
Maryland Program Open Space	Department of Natural Resources 580 Taylor Ave. Annapolis, MD 21401 410-260-8445	Local provides financial and technical assistance to local subdivisions for the planning, acquisition, and/or development of recreation land or open space areas.	A local governing body may use up to $25,000 annually from its 100% (Acquisition) money to fund planning projects that update the Local Land Preservation and Recreation Plans.	Acquires outdoor recreation and open space areas for public use Administers funds made available to local communities for open and recreational space by the Outdoor Recreation Land Loan of 1969 and from the Land and Water Conservation Fund of the National Park Service, U.S. Department of the Interior.	July 1st
Maryland Recreational Trails Program	Maryland Scenic Byways/Recreational Trails Program* Office of Planning & Preliminary Engineering State Highway Administration 707 N Calvert Street Baltimore, MD 21201 (p) 410.545.8637 (f) 410.209-5012 tmaxwell@sha.state.md.us	Maintenance and restoration of existing recreational trail; Development and rehabilitation of trailside facilities and trail linkages; Purchase and lease of trail construction equipment; Construction of new trails; Acquisition of easements or property for recreational trails or recreational trail corridors; and Implementation of interpretive/educational programs to promote intrinsic qualities, safety, and environmental protection, as those objectives relate to the use of recreational trails.	Administered by the State Highway Administration (SHA), this program matches federal funds with local funds or in-kind contributions to implement trail projects. Projects can be sponsored by a county or municipal government, a private non-profit agency, a community group or an individual (non-governmental agencies must secure an appropriate government agency as a co-sponsor). Federal funds administered by the State Highway Administration are available for up to 80% of the project cost, matched by at least 20% funding from the project sponsor. Matching funds must be committed and documented in the local jurisdiction's budget. A Memorandum of Understanding outlining funding and project implementation responsibilities will be prepared by SHA and signed by all parties before the project funds are released.	Projects must meet state and federal environmental regulatory requirements (NEPA, MEPA, Section 106, Section 4(f)). SHA will aid the project sponsor to acquire these approvals.	July 1st
CoastSmart Communities Grant Program	Maryland Department of Natural Resources Chesapeake and Coastal Service (p) 410.260.8718 (f) 410.260.8739 sasha.land@maryland.gov	Municipalities and counties in the coastal zone are eligible to apply for and receive funds: Anne Arundel, Baltimore, Calvert, Caroline, Cecil, Charles, Dorchester, Harford, Kent, Prince George's, Queen Anne's, St. Mary's, Somerset, Talbot, Wicomico, and	Up to $75,000 annually	Track A can fund flood vulnerability and risk assessments, updates to planning documents (e.g. hazard mitigation plans, zoning ordinances, building codes, floodplain ordinances, comprehensive plans), education and outreach campaigns and materials, applications to FEMA's	TBD

Table 13-1. Funding Sources

Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
		Worcester counties and Baltimore City. Funding for a one- year project that contributes to understanding, planning for, or implementing planning and outreach measures to address coastal hazard issues.		Community Rating System in concert with other task outcomes, support for adopting an updated plan and integrating the plan into day-to-day existing planning processes that reduce overall flood risk due to tidal events or stormwater and rain events.	
Green Infrastructure Resiliency Grant Program	Maryland Department of Natural Resources Chesapeake and Coastal Service (p) 410.260.8799 (f) 410.260.8739 (e) megan.granato@maryland.gov	Municipalities and counties within the Maryland portion of the Chesapeake Bay watershed are eligible to apply for and receive funds. Please note that projects proposed in Cecil, Garrett and Worcester counties must be located within the portions of those counties that are within the watershed to be eligible. Funding for one year for Phase 1 and Phase 2 projects and up to 2 years for Phase 3 projects that will assess stormwater management needs associated with localized flooding and design or construct targeted green infrastructure practices to address those needs.	Up to $100,000 per project	Track B can fund watershed assessments that focus on determining local flood risks and how green infrastructure can be used to address those risks, site or watershed-level green infrastructure implementation plans, and green infrastructure project designs. This track can also fund construction of green infrastructure projects. To apply for construction funding, all applicable permit preapplication meetings must be complete.	TBD
Maryland Community Parks and Playgrounds Program	Department of Natural Resources 580 Taylor Ave. Annapolis, MD 21401 410-260-8445	1. Development of new parks 2. Rehabilitation of existing parks 3. Expansion or improvement of existing parks 4. Purchase and installation of playground equipment 5. Development of environmentally oriented parks and recreation projects 6. Development of new trails or extension of existing trails 7. Creation of access points to water recreation resources 8. Acquisition of land to create new parks.	The source of funds for this program is primarily State General Obligation Bonds, which may be authorized on an annual basis. The Community Parks and Playgrounds Program provides funding to incorporated municipalities and Baltimore City. Grants may be for up to 100% of the project cost and are selected on a competitive basis. Each applicant will be limited to one (1) Grant Proposal List submission package, which may contain several prioritized projects, per award cycle.	The Department of Natural Resources works to provide opportunities for Marylanders, especially our children, to experience nature. The DNR has developed a web site www.dnr.state.md.us/cin/NPS/index.asp that provides information about Nature Play Spaces. Nature Play Spaces are one of the many types of public recreation projects eligible for consideration for Community Parks and Playgrounds grant funding. While land acquisition costs may be considered for project funding, the highest priority will be placed on capital costs associated with park development and improvement.	TBD

Table 13-2. MITIGATION ACTION ITEMS IMPLEMENTATION MATRIX

Project #	Project Title	Hazard									Responsible Agency	Implementation Timeframe				Cost (if known)	Designated High Priority	Project Completion Yearly Review (Yes/No)				
		Coastal	Flood	Winter	Tornado	High Wind	Thunderstorm	Drought	Extreme Heat	Emerging Infectious Diseases		Ongoing	1-3 years	4-7 years	7-10 years			Year 1	Year 2	Year 3	Year 4	Year 5
1	Maintain Current FEMA CRS Rating		X								Planning and Zoning, Emergency Services, Municipal Governments	X				Staff-time	X					
2	Drainage Corridor Assessments to Determine Status of Gray Infrastructure		X								Applicable Public Works and Planning Departments	X	X			$35-50K +/- $250,000 (project dependent)						
3	Public Outreach to Increase Support for Barrier Islands	X									County, Municipalities	X			X	~96K/per acre of restored habitat (project dependent)						
4	Update the County's Cold Weather Plan			X							Department of Emergency Services		X			Staff-time	X					
5	Winter Weather Education via Media			X							Department of Emergency Services	X				Staff-time	X					
6	Tornado Risk Public Outreach				X						Department of Emergency Services	X				Staff-time						
7	Promote the Construction of Tornado and High-Wind Save Structures				X	X					Project site dependent. Department of Emergency Services responsible for outreach and education.	X				$3,000 minimum for a safe-room.						
8	Protect Infrastructure from High Wind & Thunderstorm Risks					X	X				Infrastructure owners and Talbot County Permits and Inspections.	X				Project dependent/Staff-time						
9	Debris Management Plan Maintenance					X	X				Department of Emergency Services, Department of Public Works, Roads Department.		X			Staff-time	X					
10	Promoting Water Saving Practices Across Talbot County							X	X		Facility/Department dependent.	X				Nominal, based on outreach practices.						
11	Community Greening Inventory							X	X		Community-driven.	X				Project dependent						
12	Emerging Infectious Diseases Community Preparedness Outreach									X	Talbot County Health Department	X				Staff-time						
13	COVID-19 After Action Report									X	Talbot County Health Department, Department of Emergency Services		X			Variable, dependent on robustness of plan.	X					
14	Flood Mitigation Non-Substantial Improvements for Businesses	X	X								Business Owners, Talbot County Department of Planning and Zoning		X			Project dependent.	X					
15	Disaster Recovery Planning for Economic Development	X	X	X	X	X	X	X	X	X	Business Owners, County and Municipal Economic Development Offices, Chamber of Commerce, Emergency Management		X			Dependent upon recovery plan.	X					
16	County Schools Flood Evacuation Destinations	X	X								Talbot County Public Schools, Talbot County Department of Emergency Services		X			Staff-time						
17	Environmental Education and Resiliency Opportunity	X	X								Talbot County Public Schools	X				Staff-time/project dependent.						
18	Design Resilience into Capital Investments	X	X	X	X	X	X	X	X		Talbot County Department of Public Works		X			Staff-time						
19	Flood Prevention & Stormwater Management Best Practices	X	X								Talbot County Department of Public Works	X				Staff-time/project dependent.	X					
20	Mass Communication Strategy	X	X	X	X	X	X	X	X	X	Department of Emergency Services	X				Staff-time	X					
21	Upgrades to Communication Infrastructure					X	X				Department of Public Works		X			Project dependent						
22	Well Head Protection	X	X								Talbot County Health Department		X			$152.5K						
23	Update County Code for Well Head Elevation	X	X								Talbot County Department of Planning and Zoning		X			Staff-time	X					
24	Culvert Mitigation	X	X								Talbot County Department of Public Works, Talbot County Roads Department	X				$50,000 per project.	X					
25	Pillar and overall stakeholder groups to continue to meet annually	X	X	X	X	X	X	X	X	X	Talbot County Department of Emergency Services		X	X	X	Staff-time	X					
26	Power Generators at Essential Facilities	X	X	X							Talbot County Department of Emergency Services		X			Project Dependent						
27	Restore barrier islands to provide protection for Talbot County's shorelines from wave action.	X									Talbot County Department of Emergency Services, US Army Corps of Engineers, MD Department of Transportation Port Administration	X	X	X	X	Project Dependent						
28	Mitigate Flood Prone Properties	X	X								Department of Planning and Zoning		X			Property Dependent						
29	Sanitary Sewer Pump Station Relocation Project		X								Easton Utilities			X		$8.5 million						
30	Flood-proofing EU Head End Building Project		X								Easton Utilities			X		$1.5 million						

APPENDIX A:

Hazard Identification and Risk Assessment (HIRA) Method, Hazard Ranking Results, & Hazard Data Tables

HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

As part of the hazard mitigation plan update process for Talbot County, a Hazard Identification Risk Assessment (HIRA) has been completed. Results from the Hazard Risk Survey completed by Hazard Mitigation Planning Committee Members (HMPC) 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.

Nine (9) 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 (THIRA) will be conducted for the technological and man-made hazards (i.e., Complex Coordinated Terrorist Attack, Active Assailant, and Cyber Attack) that have been added for this plan update.

Natural Hazard Identification and Risk Assessment Ranking Results		
Hazards	**2017 Hazard Ranking**	**2022 Hazard Ranking**
Coastal Hazards	**High**	**High**
Thunderstorm	**Medium-High**	**Medium High**
Flood	**High**	**High**
High Wind	**Medium-High**	**Medium-High**
Tornado	**Medium**	**Low**
Extreme Heat	**Medium-High**	**High**
Drought	**Medium**	**Medium**
Winter Storm	**Medium-High**	**Medium-High**
Emerging Infectious Diseases	**N/A**	**High**

HAZARD IDENTIFICATION & RISK ASSESSMENT METHOD

To assess the hazard risk for the nine (9) 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), stakeholder survey, and other available data sources. These included:

- Historical impacts, in terms of human lives and property
- Geographic extent
- Historical occurrence
- Future probability
- Community perspective

The following eight (8) ranking parameters were used to develop the composite risk score, which provide the hazard ranking results for the nine (9) 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	

Community Perspective Ranking	
Very Concerned	4
Concerned	3
Somewhat Concerned	2
Not Concerned	1
Source: Talbot County Hazard Mitigation & Resilience 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 Hazards**	**Drought**	**Flood**	**Thunderstorm**	**Tornado**	**High Wind**	**Winter Storm**
1	0.00	0	0.00	0-2 events	0-10 events	0.00	10”-19”
2	25.00	0.18	10.00	3-5 events	11-17 events	60.00	20”-29”
3	50.00	0.3421	20.00	6-8 events	18-22 events	74.00	30”-39”
4	75.00	0.49	30.00	>9 events	>23 event	95.00	>40”
Source:	COASTAL: Risk Area	DROUGHT: CDL MD	FLOOD: DFIRMS	THUNDERSTORM: NCDC	TORNADO: NCDC	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)	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	**Low**
15	**Medium**
20	**Medium-High**
25	**High**

The following table provides the hazard risk ranking update results. Flood, Coastal Hazards, Extreme Heat, and Emerging Infectious Diseases categories were ranked as “High” risk hazards. Thunderstorm, High Wind, and Winter Weather were ranked as “Medium-High” risk hazards. Drought was ranked as a “Medium” risk.

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	$6.075 M = 4	0 = 1	28.17% = 3	2.92 = 4	Highly Likely = 4	Very Concerned = 4	25.5	**HIGH**
Drought	0 = 1	0 = 1	0 = 1	0 = 1	55% = 4	2.36 = 3	Occasional = 2	Somewhat Concerned = 2	18	**MEDIUM**
Tornado	0 = 1	0 = 1	$76k = 2	0 = 1	9 = 1	0.16 = 2	Occasional = 2	Somewhat Concerned = 2	13.5	**LOW**
Thunderstorm (Thunderstorm Wind, Lightning, Hail)	6 = 2	0 = 1	$1.39M = 3	0 = 1	114 = 4	1.75 = 3	Likely = 3	Somewhat Concerned = 2	22	**MEDIUM-HIGH**
High Wind	0 = 1	0 = 1	$417.5 k = 2	$1.01k = 1	115 = 4	4.31 = 4	Highly Likely = 4	Concerned = 3	23.5	**MEDIUM-HIGH**
Extreme Heat	2 = 2	5 = 4	0 = 1	0 = 1	55% = 4	2.89 = 4	Highly Likely = 4	Somewhat Concerned = 2	25	**HIGH**
Winter Weather (Winter Storm, Blizzard, Ice Storm)	0 = 1	2 = 4	$400k = 1	0 = 1	14” = 1	5.58 = 4	Highly Likely = 4	Concerned = 3	22	**MEDIUM-HIGH**
Coastal Hazards (Tropical Storm, Hurricane, Coastal Flooding)	0 = 1	0 = 1	$250k = 2	0 = 1	98% = 4	0.39 = 4*	Highly Likely = 4	Very Concerned = 4	25	**HIGH**
Emerging Infectious Diseases	2	4	0 =1	0 = 1	**100% = 4	***297.86 = 4	Highly Likely = 4	Very Concerned = 3	26.5	**HIGH**

* The data collection process does not include events related to sea level rise and shoreline erosion, which Talbot County includes with Coastal Hazards. Including sea level rise and shoreline erosion it is believed that future probability is high for this hazard.
**Emerging Infectious Diseases’ geographic extent is countywide (100%).
*** Total Events/Annualized based on Cases of Selected Notifiable Conditions Reported Talbot County, Maryland 2013-2019. 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

Total Flood Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Flood, Flash Flood, and Heavy Rain*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$6.075M	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 76 Annual Avg. = 2.92
Source: National Centers for Environmental Information, as of February 2021 & 2016 State of Maryland Hazard Mitigation Plan **Note: Data collected for 1950-present, no data available for this event type prior to 1996.*					

Flood Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2011-2021)**
0	0	$2M	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 3 Annual Avg. = 0.27
Note: Data collected for 1950-present, no data available for this event type prior to 2011. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Flood (C). 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. If the event is considered significant, it should be entered into Storm Data, even if it only affected a small area. Refer to the Flash Flood event (Section 14) for guidelines for differentiating between Flood and Flash Flood events.*					

Flash Flood Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$4.075M	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 18 Annual Avg. = 0.69
Note: Data collected for 1950-present, no data available for this event type prior to 1996. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Flash Flood (C). A life-threatening, rapid rise of water into a normally dry area beginning within minutes to multiple hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to the shorter-term flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters. Flash flooding, such as dangerous small stream or urban flooding and dam or levee failures, requires immediate action to protect life and property. Conversely, flash flooding can transition into flooding as rapidly rising waters abate. The Storm Data preparer uses professional judgment in determining when the event is no longer characteristic of a Flash Flood and becomes a Flood.*					

Heavy Rain Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$0	$0	% in 100-yr Flood Zone (A, AE, AO &VE) = 28.17%	Total = 55 Annual Avg. = 2.16
Note: Data collected for 1950-present, no data available for this event type prior to 1996. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Heavy Rain (C). Unusually large amount of rain which does not cause a Flash Flood or Flood event, but causes damage, e.g., roof collapse or other human/economic impact. Heavy Rain will no longer be acceptable to record low-impact or isolated flood events.*					

DROUGHT

Total Drought Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Drought*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1997-2021)**
0	0	$0	$0	% Crop land cover from 2017 USDA Cropland Data = 55%	Total = 59 Annual Avg. = 2.36

Source: National Centers for Environmental Information, as of February 2021, 2016 State of Maryland Hazard Mitigation Plan & USDA Cropland Data-2019
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Drought (Z). Drought is a deficiency of moisture that results in adverse impacts on people, animals, or vegetation over a sizeable area. Conceptually, drought is a protracted period of deficient precipitation resulting in extensive damage to crops, resulting in loss of yield. There are different kinds of drought: meteorological, agricultural, hydrological, and social-economic. Each kind of drought starts and ends at different times.

TORNADO

Total Tornado Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Tornado, Funnel Cloud, and Waterspout*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1967-2021)**
0	0	$76k	$0	SVRGIS (intensity & frequency) = 1	Total = 9 Annual Avg. = 0.16

Source: National Centers for Environmental Information, as of February 2021 & 2016 State of Maryland Hazard Mitigation
Note: Data collected for 1950-present, no data available for this event type prior to 1984.

Tornado Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1967-2021)**
0	0	$76k	$0	SVRGIS (intensity & frequency) = 1	Total = 5 Annual Avg. = 0.09

Note: Data collected for 1950-present, no data available for this event type prior to 1967.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Tornado (C). A violently rotating column of air, extending to or from a cumuliform cloud or underneath a cumuliform cloud, to the ground, and often (but not always) visible as a condensation funnel. For a vortex to be classified as a tornado, it must be in contact with the ground and extend to/from the cloud base, and there should be some semblance of ground-based visual effects such as dust/dirt rotational markings/swirls, or structural or vegetative damage or disturbance.

Funnel Cloud Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2002-2021)**
0	0	$0	$0	SVRGIS (intensity & frequency) = 1	Total = 3 Annual Avg. = 0.15

Note: Data collected for 1950-present, no data available for this event type prior to 2002.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Funnel Cloud (C). A rotating, visible extension of a cloud pendant from a convective cloud with circulation not reaching the ground. The funnel cloud should be large, noteworthy, or create strong public or media interest to be entered.

Waterspout Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2000-2021)**
0	0	$5k	$0	SVRGIS (intensity & frequency) = 1	Total = 1 Annual Avg. = 0.05
Note: Data collected for 1950-present, no data available for this event type prior to 2000. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Waterspout (M). A rotating column of air, pendant from a convective cloud, with its circulation extending from cloud base to the water surface of bays and waters of the Great Lakes, and other lakes with assigned Marine Forecast Zones. A condensation funnel may or may not be visible in the vortex.*					

HIGH WIND

High Wind Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: High Wind and Strong Wind*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$417.5k	$1.01k	ASCE Wind Design Speed = 115	Total = 112 Annual Avg. = 4.31
Source: National Centers for Environmental Information, as of February 2021 & 2019 Building Code Administration *Note: Data collected for 1950-present, no data available for this event type prior to 1996*					

High Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$26.5k	$0	ASCE Wind Design Speed = 115	Total = 23 Annual Avg. = 0.89
Note: Data collected for 1950-present, no data available for this event type prior to 1996 *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: High Wind (Z). Sustained non-convective winds of 35 knots (40 mph) or greater lasting for 1 hour or longer, or gusts of 50 knots (58 mph) or greater for any duration (or otherwise locally/regionally defined). In some mountainous areas, the above numerical values are 43 knots (50 mph) and 65 knots (75 mph), respectively. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.*					

Strong Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1997-2021)**
0	0	$391k	$1.01k	ASCE Wind Design Speed = 115	Total = 89 Annual Avg. = 3.56
Note: Data collected for 1950-present, no data available for this event type prior to 1997 *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Strong Wind (Z). Non-convective winds gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph), resulting in a fatality, injury, or damage. Consistent with regional guidelines, mountain states may have higher criteria. A peak wind gust (estimated or measured) or maximum sustained wind will be entered.*					

WINTER WEATHER

Winter Weather Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Winter Storm, Winter Weather, Blizzard, Ice Storm, Frost/Freeze, Heavy Snow and Sleet.*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	2	$400k	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 145 Annual Avg. = 5.58
Source: National Centers for Environmental Information, as of February 2021, 2016 State of Maryland Hazard Mitigation Plan, & NOAA/NWS					

Winter Storm Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$400k	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 20 Annual Avg. = 0.77
Note: Data collected for 1950-present, no data available for this event type prior to 1996. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Winter Storm (Z). A winter weather event that has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24-hour warning criteria for at least one of the precipitation elements. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Normally, a Winter Storm would pose a threat to life or property.*					

Winter Weather Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	2	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 74 Annual Avg. = 2.85
Note: Data collected for 1950-present, no data available for this event type prior to 1996. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Winter Weather (Z). A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria. A Winter Weather event could result from one or more winter precipitation types (snow, or blowing/drifting snow, or freezing rain/drizzle). The Winter Weather event can also be used to document out-of-season and other unusual or rare occurrences of snow, or blowing/drifting snow, or freezing rain/drizzle. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.*					

Sleet Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1997-2021)**
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 3 Annual Avg. = 0.12
Note: Data collected for 1950-present, no data available for this event type prior to 1997. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Sleet (Z). Sleet accumulations meeting or exceeding locally/regionally defined warning criteria (typical value is ½ inch or more). The Storm Data preparer should include in the narrative the times that sleet accumulation began, met criteria, and ended.*					

Cold / Wind Chill Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 24 Annual Avg. = 0.92

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Cold / Wind Chill (Z). (Z). Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -180 F or colder) conditions. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. There can be situations where advisory criteria are not met, but the combination of seasonably cold temperatures and low wind chill values (roughly 150 F below normal) may result in a fatality. In these situations, a cold/wind chill event may be documented if the weather conditions were the primary cause of death as determined by a medical examiner or coroner. Normally, cold/wind chill conditions should cause human and/or economic impact.

Blizzard Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2010-2021)**
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 1 Annual Avg. = 0.08

Note: Data collected for 1950-present, no data available for this event type prior to 2010.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Blizzard (Z). A winter storm which produces the following conditions for 3 consecutive hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.

Heavy Snow Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 21 Annual Avg. = 0.81

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Heavy Snow (Z). Z). Snow accumulation meeting or exceeding locally/regionally defined 12 and/or 24 hour warning criteria. This could mean values such as 4, 6, or 8 inches or more in 12 hours or less; or 6, 8, or 10 inches in 24 hours or less. If the event that occurred is considered significant, even if it affected a small area, it should be entered into Storm Data. In some heavy snow events, structural damage, due to the excessive weight of snow accumulations, may occur in the few days following the meteorological end of the event.

Extreme Cold Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2014-2021)**
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 1 Annual Avg. = 0.125

Note: Data collected for 1950-present, no data available for this event type prior to 2014.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Extreme Cold (Z). A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -350 F or colder). If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data. Normally these conditions should cause significant human and/or

economic impact. However, if fatalities occur with cold temperatures/wind chills but extreme cold/wind chill criteria are not met, the event should also be included in Storm Data as a Cold/Wind Chill event and the fatalities are direct.

Frost / Freeze Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2007-2021)**
0	0	$0	$0	Average snowfall total: 14.0" (1893-2008 UMD-Climatologist Office)	Total = 1 Annual Avg. = 0.067

Note: Data collected for 1950-present, no data available for this event type prior to 2007.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Frost / Freeze (Z). A surface air temperature of 32 degrees Fahrenheit (F) or lower, or the formation of ice crystals on the ground or other surfaces, for a period of time long enough to cause human or economic impact, during the locally defined growing season. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.

COASTAL EVENTS

Total Coastal Events Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Tropical Storm, and Coastal Flooding. There are no Tropical Depressions or Hurricanes recorded in the NCEI Database for this county.*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$250k	$0	% of County in Coastal Land Area = 98%	Total = 10 Annual Avg. = 0.39

Source: National Centers for Environmental Information, as of February 2021 & 2016 State of Maryland Hazard Mitigation Plan
Note: Data collected for 1950-present, no data available for this event type prior to 1996
***The data collection process does not include events related to sea level rise and shoreline erosion, which Talbot County includes with Coastal Hazards. Including sea level rise and shoreline erosion, it is believed that future probability is high for this hazard.*

Tropical Storm Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2003-2021)**
0	0	$250k	$0	% of County in Coastal Land Area = 98%	Total = 4 Annual Avg. = 0.21

Note: Data collected for 1950-present, no data available for this event type prior to 2003.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Tropical Storm (Z). A tropical cyclone in which the 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph). A Tropical Storm should be included as an entry when these conditions are experienced in the WFO's (Weather Forecast Office) CWA (County Warning Area).

Coastal Flooding Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
0	0	$0	$0	% of County in Coastal Land Area = 98%	Total = 6 Annual Avg. = 0.23

Note: Data collected for 1950-present, no data available for this event type prior to 1996.
Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.
Based on NCEI definitions/criteria: Coastal Flood (Z). Flooding of coastal areas due to the vertical rise above normal water level caused by strong, persistent onshore wind, high astronomical tide, and/or low atmospheric pressure, resulting in damage, erosion, flooding, fatalities, or injuries. Coastal areas are defined as those portions of coastal land zones (coastal county/parish) adjacent to the waters, bays, and estuaries of the oceans. Farther inland, the Storm Data preparer determines the boundary between coastal and inland areas, where flood events will be

encoded as Flash Flood or Flood rather than Coastal Flood. Terrain (elevation) features will determine how far inland the coastal flooding extends.

THUNDERSTORM

Thunderstorm Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Thunderstorm Wind, Lightning, and Hail.*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1957-2021)**
6	0	$1.393M	$0	ASCE Wind Design Speed = 115 2"> hail and lightning events with Injuries/Deaths = 1	Total = 114 Annual Avg. = 1.75
Source: National Centers for Environmental Information, as of February 2021, & 2019 Building Code Administration & 2016 State of Maryland Hazard Mitigation Plan *Note: Data collected for 1950-present, no data available for this event type prior to 1957.*					

Thunderstorm Wind Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1965-2021)**
0	0	$180k	$0	ASCE Wind Design Speed = 115	Total = 108 Annual Avg. = 1.90
Note: Data collected for 1950-present, no data available for this event type prior to 1965. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Thunderstorm Wind (C). Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or winds of any speed (non-severe thunderstorm winds below 50 knots) producing a fatality, injury, or damage. Maximum sustained winds or wind gusts (measured or estimated) equal to or greater than 50 knots (58 mph) will always be entered. Events with maximum sustained winds or wind gusts less than 50 knots (58 mph) should be entered as a Storm Data event only if the result in fatalities, injuries, or serious property damage. Storm Data software permits only one event name for encoding severe and non-severe thunderstorm winds. The Storm Data software program requires the preparer to indicate whether the sustained wind or wind gust value was measured or estimated.*					

Lightning Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1997-2021)**
6	0	$1.213M	$0	Countywide	Total = 15 Annual Avg. = 0.60
Note: Data collected for 1950-present, no data available for this event type prior to 1997. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Lightning (C). A sudden electrical discharge from a thunderstorm, resulting in a fatality, injury, and/or damage.*					

Hail Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1957-2021)**
0	0	$0	$0	2"> hail and lightning events with Injuries/Deaths = 0	Total = 21 Annual Avg. = 0.32
Note: Data collected for 1950-present, no data available for this event type prior to 1957. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Hail (C). Frozen precipitation in the form of balls or irregular lumps of ice. Hail 3/4 of an inch or larger in diameter will be entered. Hail accumulations of smaller size, which cause property and/or crop damage or casualties, should be entered. Maximum hail size will be encoded for all hail reports entered.*					

EXTREME HEAT

Total Extreme Heat Hazard Risk Assessment Data Table *Hazards included within this table from NCEI Data: Excessive Heat and Heat*					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
2	5	$0	$0	% Crop from 2017 Agriculture Census = 55%	Total = 75 Annual Avg. = 2.89
Source: National Centers for Environmental Information, as of February 2021.					

Excessive Heat Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (2000-2021)**
0	0	$0	$0	% Crop from 2017 Agriculture Census = 55%	Total = 16 Annual Avg. = 0.73
Note: Data collected for 1950-present, no data available for this event type prior to 2000. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Excessive Heat (Z). Excessive Heat results from a combination of high temperatures (well above normal) and high humidity. An Excessive Heat event occurs and is reported in Storm Data whenever heat index values meet or exceed locally/regionally established excessive heat warning thresholds. Fatalities (directly related) or major impacts to human health that occur during excessive heat warning conditions are reported using this event category. If the event that occurred is considered significant, even though it affected a small area, it should be entered into Storm Data.*					

Heat Hazard Data Table					
Injuries	**Deaths**	**Property Damage**	**Crop Damage**	**Geographic Extent**	**Days with Events (1996-2021)**
2	5	$0	$0	% Crop from 2017 Agriculture Census = 55%	Total = 59 Annual Avg. = 2.68
Note: Data collected for 1950-present, no data available for this event type prior to 1996. *Legend: There are three designators: C - County/Parish; Z - Zone; and M – Marine Zone.* *Based on NCEI definitions/criteria: Heat (Z). A period of heat resulting from the combination of high temperatures (above normal) and relative humidity. A Heat event occurs and is reported in Storm Data whenever heat index values meet or exceed locally/regionally established advisory thresholds. Fatalities or major impacts on human health occurring when ambient weather conditions meet heat advisory criteria are reported using the Heat event. If the ambient weather conditions are below heat advisory criteria, a Heat event entry is permissible only if a directly related fatality occurred due to unseasonably warm weather, and not man-made environments.*					

EMERGING INFECTIOUS DISEASES

Cases of Selected Notifiable Conditions Reported - Talbot County, Maryland							
Condition	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Anaplasmosis	0	0	0	0	1	0	0
Animal Bites	88	95	83	75	84	81	104
Babesiosis	1	0	0	0	1	0	0
Campylobacteriosis	11	7	10	5	6	9	8
Chlamydia	125	125	76	89	100	103	119
Cryptosporidiosis	3	1	2	3	2	4	0
Cyclosporisis	0	0	0	0	0	0	1
Ehrlichiosis	0	1	1	0	1	6	3
Encephalitis – non-Arboviral	0	0	0	0	1	0	0
Giardiasis	2	1	1	1	2	**2**	**1**
Gonorrhea	18	17	25	26	24	16	24
H. influenzae – invasive disease	0	0	1	0	2	2	3

Cases of Selected Notifiable Conditions Reported - Talbot County, Maryland							
Condition	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Hepatitis A (acute symptomatic)	0	0	1	0	0	1	0
Hepatitis B (acute symptomatic)	0	1	1	0	0	0	0
Hepatitis C (acute symptomatic)	1	0	0	0	1	0	1
Legionellosis	0	0	2	0	0	2	0
Listeriosis	1	0	0	0	0	0	0
Lyme Disease	45	30	20	15	28	12	18
Malaria	0	0	0	0	0	1	0
Meningitis, aseptic	1	0	0	0	1	0	0
Mycobacteriosis, Other than TB & Leprosy	4	1	4	2	9	7	7
Pertussis	2	4	0	1	0	2	0
Rabies - Animal	3	7	7	9	7	14	9
Salmonellosis – other than typhoid fever	5	7	10	9	8	18	14
Shiga toxin producing E. coli (STEC)	0	1	0	0	0	1	0
Shigellosis	0	0	1	0	0	1	1
Spotted Fever Rickettsiosis	0	0	0	0	7	20	22
Strep Group A – Invasive Disease	0	0	1	1	1	1	2
Strep Group B – Invasive Disease	4	4	11	6	7	5	0
Strep pneumoniae - Invasive Disease	0	0	2	1	4	2	2
Syphilis – primary and secondary	1	1	0	0	1	1	1
Tuberculosis	0	0	0	0	3	0	0
Typhoid Fever - acute							
West Nile Virus	0	0	0	0	0	1	0
Vibriosis (non-cholera)	1	3	0	3	1	2	2
Zika virus disease	*	*	*	0	0	0	0
Zika virus infection	*	*	*	0	0	0	0
TOTALS:	316	306	259	246	302	314	342

Data sources: Maryland's NEDSS and PRISM databases. Data is current as of 4/15/2021. 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.

** Zika virus infections not reported for the years 2013- 2015 in the database.*

APPENDIX B:

Mitigation Action Items Status Report

MITIGATION ACTION ITEMS STATUS REPORT

The purpose of hazard mitigation action items and associated projects is to reduce or eliminate long-term risk to people and property from hazards and their effects. During the 2017 Plan Update process action items and projects were developed. As part of this Plan Update, a mitigation action item status report was created to determine the present status of these action items/projects.

Each action item/project within this status report included the following information:

- Action/Project Title
- Progress Report Period (2017-2021)
- Action/Project Background
- Responsible Entity
- Partners

Hazard Mitigation Planning Committee (HMPC) members were tasked with providing the following information for each action item, to the best of their ability:

- Contact Name/Information
- Current Project Status (e.g., Completed, Canceled, Delayed, or On Schedule)

Additionally, HMPC members were asked the following four questions for each action item:

1. What was accomplished for this project during this reporting period?
2. What obstacles, problems, or delays did the project encounter?
3. If incomplete, is the project still relevant? Should the project be changed or revised?
4. Other Comments?

A total of twenty-four (24) action items were evaluated as part of the plan update process; six (6) of these action items were ranked as "high priority" in the previous plan. Members of the Hazard Mitigation Planning Committee provided important feedback regarding the progress of these action items/projects.

Mitigation Action Progress Report Form #1

Action/Project Title:	#1 - Flood Mitigation Non-Substantial Improvements for Businesses	
Progress Report Period:	Start Date: 2017	End Date: 2021
Action/Project Background:	Proposed improvements are "non-substantial" if the costs of all improvements are less than 50% of the market value of the building. Although owners are not required to bring the existing building into compliance, elevation is the best way to reduce vulnerability. There are many other things owners can do to reduce future flood damage: • Use flood resistant material, for example tile, closed-cell wall insulation, and polyvinyl wall coverings. • Raise air conditioning equipment, heat pump, furnace, hot water heater, and other appliances on platforms. • Install electrical outlets higher above the floor. • Move ductwork out of crawlspaces. • Retrofit crawlspaces with flood openings. • Fill in below-grade crawlspaces/utility space. • Raise windowsills and entryways above Base Flood Elevation (BFE) for stores located in floodplains.	
Responsible Entity:	Business Owners Talbot County Department of Planning and Zoning	
Partners:	Insurance Agencies	
Contact Name:		
Contact Information:	Phone:	Email:
Project Status:	○ Project Completed ○ Project Canceled ○ Project Delayed ○ Project on Schedule Anticipated Completion Date:	

Summary of Project Progress for this Report Period

1. **What was accomplished for this project during this reporting period?**
2. **What obstacles, problems, or delays did the project encounter?**
3. **If incomplete, is the project still relevant? Should the project be changed or revised?**
4. **Other Comments**

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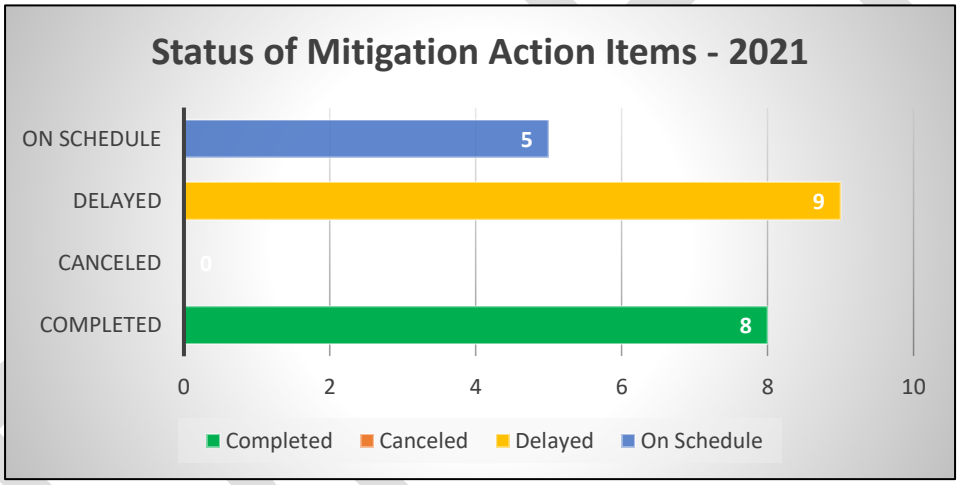
Figure B-1: An example of the fillable status update form provided to HMPC members to gather feedback.

Based on this feedback, the following was determined: eight (8) projects are "completed", five (5) projects are "on schedule" to be completed, and nine (9) projects are "delayed" for various reasons, including such reasons as lack of funding, lack of public support, or changes in staff.

The projects identified as "completed" are listed below. Over half (four out of six) of the high priority projects were designated as "completed"; these projects are identified in red.

- ✓ Project #7 – Open Space Preservation
- ✓ Project #8 – Flood Awareness/Public Education
- ✓ Project #9 – Public Outreach Sessions
- ✓ Project #12 – Public Education and Awareness in Hazard Prone Areas
- ✓ Project #14 – Mitigate Pump Station Risk to Overflow
- ✓ Project #16 – Repetitive Roadways Flooding Issues
- ✓ Project #19 – Establish a Business Liaison in the Emergency Operations Center for economic recovery
- ✓ Project #23 – Increase Community Rating System (CRS) Score

The HMPC determined that the nine (9) projects designated as "delayed" in addition to the five (5) projects that were identified as being "on schedule" are to be carried forward into the current Plan Update. These items were reviewed and refined to reflect current conditions within Talbot County for the Plan Update. The graph below further illustrates the present status of the 2017 Action Item based upon stakeholder feedback.



The table on the following pages provides full status details for each action item. The table includes the following information, provided by stakeholders:

1. Who responded? (e.g., department or town)
2. Status (Completed, On Schedule, Delayed, or Cancelled)
3. What was accomplished?
4. What were the obstacles or delays?
5. Is this still relevant or does it require any revisions?
6. Other Comments

An important note is that some projects were designated with a different status depending upon the entity that responded. For example, *Project #7 – Open Space Preservation* was deemed "completed" by the Town of Oxford but "delayed" by the Department of Planning and Zoning. These differences in status are noted throughout the table. Areas where no information was provided are marked with "-".

Action Item	Responder(s)	Status	Accomplishments	Obstacles or Delays?	Relevancy/Revision?	Other Comments
#1 – Flood Mitigation Non-Substantial Improvements for Businesses	Planning and Zoning	**Delayed**	CRS Outreach includes homeowner and business education.	More could be done. However, the elimination of a full-time Floodplain Coordinator position eliminates the potential to do more.	The project is still relevant.	-
#2 – Disaster Recovery Planning for Economic Development	Emergency Services	**Delayed**	-	-	-	Not much of this was accomplished during this project period. Some agencies such as the Chamber of Commerce, Planning and Zoning, and Economic Development provide this information, but a big initiative was not completed. Currently, Economic Development is working on a business recovery/response product using maps and data to aid businesses during disasters.
#3 – County Schools Flood Evacuation Destinations	Emergency Services	**Delayed**	None.	Change of staff in TCPS operations during project period	Yes, still relevant.	-
#4 – Environmental Education and Resilience Opportunity	Emergency Services	**Delayed**	None.	-	Yes, still relevant.	-
#5 – Design Resilience into Capital Investments	Town of Oxford	**On Schedule**	All construction is to be designed to BFE plus 3' per Floodplain requirements.	The correct TCPS staff was not assigned or integrated into this project.	-	Would like to amend regulations to require BFE +3 in all areas of town, including outside of Floodplain for both government capital improvements and private improvements.
#6 - Flood Prevention & Stormwater Management Best Practices	Dept. of Public Works	-	-	-	-	-
#7 – Open Space Preservation	Town of Oxford, Planning and Zoning	**Completed/ Delayed**	Projects are ongoing and continually updated. The scope is broad and the area to be covered is large (virtually surrounding the County). However, the Planning and Zoning Department contracted with Maryland Environmental Service, Michael Baker International and Smith Planning and Design to update the County's Green Infrastructure Plan. The Plan includes several site-specific	Obstacles common to the Eastern Shore and other rural areas are limited staff and funding.	The project is still relevant and very important.	Completed for the Town of Oxford. Delayed for County, Planning and Zoning.

Action Item	Responder(s)	Status	Accomplishments	Obstacles or Delays?	Relevancy/Revision?	Other Comments
			pilot projects to address issues of shore erosion, sea level rise and periodic flooding. Pilot projects include a Tilghman living shoreline project, a Knapps Narrows project and proposed barrier islands that address shore erosion on the peninsulas. Oxford, one of the most fragile towns, has had the most success with installing natural shoreline and structural improvements. Easton has also made improvements to several tributaries to the Tred Avon.			
#8 – Flood – Public Education/Awareness	Emergency Services, Town of Oxford, Planning and Zoning	**Completed/ Delayed**	Oxford – Successful application to the CRS program at Class 7. DES – A Talbot County Story Map was created specifically regarding flooding (education, mitigation, and recovery) Planning – In June of 2018, Talbot County was awarded a grant through the Maryland DNR's Community Resiliency Grant Program to produce an online multi-media story map that is interactive and accessible to public. Talbot County also partnered with the Eastern Shore Climate Adaptation Partnership CRS Work Group in the creation of a Program for Public Information campaign designed to distribute CRS flood safety messages and assist in the design of the County's entire flood protection outreach prrogram. Informational brochures on flood risks and property protection are also provided to the public through events, the libraries within several County offices, and the Flood Information content on the County's website. Information brochures and library reference materials were updated and reformatted in content.	Planning – No comment.	DES – Still relevant. Need to revisit story map roll out. Planning – No comment.	Oxford – Completed. DES – Unsure on ESCAP status on creating public information material group. I thought that was in the works but unsure if products were ever created. Planning and Zoning – Completed.
#9 – Public Outreach Sessions	Emergency Services, Public Works, Town of Oxford, Planning and Zoning	**Completed/ On Schedule**	Talbot GIS – there have been several outreach efforts including an Interactive Flood Risk map and an ESRI story map. These tools provide detailed information on location and expected impacts. Both sites are routinely updated in both technology and content. http://maps.talbgov.org/Html5Viewer2/Index.html DES – The Department of Emergency services did and continues to do public	Talbot GIS – The Department of Emergency Services should be added to this Mitigation Action as a partner. DES – Only issue is setting realistic expectations amongst residents of the reality of flooding within the county.	Talbot GIS – These outreach efforts are ongoing year to year with periodic updates and improvements on appearance, content, and technological updates. DES – still relevant.	Talbot GIS – Flood Risk map: http://maps.talbgov.org/Html5Viewer2/Index.html? DES – Completed.

Action Item	Responder(s)	Status	Accomplishments	Obstacles or Delays?	Relevancy/Revision?	Other Comments
			outreach sessions covering this information throughout the year in many communities within Talbot County			
#10 – Mass Communication	Emergency Services	**Delayed**	Unsure if a formal plan was created. Would like to revisit Jim Bass' intention with this. We have put together informal means of messaging (externally and internally/public reaching out to us during events)	-	Yes, still relevant	-
#11 – Public Outreach Plan	Emergency Services	**On Schedule/ Delayed**	DES – We currently do this during flooding events, but a formalized message template and timeline of messaging is not set. Very interested in continuing this.	-	DES – Yes, still relevant	DES – Delayed.
#12 – Public Education and Awareness in Hazard Prone Areas	Emergency Services	**Completed**	Mailings sent out in 2019 prior to hurricane season with flood messaging. Know your zone campaign for those in flood prone areas. Public outreach sessions to communities and businesses within flood prone area.	COVID - public outreach broader on social media instead of at community HOA and club meetings.	Yes, still relevant	-
#13 – Communication Infrastructure	Emergency Services, Public Works, Easton Utilities	**On Schedule**	Talbot County hired the consulting firm CTC Technology and Energy to assist in solutions to improve high speed broadband in the county. This effort led a partnership between Talbot County and Easton Utilities to apply for a USDA Re-Connect grant. On the second grant application the partnership was awarded $13.1 million and with the addition of local funds the total project cost will be about $17.5 million and provide gigabit service to about 3,500 homes and businesses.	The partnership was not able to provide 100% high speed broadband coverage for all the unserved or underserved portions of the county. We are working on solutions for the more remote isolated communities. Funding was also an issue.	This project is still relevant, but the project will take several years to complete (~ 5 years).	Easton Utilities press release: https://eastonvelocity.com/connecttalbot/connecttalbot-press-release/
#14 – Mitigate Pump Station Risk to Overflow	Easton Utilities, Town of Oxford, Public Works	**Completed/ On Schedule**	Oxford – Complete upgrade to the Oxford WWTP with facilities built at or above the 500 year/BFE plus 3' PW – Flood mitigation by stream restoration project for pump station at 403 Bay St, Easton. Funding designated by MDE for relocation of pump station 1131 S. Washington St, Easton.	Oxford – Many obstacles, problems, and/or delayed were encountered during the life of the project. PW – Funding.	PW – The station at 9076 Chapel Road has never flooded since it was built in 1990. The project should be changed to add two other stations in Easton: 1131 S. Washington Street and 403 Bay Street.	Oxford – Pump Stations can take in flood waters if tidal water reaches a high enough level and the pumps are unable to keep up. (Isabel and Sandy) PW – On Schedule/Ongoing
#15 – Well Head Protection	Health Department	**On Schedule**	Wall construction permits have been issued in flood prone areas of the County with extended well Height terminals to prevent flooding.	Well replacements are dependent on age of existing well. Existing wells not brought up to current flood zone requirements in a timely fashion.	Well head protection is always important to protect our aquifers.	-
#16 – Repetitive Roadways Flooding Issues	Town of Oxford	**Completed**	Causeway Retention Ponds: Construction of a series of Retention Ponds to reduce street flooding from both tidal and stormwater.	-	-	State Road remains an issue. Possible mitigation is being reviewed in other areas of town. Studies

Action Item	Responder(s)	Status	Accomplishments	Obstacles or Delays?	Relevancy/Revision?	Other Comments
			Funded through MD DNR Chesapeake and Atlantic Coastal Bays Trust Fund			have been done and information is available.
#17 – Update County Code for Well Head Elevation	Planning and Zoning	**Delayed**	The project was not accomplished during the reporting period. The County's floodplain management ordinance only requires that new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems.	-	The project is still relevant.	-
#18 – Culvert Mitigation	Dept. of Public Works and Roads Dept.	-	-	-	-	-
#19 – Establish a Business Liaison in the Emergency Operations Center for economic recovery	Emergency Services	**Completed**	Cassandra Vanhooser has been an integrated partner to our EOC and in the past 18 months really developed a strong relation with the business community and our EOC partners. This includes brining her Economic Development Board, Chamber of Commerce President, and other stakeholders to the table to talk about integrated response and messaging in our community before, during, and after events.	-	Still relevant. Would like to beef up the integration maybe with a one-pager of more formalized partnership (examples of actions to take depending on the event, annual meeting with DES and the businesses to talk about mitigation and recovery, etc.)	-
#20 – Pillar and overall stakeholder groups to continue to meet annually	Emergency Services	**Delayed**	There was one formal meeting.	Change of staff in Emergency Management.	Yes. Would like to set an annual meeting or tie this into another committee's quarterly meeting to keep this on the forefront of stakeholder's minds.	-
#21 – Power Generators at Essential Facilities	Emergency Services	**Delayed**	We have discussed this many times but never started a project for a specific building.	Completing an inventory of what buildings (critical infrastructure) have what generator capabilities and identify gaps.	Yes, still relevant.	-
#22 – Restore barrier islands to provide protection for Talbot County's shorelines from wave action	Emergency Services, Town of Oxford	**On Schedule /Delayed**	Oxford – Design for a Living Shoreline with small marsh islands to reduce wave energy along the Strand Shoreline.	Oxford – Garnering public support for a major change.	Oxford – Waiting on State/Fed permit approval.	Oxford – State and Federal funding secured for construction. Anticipated completion date: 2022-2023 DES – Delayed, unsure if this project is occurring.
#23 – Increase Community Rating System Rating	Emergency Services, Planning and Zoning	**Completed**	DES – Our CRS rating improved during our last submission. Planning – Talbot County's CRS rating went from a Class 8 to a Class 7.	-	DES – Yes, still relevant. Hoping to tie this Action Item in with the ESCAP public outreach plan to create messaging/templates regionally that everyone could use to help improve flood messaging.	-

Action Item	Responder(s)	Status	Accomplishments	Obstacles or Delays?	Relevancy/Revision?	Other Comments
					Planning – The effort to receive the higher rating was accomplished when the Department had a full-time floodplain coordinator. This position was eliminated and combined with the Zoning Coordinator position. Maintaining the CRS rating may be very difficult without the full-time position.	
#24 – Mitigate Flood Prone Properties	Emergency Services, Planning and Zoning	**Delayed**	Planning – On May 10, 2016, Talbot County Government executed a grant contract with the Maryland Historical Trust (MHT) to: 1) complete Maryland Inventory of Historic Properties (MIHP) Survey District Forms for the water-oriented villages of Neavitt, Newcomb, Royal Oak and Tilghman Island for those structures in the 500-year floodplain, 2) complete approximately Hazard Mitigation Forms for individual structures located within the floodplain, and 3) complete flood risk assessments and specific mitigation recommendations in each of the four villages for those surveyed structures. More in-depth flood risk assessments and specific mitigation recommendations were then completed for 25 of the most vulnerable properties to protect each property from flooding, expedite recovery from a flood event, and to allow the property to be usable for the maximum amount of time possible. The in-depth assessment included recommended structural and non-structural hazard mitigation actions for specific building types while maintaining their cultural integrity.	Planning – The project identified the most flood-prone areas in the four villages and their impact to historic structures. However, once the project was complete, there was no follow-up communication or education with the surveyed properties.	Planning – The project focus on mitigation of historic or contributing properties, not acquisition and demolition by the County. Acquisition and demolition of vulnerable properties may not be feasible. Consideration should be given to whether the mitigation action should involve targeted outreach and education,	DES – Unsure if this project is occurring within other departments
Red: Projects are rated as high priority.						

APPENDIX C:

Critical And Public Facility Database

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
County Owned	Airport	Easton Airport	29137 NEWNAM RD	N	Y	N	X	0	0	0	0			N
County Owned	Community Center	Talbot County Community	10028 OCEAN GATEWAY	N	Y	Y	X	0	0	0	0			
County Owned	Dock		7381 TILGHMAN ISLAND RD	N	Y	N	AE	1	2	3	4	YES	1.7	
County Owned	Dock			N	Y	N	AE	1	2	3	4	YES	2.3	
County Owned	Dock			N	Y	N	X	1	2	3	4	YES		
County Owned	Dock			N	Y	N	AE	1	2	3	4	YES	3.7	
County Owned	Dock			N	Y	N	AE	1	2	3	4	YES	4.4	
County Owned	Dock			N	Y	N	AE	1	2	3	4	YES	3.7	
County Owned	Dock			N	Y	N	AE	1	2	3	4	YES	2.5	
County Owned	Dock			N	Y	N	AE	1	2	3	4	YES	3.5	
County Owned	Housing Authority	Talbot County Pool	501 PORT ST	N	Y	N	X	0	0	0	0			
County Owned	Library	Talbot Count Library	10 W DOVER ST	N	Y	N	X	0	0	0	0			N
County Owned	Library	Talbot County Library in St. Michaels	106 FREMONT ST	N	Y	N	X	0	0	3	4			N
County Owned	Museum	Historical Society of Talbot	29 S WASHINGTON ST	N	Y	N	X	0	0	0	0			
County Owned	Museum	Historical Society of Talbot		N	Y	N	X	0	0	0	0			
County Owned	Museum		11308 LONGWOODS RD	N	Y	N	X	0	0	0	0			Y
County Owned	Office	Talbot County Courthouse	11 N WASHINGTON ST	N	Y	N	X	0	0	0	0			
County Owned	Office	Talbot County Government Building	142 N HARRISON ST	N	Y	N	X	0	0	0	0			Y
County Owned	Office	Talbot County Health Department	100 S HANSON ST	N	Y	N	X	0	0	0	0			
County Owned	Office	Talbot County Govt Offices	215 BAY ST	N	Y	N	X	0	2	3	4			Y
County Owned	Parks and Recreation	Hog Neck Golf Course	10027 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			N
County Owned	Parks and Recreation	Homerun Baker Park	4200 MAIN ST	N	Y	N	X	0	0	0	0			N
County Owned	Parks and Recreation	Talbot Count tennis court		N	Y	N	X	0	0	0	0			
County Owned	Parks and Recreation	Talbot County baseball court	31028 SKIPTON CORDOVA ROA	N	Y	N	X	0	0	0	0			
County Owned	Parks and Recreation	Talbot County basketball court	5536 PUBLIC LANDING RD	N	Y	N	X	1	2	3	4	YES		
County Owned	Parks and Recreation			N	Y	N	X	0	0	3	4			
County Owned	PLN Hangar	Clark Transportation	29065 CORKRAN RD	N	Y	N	X	0	0	0	0			N
County Owned	PLN Hangar		29050 CORKRAN RD	N	Y	N	X	0	0	0	0			N
Education	Community School	US Naval Research Lab Tilgh	4642 BLACK WALNUT POINT RD	Y	N	N	X	1	2	3	4	YES		
Education	Community School	Chesapeake Bay Maritime	100 NORTH LN	Y	N	N	AE	1	2	3	4	YES	1.7	
Education	Community School	Chesapeake Bay Maritime		Y	N	N	AE	1	2	3	4	YES	2.8	Y
Education	Private School	Benedictine School Group	29517 DUTCHMANS LN	Y	N	N	X	0	0	0	0			N
Education	Private School	Calhoon MEBA Engineering	27050 SAINT MICHAELS RD	Y	N	N	X	0	0	0	4			
Education	Private School	Church of God Private School	1009 N WASHINGTON ST	Y	N	N	X	0	0	0	0			
Education	Private School	Christ Church Day School	111 S HARRISON ST	Y	N	N	X	0	0	0	0			
Education	Private School	Country School	716 GOLDSBOROUGH ST	Y	N	N	X	0	0	0	0			
Education	Private School	Cummings Nancy Riding	27990 OXFORD RD	Y	N	N	X	0	0	0	0			Y
Education	Private School	Easton Montessori School	2 MARTIN CT	Y	N	N	X	0	0	0	0			
Education	Private School	Saint Peter and Paul Elementary	900 HIGH ST	Y	N	N	X	0	0	0	0			
Education	Private School	St Marks Church	100 PEACHBLOSSOM RD	Y	N	Y	X	0	0	0	0			
Education	Private School	Saint Peter and Paul High School	1212 S WASHINGTON ST	Y	N			0	0	0	0			N
Education	Public School	St Michaels High School	200 SEYMOUR AVE	Y	N		X	0	0	0	0			N
Education	Public School	Board of Education	12 MAGNOLIA ST	Y	N	N	X	0	0	0	0			
Education	Public School	Chapel District Elementary	11430 CORDOVA RD	Y	N	Y	X	0	0	0	0			Y
Education	Public School	Easton Elementary	305 GLENWOOD AVE	Y	N	Y	X	0	0	0	0			
Education	Public School	Easton High	720 MECKLENBURG AVE	Y	N	Y	X	0	0	0	0			
Education	Public School	Easton Middle	201 PEACHBLOSSOM RD	Y	N	Y	X	0	0	0	0			
Education	Public School	St Michaels Elementary Middle	100 SEYMOUR AVE	Y	N	Y	X	0	2	3	4			
Education	Public School	Tilghman Elementary School	21374 FOSTER AVE	Y	N	Y	X	0	2	3	4			

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
Education	Public School	White Marsh Elementary School	4322 LOVERS LN	Y	N	Y	X	0	0	0	0			Y
Education	Public School	Easton Elementary	307 GLENWOOD AVE	Y	N	Y	X	0	0	0	0			
Education	Special Needs	Benedictine School Group Home	29369 WILL ST	Y	N	N	X	0	0	0	0			N
Education	Special Needs	Benedictine School Group Home	7301 FRANCES ST	Y	N	N	X	0	0	0	0			N
Education	Special Needs	Benedictine School Group Home	7333 SHIRLEY DR	Y	N	N	X	0	0	0	0			N
Education	Special Needs	Benedictine School Vacation Retreat Home	9018 HIGH BANKS TER	Y	N	N	X	0	2	3	4			N
Emergency	EMS	Talbot Co EMS	29041 CORKRAN RD	Y	N		X	0	0	0	0			N
Emergency	EOC	Talbot County EOC	605 PORT ST	Y	N	N	X	0	0	0	0			N
Emergency	Fire Department	Cordova VFD	11864 KITTYS CORNER RD	Y	N	N	X	0	0	0	0			N
Emergency	Fire Department	Easton VFD	315 AURORA PARK DR	Y	N	Y	X	0	0	0	0			
Emergency	Fire Department	Oxford VFD	300 OXFORD RD	Y	N	N	X	0	2	3	4			Y
Emergency	Fire Department	St Michaels VFD	1001 S TALBOT ST	Y	N	N	X	0	0	3	4			N
Emergency	Fire Department	Tilghman VFD	5979 N MAIN ST	Y	N	N	X	0	2	3	4			N
Emergency	Fire Department	Trappe VFD	4001 POWELL AVE	Y	N	N	X	0	0	0	0			N
Emergency	Fire Department	Easton VFD Substation	29496 MATTHEWSTOWN RD	Y	N	N	X	0	0	0	0			N
Emergency	Fire Station	Queen Anne Hillsboro VFD	13520 FIRST ST	Y	N			0	0	0	0			
Emergency	Police Station	St Michaels Police Dept	100 FREMONT ST	Y	N		X	0	0	0	0			N
Emergency	Police Station	DNR Police	9385 JET LN	Y	N		X	0	0	0	0			N
Emergency	Police Station	US Coast Guard	904 S MORRIS ST	Y	N		X	0	0	0	0			Y
Emergency	Police Station	Talbot County Detention Center/Sheriff	115 W DOVER ST	Y	N	N	X	0	0	0	0			N
Emergency	Police Station	Easton Police	106 W DOVER ST	Y	N	N	X	0	0	0	0			
Emergency	Police Station	Trappe Police	4011 POWELL AVE	Y	N	N	X	0	0	0	0			Y
Emergency	Police Station	Maryland State Police	7053 OCEAN GTWY	Y	N	N	X	0	0	0	0			Y
Emergency	Police Station/Town Office	Oxford Police and Town Office	101 MARKET ST	Y	N	N	X	0	0	3	4			Y
Medical	Assisted Living	CARE Ambulatory Assistance	20 N HANSON ST	Y	N	N	X	0	0	0	0			Y
Medical	Assisted Living	Channel Marker Inc.	222 PORT ST	Y	N	N	X	0	0	0	0			
Medical	Assisted Living	Cynwood Assisted Living	545 CYNWOOD DR	Y	N	N	X	0	0	0	0			N
Medical	Assisted Living	Sunrise Assisted Living	6670 CEDAR POINT RD	Y	N	N	AE	1	2	3	4	YES	1.0	Y
Medical	Hospital	Digestive Health Associates	509 IDLEWILD AVE	Y	N	N	X	0	0	0	0			N
Medical	Hospital	Memorial Hospital	219 S WASHINGTON ST	Y	N	N	X	0	0	0	0			
Medical	Hospital	Dr. Sharriff	607 DUTCHMANS LN	Y	N	N	X	0	0	0	0			N
Medical	Hospital	Memorial Hospital	505 DUTCHMANS LN	Y	N	N	X	0	0	0	0			
Medical	Hospital	Robert J. Patterson MD	800 S TALBOT ST	Y	N	N	X	0	0	3	4			Y
Medical	Nursing Home	Londonderry	700 PORT ST	Y	N		X	0	0	0	0			N
Medical	Nursing Home	Parkview at Easton	640 MECKLENBURG AVE	Y	N		X	0	0	0	0			N
Medical	Nursing Home	The Pines Genesis Elder Care	610 DUTCHMANS LN	Y	N	N	X	0	0	0	0			Y
Medical	Office	Alternative Addictions	29515 CANVASBACK DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Dr. Canter	556 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Brian F Corden MD PA	508 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Charles Dinapoli MD	404 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Chesapeake Cardiology	522 IDLEWILD AVE	N	Y	N	X	0	0	0	0			N
Medical	Office	Chesapeake Internal Medicine	598 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Delmarva Foundation	9240 CENTREVILLE RD	N	Y	N	X	0	0	0	0			N
Medical	Office	Dankmeyer Inc.	604 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Office	David Smith MD	29466 PINTAIL DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Dental Choice	400 DUTCHMANS LN	N	Y	N	X	0	0	0	0			Y
Medical	Office	Dentist George E. Jr.	8685 COMMERCE DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Diagnostic and Imaging Center	10 MARTIN CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Dialysis Corporation of A	402 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Digestive Health Associates	511 IDLEWILD AVE	N	Y	N	X	0	0	0	0			N

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
Medical	Office	Dr. Christopher Cianci	606 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Office	Dr. Martin C. Haley	7 CAULK LN	N	Y	N	X	0	0	0	0			N
Medical	Office	Dr. Mehrizi Ali	719 GOLDSBOROUGH ST	N	Y	N	X	0	0	0	0			Y
Medical	Office	Eastern Shore Urology	6 CAULK LN	N	Y	N	X	0	0	0	0			N
Medical	Office	Easton Clinic, LLC	2 MARTIN CT	N	Y	N	X	0	0	0	0			
Medical	Office	Easton Family Physician	508 IDLEWILD AVE	N	Y	N	X	0	0	0	0			
Medical	Office	Elizabeth A. Orsini DDS	505 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	Frederick J. Heaton DDS	538 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Gordon K Calvert Jr. DD	400 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office	HealthSouth of Easton	510 IDLEWILD AVE	N	Y	N	X	0	0	0	0			N
Medical	Office	HealthSouth Sports Medicine	401 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Helpco LLC	1 MARTIN CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Herbert Gorin DDS	2 MARTIN CT	N	Y	N	X	0	0	0	0			
Medical	Office	David Oliver, MD	503 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Hospital Commission	121 FEDERAL ST	N	Y	N	X	0	0	0	0			N
Medical	Office	Houch William R. DDS	613 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Office	J. Frederick Heaton DDS	538 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Ali Soulati, DDS	508 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	LabCorp	29466 PINTAIL DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Mark Higgin Bottom DDS	556 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	LabCorp	401 PURDY ST	N	Y	N	X	0	0	0	0			N
Medical	Office	Plastic Surgery Specialist	611 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	Richard Heide, DMD, MSD	611 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	Michael Del Torto MD	403 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Mid Shore Surgical Eye	8420 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			Y
Medical	Office	Parkway Dentist	8695 COMMERCE DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Pinnacle Plastic Surge	5 MARTIN CT	N	Y	N	X	0	0	0	0			N
Medical	Office	YMCA	506 IDLEWILD AVE	N	Y	N	X	0	0	0	0			N
Medical	Office	Red Cross of the Delmar	706 IDLEWILD AVE	N	Y	N	X	0	0	0	0			N
Medical	Office	Shore Surgical Center	505 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	River Family Physicians	555 CYNWOOD DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Shore Surgical	505 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	Talbot Hospice Foundation	586 CYNWOOD DR	N	Y	N	X	0	0	0	0			N
Medical	Office	Tidewater Pediatrics	605 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Office	Tidewater Physical Therapy	406 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office	Adam Weinstein, MD	7969 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			Y
Medical	Office	William Friedel MD	405 MARVEL CT	N	Y	N	X	0	0	0	0			N
Medical	Office		218 BAY ST	N	Y	N	X	0	0	3	4			Y
Medical	Office	Dr. Perez Detrich	140 S WASHINGTON ST	N	Y	N	X	0	0	0	0			Y
Medical	Office		609 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Office	Malak Derakhshani	603 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Office		505 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	Talbot Dermatology	5 CAULK LN	N	Y	N	X	0	0	0	0			N
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N
Medical	Office		508 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office	Century Spine Center	611 DUTCHMANS LN	N	Y	N	X	0	0	0	0			
Medical	Office	Mark Higgin Bottom DDS	556 CYNWOOD DR	N	Y	N	X	0	0	0	0			
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N
Medical	Office		5 CAULK LN	N	Y	N	X	0	0	0	0			
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N
Medical	Office		8221 TEAL DR	N	Y	N	X	0	0	0	0			N

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
Medical	Retirement Center	Candle Light Cove	106 W EARLE AVE	N	Y	N	X	0	0	0	0			N
Medical	Retirement Center	Bailey Intergrace	501 DUTCHMANS LN	N	Y	N	X	0	0	0	0			N
Medical	Retirement Center	Candle Light Cove	106 W EARLE AVE	N	Y	N	X	0	0	0	0			N
Medical	Senior Housing	The Dixon House Inc	108 N HIGGINS ST	N	Y	N	X	0	0	0	0			
Medical	Senior Housing	Senior Housing	204 BAY ST	N	Y	N	X	0	0	0	0			
Medical	Senior Housing	Senior Housing		N	Y	N	X	0	0	0	0			
Medical	Senior Housing	Senior Housing		N	Y	N	X	0	0	0	4			
Medical	Special Needs	Deaf Independent Living	13 WRIGHTSON AVE	N	Y	N	X	0	0	0	0			Y
Medical	Special Needs	Deaf Independent Living	8784 BLACK DOG ALLEY	N	Y	N	X	0	0	0	0			Y
Medical	Special Needs	Deaf Independent Living	7391 PATRICK RD	N	Y	N	X	0	0	0	0			N
Miscellaneous	Marina	Bachelor Point Yacht Company		N	Y	N	X	1	2	3	4	YES		N
Miscellaneous	Marina	Bates Marine Basin	106 RICHARDSON ST	N	Y	N	AE	1	2	3	4	YES	0.5	N
Miscellaneous	Marina	Campbell Town Creek Boat Yard	107 MYRTLE AVE	N	Y	N	AE	1	2	3	4	YES	1.3	N
Miscellaneous	Marina	Cutts and Case Shipyard		N	Y	N	X	1	2	3	4	YES		
Miscellaneous	Marina	Dickerson Harbor	3831 TRAPPE LANDING RD	N	Y	N	X	1	2	3	4	YES		N
Miscellaneous	Marina	Easton Point Marina	975 PORT ST	N	Y	N	AE	1	2	3	4	YES	1.8	
Miscellaneous	Marina	Higgins Yacht Yard		N	Y	N	AE	1	2	3	4	YES	3.3	N
Miscellaneous	Marina	Hinckley Yacht Services	202 BANK ST	N	Y	N	AE	1	2	3	4	YES	0.7	N
Miscellaneous	Marina	Knapps Marina	6176 TILGHMAN ISLAND RD	N	Y	N	X	1	2	3	4	YES		N
Miscellaneous	Marina	Lowes Wharf Marina	21651 LOWES WHARF RD	N	Y	N	AE	1	2	3	4	YES	0.5	
Miscellaneous	Marina	Safe Harbor Oxford	402 STRAND	N	Y	N	X	1	2	3	4	YES		Y
Miscellaneous	Marina	Oak Creek Marina	7419 BACK ST	N	Y	N	X	1	2	3	4	YES		
Miscellaneous	Marina	Oxford Boatyard Yacht Sales	407 STRAND	N	Y	N	AE	1	2	3	4	YES	0.5	Y
Miscellaneous	Marina	OYA	317 S MORRIS ST	N	Y	N	AE	1	2	3	4	YES	0.6	N
Miscellaneous	Marina	Pier ST Marina	104 W PIER ST	N	Y	N	AE	1	2	3	4	YES	3.0	Y
Miscellaneous	Marina	Severn Marine Services		N	Y	N	AE	1	2	3	4	YES	1.0	Y
Miscellaneous	Marina	Tilghman on Chesapeake	21610 ISLAND CLUB RD	N	Y	N	X	1	2	3	4	YES		N
Miscellaneous	Marina		21764 CAMPER CIR	N	Y	N	AE	1	2	3	4	YES	0.5	N
Miscellaneous	Marina		12498 WYE LANDING LN	N	Y	N	X	1	2	3	4	YES		N
Miscellaneous	Storage Yard	Marina Mart	12214 OCEAN GATEWAY	N	Y	N	X	1	2	3	4	YES		Y
Miscellaneous	Storage Yard	Talbot River Tours	846 POINT RD	N	Y	N	X	0	0	0	4			N
Miscellaneous	Storage Yard	Tidewater Canvas		N	Y	N	X	0	2	3	4			N
Municipal-Easton	Housing Authority	Asbury Place	400 E DOVER ST	N	Y	N	X	0	0	0	0			N
Municipal-Easton	Housing Authority	Doverbrook Apartments		N	Y	N	X	0	0	0	0			
Municipal-Easton	Housing Authority	Doverbrook Apartments		N	Y	N	X	0	0	0	0			
Municipal-Easton	Housing Authority	Easton apartment complex	705 DOVER RD	N	Y	N	X	0	0	0	0			
Municipal-Easton	Housing Authority	Easton apartment complex		N	Y	N	X	0	0	0	0			
Municipal-Easton	Housing Authority	Easton apartment complex		N	Y	N	X	0	0	0	0			
Municipal-Easton	Housing Authority	Easton Residence	323 SOUTH ST	N	Y	N	X	0	0	0	0			Y
Municipal-Easton	Office	Chesapeake Wildlife Heritage		N	Y	N	X	0	0	0	0			Y
Municipal-Easton	Office	Easton Business Management	11 S HARRISON ST	N	Y	N	X	0	0	0	0			
Municipal-Easton	Office	Easton Mayor and Council	14 S HARRISON ST	N	Y	N	X	0	0	0	0			
Municipal-Easton	Parks and Recreation	Easton Tennis Court		N	Y	N	X	0	0	0	0			N
Municipal-Easton	Parks and Recreation	North Easton Sports Com	1078 N WASHINGTON ST	N	Y	N	X	0	0	0	0			
Municipal-Easton	Public Works	Easton Utilities Plant 1	219 N WASHINGTON ST	N	Y	N	X	0	0	0	0			
Municipal-Easton	Public Works	Easton Utilities Comm Muni Power Plant	201 N WASHINGTON ST	N	Y	N	X	0	0	3	4			
Municipal-Easton	Public Works	Easton contains building		N	Y	N	X	1	2	3	4			
Municipal-Easton	Public Works	Calvert Pumping Station	204 PARRIS LN	N	Y	N	X	0	0	0	0			
Municipal-Easton	Public Works	Easton Garage	220 PORT ST	N	Y	N	X	0	2	3	4			
Municipal-Oxford	Community Center	Grace Bible Church		N	Y	Y	X	1	2	3	4			Y
Municipal-Oxford	Library	Oxford Library		N	Y	N	X	0	0	3	4			Y
Municipal-Oxford	Museum	Oxford Museum Inc.		N	Y	N	X	0	0	3	4			Y

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
Municipal-Oxford	Parks and Recreation	Oxford tennis courts		N	Y	N	AE	1	2	3	4	YES	1.5	
Municipal-Oxford	Public Works	Oxford Dock		N	Y	N	AE	1	2	3	4	YES	2.7	
Municipal-St. Michaels	Housing Authority	St Michaels	300 N TALBOT ST	N	Y	N	X	0	2	3	4			
Municipal-St. Michaels	Housing Authority	St Michaels Housing Authority		N	Y	N	X	0	0	3	4			
Municipal-St. Michaels	Housing Authority	Storage		N	Y	N	X	0	0	3	4			
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime	213 N TALBOT ST	N	Y	N	AE	0	2	3	4		2.7	
Municipal-St. Michaels	Museum	Chesapeake Bay Maritime		N	Y	N	AE	1	2	3	4	YES	3.8	Y
Municipal-St. Michaels	Museum	J Intern	103 FREMONT ST	N	Y	N	X	0	0	3	4			Y
Municipal-St. Michaels	Museum	St Mary's Square Museum	409 ST MARYS SQ	N	Y	N	X	0	0	3	4			Y
Municipal-St. Michaels	Office	Town of St. Michaels Of	300 MILL ST	N	Y	N	X	1	2	3	4	YES		Y
Municipal-St. Michaels	Public Works	Commissioners of St. Michaels	301 MILL ST	N	Y	N	X	1	2	3	4	YES		
Municipal-St. Michaels	Public Works	St Michaels Town Shop		N	Y	N	X	0	0	3	4			Y
Utility	Electric	Choptank Electric	11324 OCEAN GATEWAY	N	Y		X	0	0	0	0			
Utility	Electric	Easton Utilities	450 GLENWOOD AVE	N	Y		X	0	0	0	0			
Utility	Electric	Delmarva Power Substation	129 GRACE ST	N	Y	N	X	0	0	0	0			
Utility	Electric	Delmarva Power & Light		N	Y	N	X	0	2	3	4			
Utility	Electric	Delmarva Power & Light		N	Y	N	X	1	2	3	4			
Utility	Electric	Delmarva Power & Light		N	Y	N	X	0	0	0	4			
Utility	Electric	Delmarva Power & Light		N	Y	N	X	0	0	0	4			
Utility	Electric	Choptank Electric	6901 SCHOOLHOUSE LN	N	Y	N	X	0	0	3	4			
Utility	Electric	Easton Utilities Head End/North	405 BAY ST	N	Y	N	AE	0	2	3	4		0.5	
Utility	Electric	Easton Utilities Power Plant 2	8940 GLEBE PARK DR	N	Y	N	X	0	0	0	0			N
Utility	Gas	Eastern Shore Natural Gas		N	Y	N	X	0	0	0	0			
Utility	Gas Oil	United Shoregas	929 S TALBOT ST	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Meintzer Brothers Petroleum	400 S AURORA ST	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Delmarva Oil Inc	900 PORT ST	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Pep Up Inc Russ Oil Co	956 PORT ST	N	Y		AE	0	0	0	0		1.1	Y
Utility	Gas Oil	Southern States Petroleum Talbot	801 PORT ST	N	Y		X	0	0	0	0			N
Utility	Gas Oil	Tri Gas and Oil Company	407 BROOKLETTS AVE	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Suburban Propane	1080 N WASHINGTON ST	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Tri Gas and Oil Company	9253 OCEAN GATEWAY	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Sharp Energy Inc	9387 OCEAN GATEWAY	N	Y		X	0	0	0	0			Y
Utility	Gas Oil	Valley National Gases Inc	9580 BLACK DOG ALLEY	N	Y		X	0	0	0	0			N
Utility	Gas Oil	McMahan Oil Company	930 PORT ST	N	Y		AE	0	0	0	0		0.5	Y
Utility	Pumping Station	Pumping Station #2	25940 ROYAL OAK RD	N	Y		X	0	0	0	0			N
Utility	Pumping Station	Pumping Station #1	25730 ROYAL OAK RD	N	Y		X	0	0	0	0			
Utility	Pumping Station	Pumping Station #3	6020 BELLEVUE RD	N	Y		X	0	0	0	0			
Utility	Pumping Station	Pumping Station	9345 UNIONVILLE RD	N	Y		X	0	0	0	0			
Utility	Pumping Station	Chapel East Pumping Station	9076 CHAPEL RD	N	Y		A	0	0	0	0		N_A	N
Utility	Pumping Station	Peachblossom Pumping Station	7606 OXFORD RD	N	Y		X	0	0	0	0			
Utility	Pumping Station	Easton Pump Station	29853 STANDISH ST	N	Y		X	0	0	0	0			
Utility	Pumping Station	Windmill Major Pump Station	1131 S WASHINGTON ST	N	Y	N	AE	0	2	3	4		0.5	
Utility	Pumping Station	South Clifton Pump Station	7891 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			N
Utility	Pumping Station	Bank ST Pump Station	BANK ST	N	Y		AE	1	2	3	4		0.9	
Utility	Pumping Station	Causeway Main Pumping Station	OXFORD RD	N	Y		AE	1	2	3	4		1.0	

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
Utility	Pumping Station	Bonfield Pumping Station	BONFIELD AVE	N	Y		AE	1	2	3	4		0.5	
Utility	Pumping Station	Bachelor Harbor Pump Station	BACHELORS HARBOR DR	N	Y		AE	0	0	0	0		3.7	
Utility	Pumping Station	Easton Club East Major Pump Station	29766 LYONS DR	N				0	0	0	0			
Utility	Substation	Choptank Electric	6979 DOVER NECK RD	N	Y	N	X	0	2	3	4			
Utility	Substation	Delmarva Power Substation	8289 OLD BLOOMFIELD RD	N	Y	N	X	0	0	0	0			
Utility	Substation	Delmarva Power Substation	602 W GLENWOOD AVE	N	Y	N	X	0	0	0	0			
Utility	Substation	Delmarva Substation Bozman	23931 ST MICHAELS RD	N	Y	N	X	0	0	0	0			
Utility	Substation	Delmarva Power Substation	28340 ALMSHOUSE RD	N	Y	N	X	0	0	0	0			
Utility	Substation	Easton Public Works		N	Y	N	X	0	0	3	4			
Utility	Telephone	Verizon	40 S WASHINGTON ST	N	Y		X	0	0	0	0			
Utility	Telephone	Verizon	781 IDLEWILD AVE	N	Y	N	X	0	0	0	0			
Utility	Telephone	T Mobile	10496 HINERS LN	N	Y	N	X	0	0	0	0			
Utility	Telephone	Verizon	111 E CHEW AVE	N	Y	N	X	1	2	3	4			
Utility	Telephone	Verizon Trappe	29428 GREENFIELD AVE	N	Y	N	X	0	2	3	4			
Utility	Telephone	Verizon		N	Y	N	AE	0	0	0	0		0.5	
Utility	Telephone	Verizon		N	Y	N	X	0	0	0	0			
Utility	Telephone	Verizon	5932 TILGHMAN ISLAND RD	N	Y	N	X	0	0	3	4			
Utility	Tower	Verizon	108 WOODSIDE AVE	N	Y		X	0	0	0	0			
Utility	Tower		7869 BOZMAN NEAVITT RD	N	Y		X	0	0	0	0			
Utility	Tower	Verizon	LANDING NECK RD	N	Y		X	0	0	0	0			Y
Utility	Tower	Dover Radion Page	2987 OCEAN GATEWAY	N	Y		X	0	0	0	0			Y
Utility	Tower	Delmarva Power & Light	26985 ST MICHAELS RD	N	Y	N	X	0	0	0	0			
Utility	Tower	Comcast Cablevision of Delmarva	2500 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			
Utility	Tower	Easton Airport Tower	29065 CORKRAN RD	N	Y	N	X	0	0	0	0			N
Utility	Tower	Gateway Marina and Ships Store		N	Y	N	AE	1	2	3	4	YES	5.0	N
Utility	Tower	Maryland State Police	7053 OCEAN GTWY	N	Y	N	X	0	0	0	0			Y
Utility	Tower	Mid Atlantic Communication	9855 WADES POINT RD	N	Y	N	X	0	0	0	4			
Utility	Tower	American Towers Inc	30530 MATTHEWSTOWN RD	N	Y	N	X	0	0	0	0			Y
Utility	Tower	Cellular One	11780 LONGWOODS RD	N	Y	N	X	0	0	0	0			Y
Utility	Tower	Shortall Building Supplies	11523 CORDOVA RD	N	Y	N	X	0	0	0	0			N
Utility	Tower	Tred Avon Yacht Club	102 W THE STRAND	N	Y	N	AE	1	2	3	4	YES	0.5	N
Utility	Tower	Verizon	26709 OXFORD RD	N	Y	N	X	0	0	0	0			
Utility	Tower	American Towers Inc	3389 OCEAN GTWY	N	Y	N	X	0	2	3	4			
Utility	Tower	Cellular One	402 BROOKLETTS AVE	N	Y	N	X	0	0	0	0			Y
Utility	Tower	WCEI Radio	306 PORT ST	N	Y	N	X	0	0	0	0			Y
Utility	Tower	Wye Mills Tower Site for 800	14056 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			N
Utility	Tower	Wye Tree Experts Inc.	12721 OCEAN GATEWAY	N	Y	N	X	0	0	0	0			Y
Utility	Tower	Falcon Cable Trappe Tower	29415 TARBUTTON MILL RD	N	Y	N	X	0	0	0	0			Y
Utility	Tower	Trappe Tower Site for 800 MHz	3269 OCEAN GTWY	N	Y	N	X	0	0	0	0			N
Utility	Tower			N	Y	N	X	0	0	0	0			
Utility	Water Tower	Easton Water Tower	29496 MATTHEWSTOWN RD	N	Y		X	0	0	0	0			N
Utility	Water Tower	Easton Water Tower	HICKORY RIDGE RD	N	Y		X	0	0	0	0			
Utility	Water Tower	St Michaels Water Tower	N TALBOT ST	N	Y		X	0	0	0	0			
Utility	Water Tower	St Michaels Water Tower	106 WOODSIDE AVE	N	Y	N	X	0	0	3	4			
Utility	Water Tower	Town of Oxford Water Tower	103 JL THOMPSON DR	N	Y	N	X	1	2	3	4			N
Utility	Water Tower	Trappe Water Tower	3932 HARRISON CIR	N	Y	N	X	0	0	0	0			
Utility	Water tower	Easton Utilities	8940 GLEBE PARK DR	N	Y	N	X	0	0	0	0			N
Utility	Water Tower/Cellular	Oxford Water Tower	400 TILGHMAN ST	N	Y	N	AE	1	2	3	4	YES	0.5	

Facility Type	Facility Detail	Facility Name	Address	Critical Facility (Y/N)	Public Facility (Y/N)	Shelter (Y/N)	Flood Zone	Category 1	Category 2	Category 3	Category 4	Within 100 ft Buffer (Y/N)	Flood Depth	Built Prior 1965 (Y/N)
Utility	WTP	Public Works Building	103 JL THOMPSON DR	N	Y	N	X	1	2	3	4			N
Utility	WTP	Glebe RD Water Treatment	28705 GLEBE RD	N	Y		X	0	0	0	0			N
Utility	WTP	Martingham Utilities Cooperative	24490 DEEPWATER POINT DR	N	Y	N	X	0	2	3	4			N
Utility	WWTP	Easton Waste Treatment	30770 NORTH DOVER RD	N	Y	N	X	1	2	3	4	YES		
Utility	WWTP	MidShore Regional Transfer Station	7341 BAKERS LANDING RD	N	Y	N	X	0	0	0	0			
Utility	WWTP	St Michaels WWTP	929 CALVERT AVE	N	Y	N	X	0	0	3	4			
Utility	WWTP	Tilghman Island Wastewater Treatment Plant	21345 SETH AVE	N	Y	N	X	1	2	3	4	YES		
Utility	WWTP	Trappe Wastewater Treatment Plant	4099 HENNISSEE LN	N	Y	N	X	0	0	0	0			
Utility	WWTP	Talbot County Biosolids Facility	9786 KLONDIKE RD	N	Y	N	X	0	0	0	0			N
Utility	WWTP	Wastewater Treatment Plant	101 JL THOMPSON DR	N	Y		X	0	2	3	4			N

APPENDIX D:

Hazus Hurricane Wind Report

Hazus-MH: Hurricane Event Report

Region Name: TC_HU_Wind

Hurricane Scenario: Isabel_Talbot

Print Date: Tuesday, November 15, 2016

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.

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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:
Addendum A contains a complete listing of the counties contained in the region.

The geographical size of the region is 271.83 square miles and contains 10 census tracts. There are over 16 thousand households in the region and has a total population of 37,782 people (2010 Census Bureau data). The distribution of population by State and County is provided in Addendum B.

There are an estimated 19 thousand buildings in the region with a total building replacement value (excluding contents) of 6,489 million dollars (2010 dollars). Approximately 90% of the buildings (and 81% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 19,758 buildings in the region which have an aggregate total replacement value of 6,489 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 Total
Residential	5,233,143	80.6%
Commercial	865,586	13.3%
Industrial	185,657	2.9%
Agricultural	32,018	0.5%
Religious	79,507	1.2%
Government	33,226	0.5%
Education	60,065	0.9%
Total	**6,489,202**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 128 beds.

There are 13 schools, 6 fire stations, 5 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:	Isabel_Talbot
Type:	Deterministic
Maximum Peak Gust in Study Region:	95 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)	Central Pressure (mBar)	Profile Parameter	Radius to Hurricane Force Winds (miles)
1	35.40	-76.60	--	67.96	6.21	90.40	957.00	--	--
2	36.95	-76.75	--	70.00	6.21	90.40	959.00	--	--
3	38.44	-76.71	--	55.85	27.41	90.40	960.00	--	--
4	39.64	-76.77	--	39.65	26.31	83.32	965.00	--	--

Building Damage

General Building Stock Damage

Hazus estimates that about 114 buildings will be at least moderately damaged. This is over 1% of the total number of buildings in the region. There are an estimated 4 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	112	94.07	6	4.75	1	0.83	0	0.33	0	0.02
Commercial	1,206	95.58	49	3.86	7	0.52	0	0.03	0	0.00
Education	42	95.98	2	3.67	0	0.34	0	0.01	0	0.00
Government	43	96.88	1	2.95	0	0.16	0	0.00	0	0.00
Industrial	366	95.44	15	3.97	2	0.51	0	0.07	0	0.00
Religion	112	96.38	4	3.41	0	0.21	0	0.00	0	0.00
Residential	16,448	92.45	1,240	6.97	97	0.54	2	0.01	4	0.02
Total	**18,328**		**1,316**		**107**		**3**		**4**	

Table 3: Expected Building Damage by Building Type

Building	None		Minor		Moderate		Severe		Destruction	
Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	356	94.65	18	4.70	2	0.63	0	0.01	0	0.00
Masonry	4,968	92.32	370	6.88	41	0.75	1	0.03	1	0.02
MH	551	99.90	0	0.08	0	0.02	0	0.00	0	0.00
Steel	855	95.59	34	3.77	5	0.59	0	0.05	0	0.00
Wood	11,634	92.63	867	6.90	55	0.44	1	0.01	3	0.02

Essential Facility Damage

Before the hurricane, the region had 128 hospital beds available for use. On the day of the hurricane, the model estimates that 128 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**
EOCs	1	0	0	1
Fire Stations	6	0	0	6
Hospitals	1	0	0	1
Police Stations	5	0	0	5
Schools	13	0	0	12

Induced Hurricane Damage

Debris Generation

Hazus estimates the number 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 88,264 tons of debris will be generated. Of the total amount, 73,355 tons (83%) is Other Tree Debris. Of the remaining 14,909 tons, Brick/Wood comprises 22% 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 129 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 11,672 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 4 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 37,782) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 57.5 million dollars, which represents 0.89 % 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 58 million dollars. 1% 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 97% 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	40,256.26	697.48	164.50	191.42	41,309.65
	Content	13,960.73	64.35	53.14	34.69	14,112.91
	Inventory	0.00	1.75	10.06	3.46	15.26
	Subtotal	**54,216.99**	**763.58**	**227.69**	**229.57**	**55,437.83**
Business Interruption Loss						
	Income	0.00	74.20	1.09	8.34	83.63
	Relocation	1,238.66	71.44	8.39	20.94	1,339.43
	Rental	508.96	33.33	0.80	1.25	544.34
	Wage	0.00	60.16	1.86	47.26	109.28
	Subtotal	**1,747.62**	**239.13**	**12.14**	**77.79**	**2,076.68**
Total						
	Total	**55,964.60**	**1,002.72**	**239.83**	**307.36**	**57,514.50**

Addendum A: County Listing for the Region

Maryland
- Talbot

Addendum B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Maryland				
Talbot	37,782	5,233,143	1,256,059	6,489,202
Total	**37,782**	**5,233,143**	**1,256,059**	**6,489,202**
Study Region Total	**37,782**	**5,233,143**	**1,256,059**	**6,489,202**

Direct Economic Losses For Buildings:

November 15, 2016

All values are in thousands of dollars

	Capital Stock Losses				Income Losses				
	Cost Building Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	Total Loss
Maryland									
Talbot	41,310	14,113	15	0.64	1,339	84	109	544	57,515
Total	**41,310**	**14,113**	**15**	**0.64**	**1,339**	**84**	**109**	**544**	**57,515**
Study Region Total	**41,310**	**14,113**	**15**	**0.64**	**1,339**	**84**	**109**	**544**	**57,515**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

APPENDIX E:
HMPC Meeting Notes

PLAN UPDATE

Appendix E: HMPC Meeting Notes includes agendas, attendance, notes, and timelines for the following three stakeholder meetings:

- Hazard Mitigation Planning Committee Meeting #1 – May 26, 2021
- Hazard Mitigation Planning Committee Meeting #2 – September 22, 2021
- Hazard Mitigation Planning Committee Meeting #3/Mitigation Action Item Workshop – November 19, 2021

TALBOT COUNTY HAZARD MITIGATION PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #1

May 26, 2021 10:00 AM

The following Talbot County Hazard Mitigation Planning Committee (HMPC) members were present at the first meeting:

Name	Organization/Department
Erin Braband	Town of Trappe
Parker Durham	Department of Information Technology
Tommy Haddaway	Emergency Services
Bill Hildebrand	Maryland Department of Emergency Management
Cheryl Lewis	Town of Oxford
Brian LeCates	Emergency Services
Mike Mertaugh	Department of Public Works
Paul Moffett	Easton Utilities
Roy Myers	Town of Saint Michaels
Donald Richardson	Town of Easton
Miguel Salinas	Planning and Zoning
Geneva Schaffle	Department of Emergency Services
Cassandra Vanhooser	Economic Development and Tourism
Jean Weisman	Town of Saint Michaels
Rich Williams	Health Department
Mark Cohoon	Department of Public Works

Agenda

- Hazard Mitigation Overview
- FEMA Requirements
- Project Timeline
- Stakeholder and Public Participation
- Project Website and Social Media
- Hazard Risk Survey
- Development of Action Items and Projects

Hazard Mitigation Overview

- 2017 Talbot County Hazard Mitigation and Resilience Plan (HMRP) is in the plan update process. The 2017 Talbot County HMRP is available for review at www.talbotdes.org/plan_prepare.asp?res=des_hazard_mitigation

- 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 MDEM & FEMA.
  - For municipalities to be covered under the Talbot County HMRP, they must participate throughout the planning process and formally adopt the plan.

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

- Cost effective
  - Natural hazard mitigation provides the nation $6 in benefit for every $1 invested.
- Hazards Identified within the HMRP:
  - Coastal Hazards (tropical storms/hurricanes, nor'easters, shoreline erosion, sea level rise)
  - Flood (coastal/tidal, riverine)
  - High Wind, Winter Storm, Tornado, Thunderstorm, Drought, Extreme Heat
  - NEW Hazard: Emerging Infectious Diseases
    - New Threats added: complex coordinated terrorist attack, active assailant, cyber-attack/threat

Project Timeline

- The initial project team meeting was held in May 2021, where stakeholders were identified and discussed.
  - The Stakeholder Group will meet three (3) times at a minimum, with small/targeted group meetings scheduled as needed.
    - e.g., municipal group(s) will meet separately to discuss topics specific to municipalities
- A Draft plan for local stakeholder review will be made available in February 2022 (refer to the attached project timeline).

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.
    - The project website will be officially launched after stakeholder review. The link to the draft website will be sent to stakeholders the first half of June.
    - The project website will be launched to the public after review.
- Stakeholders are asked to complete a Hazard Risk Survey to gather their perspective on the hazards identified within the plan.
    - Link: www.surveymonkey.com/r/5KSZPKQ

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 for Stakeholders:
    - www.surveymonkey.com/r/5KSZPKQ
    - Due: COB June 15, 2021
- Mitigation Action Items Status Update
    - Fillable PDF form distributed to stakeholders for completion.
    - Due: COB June 15, 2021
- Project Website:
    - Launch Date: end of June 2021
- Targeted Small Group Meetings:
    - July-August 2021
- Meeting #2:
    - September 2021

Talbot County HMRP Project Timeline – 2021/2022													
	May 2021	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. 2022	Feb.	March	April/May	June
Project Milestones													
Organize Resources & Planning Team													
Project Team Meeting (Key County Staff)	*												
THIRA Threats (Meetings & Tasks)			*	Data Collection		*	Gap Analysis	*	Draft THIRA				
Planning Committee Meeting #1	*												
2017 Mitigation Strategies Update Process													
HIRA 2021 Update													
Mitigation Strategies Report													
Public Outreach Campaign (Website, Survey, Social Media)													
Municipal Planning & Outreach (Included as part of County Plan)		Data Collection		Status Report				New Actions		Draft HMRP			
Planning Committee Meeting #2					*								
Hazard Vulnerability Assessment													
Capability Assessment & Gaps													
Planning Committee Meeting #3							*						

Talbot County HMRP Project Timeline – 2021/2022													
	May 2021	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. 2022	Feb.	March	April/May	June
Project Milestones													

Talbot County HMRP Project Timeline – 2021/2022													
2021 Mitigation Actions & Projects Prioritization													
DRAFT PLAN										Draft HMRP			
Local & Public Review & Comments													
State & FEMA Review & Comments													
Adoption by Talbot County													

TALBOT COUNTY HAZARD MITIGATION PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #2

September 22, 2021, 10:30 AM – 12:15 PM

The following members comprise the Talbot County Hazard Mitigation Planning Committee (HMPC):

Name	Organization/Department
Greg Allis	Talbot County Planning and Zoning
Michael Bibb	Town of St. Michaels
Erin Braband	Town of Trappe
Maria Brophy	Town of Oxford
Mark Cohoon	Talbot County Public Works
Donnie Cooper	Talbot County Public Schools
Parker Durham	Talbot County Department of Information Technology
Marty Eichelman	Town of Queen Anne
Tommy Haddaway	Talbot County Emergency Services
Bill Hildebrand	Maryland Department of Emergency Management
Bill Keswick	Talbot County Public Schools
Kymberly Kudla	Town of St. Michaels
Brian LeCates	Talbot County Emergency Services
Chery Lewis	Town of Oxford
Scott Mergenthaler	Talbot County Sheriff's Office
Mike Mertaugh	Talbot County Public Works
Paul Moffett	Easton Utilities
Brian Moore	Facilities Maintenance
Roy Myers	Town of St. Michaels
Chase Phillips	Talbot County Planning and Zoning
Sara Ramotnik	Eastern Shore Land Conservancy
Don Richardson	Town of Easton
Rebecca Saduk	Easton Utilities
Miguel Salinas	Talbot County Planning and Zoning
Geneva Schaffle	Talbot County Emergency Services
Renee Sheehy	Delmarva Power
Martin Sokolich	Talbot County Planning and Zoning
Brennan Tarleton	Talbot County Planning and Zoning
Cassandra Vanhooser	Talbot County Economic Development and Tourism
Rich Williams	Talbot County Health Department

Agenda

- Hazard Mitigation Overview (FEMA requirements, municipal involvement, benefits of hazard mitigation planning)
- Project Timeline
- Plan Update Progress Report
    - Draft Natural Hazard Chapters
    - Outreach Activities (Municipal, Public, Social Media)
    - Mitigation Action Items Status Update
- **Mitigation Action Items Workshop**
- Next Steps

Hazard Mitigation Overview

- 2017 Talbot County Hazard Mitigation and Resilience Plan (HMRP) is in the plan update process. The 2017 Talbot County HMRP is available for review at www.talbotdes.org/plan_prepare.asp?res=des_hazard_mitigation
- FEMA Requirements:
    - FEMA requires hazard mitigation plans to be updated every five (5) years; the current plan expires on September 25, 2022.
    - Stakeholder/public engagement is vital throughout all stages of the plan development process to be approved by MDEM & FEMA.
    - For municipalities to be covered under the Talbot County HMRP, they must participate throughout the planning process and formally adopt the plan.

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

- Cost effective
    - On average, natural hazard mitigation provides the nation $6 in benefit for every $1 invested.
- Hazards Identified within the HMRP:
    - Coastal Hazards (tropical storms/hurricanes, nor'easters, shoreline erosion, sea level rise)
    - Flood (coastal/tidal, riverine)
    - High Wind, Winter Storm, Tornado, Thunderstorm, Drought, Extreme Heat
    - New Hazard: Emerging Infectious Diseases
- In addition to the natural hazards, three (3) new threats have been added to the plan and include:
    - Complex Coordinated Terrorist Attack
    - Active Assailant
    - Cyber-Attack/Threat

Threats are human caused incidents that result from intentional acts. This could include chemical, biological, or cyber-attacks and other act of terrorism.

Project Timeline

- The initial project team meeting was held in May 2021, where stakeholders were identified and discussed.
    - The Stakeholder Group will meet three (3) times at a minimum, with small/targeted group meetings scheduled as needed.
        - e.g., municipal group(s) will meet separately to discuss topics specific to municipalities
- A Draft plan for local stakeholder review will be made available in February 2022

- The Plan Update is currently ahead of schedule – 8 out of the 9 natural hazards currently have a working draft that have been submitted to stakeholders for review and comment.

Plan Update Progress Report

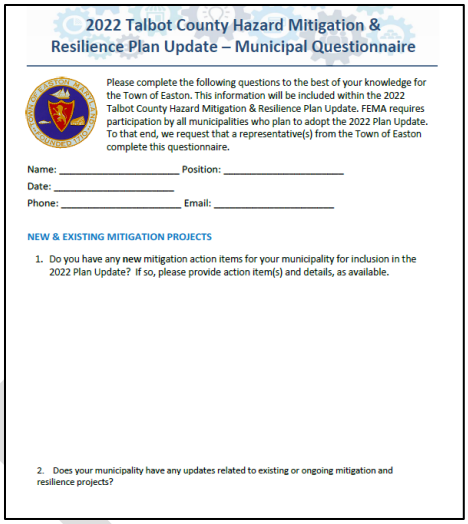
Draft Natural Hazard Chapters

- Most of the natural hazards identified in the plan have received a draft update, including: coastal hazards, winter storm, tornado, high wind & thunderstorm, drought & extreme heat, and emerging infectious diseases. Chapter 5: Flood is currently in progress.
    - These chapters have received a thematic and visual update, as well as updates to data, tables, text, vulnerability assessments (where applicable), and mapping (where applicable).
    - The drafts have been sent to stakeholders for review and comment.
    - Stakeholders were provided with a feedback form with each draft natural hazard chapter. This form included newly recommended action items.
- The Hazard Identification and Risk Assessment Method (Appendix A) was completed and provided to stakeholders. This appendix is also available on the project website (www.talbothazardplan.org).
- The Mitigation Action Items Status Report (Appendix B) was completed and provided to stakeholders.
- Hazard Impact Tables, located within each natural hazard profile, have been updated based on stakeholder review and input.

Outreach – Municipal/Small Groups

- Municipalities have received a “municipal questionnaire” to determine the status of existing action items and gather ideas for new mitigation actions and projects.

  - The questionnaire also assesses municipal capabilities (planning & regulatory, admin & technical, financial, and education & outreach).
  - Small group meetings are being held with municipal representatives to further discuss ongoing and future goals and action items.
- Meetings have been held with the LEPC (July) and with public health officials to discuss Emerging Infectious Diseases.



2022 Talbot County Hazard Mitigation & Resilience Plan Update – Municipal Questionnaire

Please complete the following questions to the best of your knowledge for the Town of Easton. This information will be included within the 2022 Talbot County Hazard Mitigation & Resilience Plan Update. FEMA requires participation by all municipalities who plan to adopt the 2022 Plan Update. To that end, we request that a representative(s) from the Town of Easton complete this questionnaire.

Name: _____ Position: _____
Date: _____
Phone: _____ Email: _____

NEW & EXISTING MITIGATION PROJECTS

1. Do you have any new mitigation action items for your municipality for inclusion in the 2022 Plan Update? If so, please provide action item(s) and details, as available.

2. Does your municipality have any updates related to existing or ongoing mitigation and resilience projects?

Outreach – Public and Social Media

- The project website was launched at the beginning of summer; it has since received hundreds of unique visitors. The website is posted on Talbot County's DES social media (e.g., Facebook) which drives traffic to the public survey.
- The **public survey** currently has 336 unique responses.
  - Municipal response breakdown: Easton (131), Oxford (45), Queen Anne (2), St. Michaels (33), Trappe (17), Unincorporated (81).
  - Preliminary results indicate the public is **most concerned** with Emerging Infectious Diseases, Coastal Hazards, and Flood.

Mitigation Action Items Update

- In June 2021 stakeholders were asked to provide their feedback on 24 action items/projects from the 2017 Plan.
  - 24 action items were evaluated, of these: eight (8) were identified as "completed," nine (9) were identified as "delayed," and five (5) were identified as "on schedule."
  - Six of the 24 action items were ranked as "high priority" and four (4) of these were "completed."
  - Those action items identified as "on schedule" or "delayed" are being assessed to determine if they will be refined and integrated into the Plan Update.
- Full results are available in *Appendix B: Mitigation Action Items Status Report*.

Mitigation Action Items Workshop

- Hazard-specific action items have been developed during this plan update cycle.
- Stakeholder feedback is necessary to ensure the action items best reflect Talbot County's goals and objectives.

- The action items included in the workshop have been recommended based on conclusions drawn from the update of the hazard mitigation plan, stakeholder input, public comment, and from related planning documents.
- Stakeholders were asked to provide their thoughts and feedbacks on these recommended action items to ensure the items "made sense" for the county and its municipalities.
    - Action Items are modified based upon stakeholder feedback
    - Stakeholders will be provided **additional opportunities to provide feedback** on mitigation action items.

Stakeholder comments are included in the following table. Only action items that received feedback from stakeholders during the meeting are included.

Recommended Action Item	Stakeholder Comments
Coastal	
1.) Residents in low-lying communities should be educated regarding, and encouraged to utilize, an evacuation plan. During a coastal hazard event the primary route of evacuation may become submerged (e.g., MD-333 at the entrance to the Town of Oxford); therefore, residents and communities should be encouraged to plan and develop a secondary evacuation route.	• St. Michaels – Route 33 has the same issues as MD-333. These are state roads, but the state won't address the repetitive flooding issue despite repeated attempts by the impacted towns. • In Oxford and St. Michaels, boats are often the only way to evacuate once the entryways into town have become inundated. • "Secondary Route" wording may need to be adjusted, as there often is not a secondary route, except by boat. • PW – for years priority road lists have been sent to DoT, MD-33 and MD-333 have been on that list. • Businesses and visitors can be included in the language of these action items
2.) Green infrastructure can help protect coastal communities from impacts associated with coastal hazards, such as flooding from hurricane storm surge, sea-level rise, and shoreline erosion. Barrier island restoration is a type of green infrastructure that can protect shorelines from storm surge and erosion. Public outreach should be conducted to increase public support for ongoing barrier island projects at the municipal level as well as proposed barrier island projects in Talbot County's Green Infrastructure Plan (*Cleaner, Greener Talbot*).	• Public outreach efforts including green infrastructure are supported and necessary, but correcting stormwater issues in towns such as St. Michaels will require more aggressive and multi-pronged approach. • The Town of Oxford has tide gates at multiple locations to prevent backflow, but they need upgrades. Additional green infrastructure would increase the effectiveness of these tide gates.
Flood	
1.) Continue to participate in Community Rating System activities with the goals of (a.) maintaining the county's current CRS rating, class 7, and (b.) working towards raising the county's CRS rating.	• County and municipal governments can work together to perform CRS activities.
2.) Conduct stream corridor assessments to determine the status of bridges, culverts, pipes, failing channelization, debris blockages, and	• Planning and Zoning Dept. will ask about the status of any ongoing stream corridor assessments.

Recommended Action Item	Stakeholder Comments
other issues that may increase the severity of flood events.	
3.) Promote the Citizen Alert System (Everbridge) via social media.	• Talbot DES – this is attainable, and it is promoted a lot. • Preliminary public survey results indicate a lack of awareness of this emergency notification resource. • Include "via media, including social media."
4.) Ensure that all public communications, outreach efforts, signage, etc. is multi-language or provides means to translate.	• This is a very popular idea. • The County has been working with the Chesapeake Multi-Cultural Resource Center a lot during the pandemic. • Promoting this resource center to other groups and businesses would be helpful.
Winter Storm	
1.) Develop or update the County's Cold Weather Plan.	• At present, this plan is "informal" and there is a desire to formalize the plan. • It is believed that the County currently has one, but it needs to be further investigated. It will need updated.
2.) Promote winter weather survival tips to citizens throughout the fall and winter seasons on the County's website and social media.	• DES is currently doing this, but updates and additional promotion are needed.
Tornado	
1.) Conduct public outreach activities to increase awareness of tornado risk. Activities may include educating the public via media outlets, conducting tornado drills in schools and public buildings, and distributing tornado safety materials.	• Schools conduct biennial safety drills related to hazardous weather events and many more drills related to other public safety issues.
High Wind & Thunderstorm	
1.) Protect Power Lines and Infrastructure by continuing regular maintenance and upkeep of utilities. Examples of strategies include tree pruning around lines, inspection of utility and power line poles to determine their structural integrity and burying power lines to provide uninterrupted power after severe winds.	• It would be beneficial to work with the local utility companies as they keep their own list of priority infrastructure. Knowing how utilities prioritize infrastructure can help the county and municipality prioritize their own.
2.) Retrofit public buildings and critical facilities to reduce future wind damage. Examples include improving roof coverings (e.g., no pebbles, removal of ballast roof systems), anchoring of roof-mounted HVAC systems, and protecting traffic lights and other traffic controls from high winds.	• The public may need further education on the benefits of retrofitting and protecting vital infrastructure from the damages associated with high winds and thunderstorms. • Additionally, increased public education relating to the "potential for power loss" would be greatly beneficial.
2.) Update, implement, and maintain the current draft of Talbot County's Debris Management Plan.	• The current draft needs some attention; the plan is updated but it is not quite reflective of Talbot County.
Drought & Extreme Heat	
1.) Encourage community greening activities and collect data on community greening activities such as rain gardens and bioretention areas. Guidance from the "Cleaner, Greener Talbot"	• The Green Infrastructure Plan (Cleaner, Greener Talbot) has a form to help start this inventory process (included as an appendix).

Recommended Action Item	Stakeholder Comments
Plan will be helpful in site selection. Populate countywide community greening inventory using the data gathered following assessment.	

Other Comments
1. Stakeholders suggested that it would be very helpful if the county developed a digital library including all plans and notices. This would be very helpful to the municipalities and members of the community.

NEXT STEPS

- Meeting #2 Notes - distributed to all stakeholders and uploaded to project website.
- Small-group meetings will continue, including municipalities and other community organizations.
- The THIRA Appendix will be developed following the drafting of all natural hazard chapters.
    - Three threats have been identified for this plan update: Complex Coordinated Terrorist Attack, Active Assailant, and Cyber-Attack/Threat
    - Developing the THIRA will require input from stakeholders via small-group meetings. Be on the lookout for an invitation.
- Action Items Priority Ranking Exercise
    - Ranking action items will require additional stakeholder feedback.
- Development of mitigation projects, including high priority projects (based on the priority ranking exercise)
- Results from the public survey will be integrated into the plan update
- Complete working draft of plan update
- **Meeting #3: November/December 2022**

Plan Update Website: www.talbothazardplan.org
Public Survey: www.surveymonkey.com/r/K6ZZ9HS
Contact:
Smith Planning and Design, LLC
E: emessick@smithp-d.com
P: (301) 724-7611

TALBOT COUNTY HAZARD MITIGATION PLANNING COMMITTEE

PLANNING COMMITTEE MEETING #3 (MITIGATION ACTION ITEM WORKSHOP)

November 19, 2021, 10:00 AM – 12:00 PM

The following members of the Talbot County Hazard Mitigation Planning Committee (HMPC) attended the Mitigation Action Item Workshop:

Name	Organization/Department
Sarah Abel	Town of St. Michaels
Nancy Andrew	Talbot Family Network
Maria Brophy	Town of Oxford
Mark Cohoon	Talbot County Public Works
Parker Durham	Talbot County Department of Information Technology
Kia Gibbs	Easton Utilities
Bill Hildebrand	Maryland Department of Emergency Management
Bill Keswick	Talbot County Public Schools
Scott Mergenthaler	Talbot County Sheriff's Office
Mike Mertaugh	Talbot County Public Works
Chase Phillips	Talbot County Planning and Zoning
Rebecca Saduk	Easton Utilities
Geneva Schaffle	Talbot County Emergency Services
Rich Williams	Talbot County Health Department

Agenda

- Introductions/Icebreaker Polls
- Plan Status Update
  - Draft Natural Hazard Chapters
  - Outreach Activities (Public, Social Media)
- Mitigation Action Item In-Person Workshop
- Mitigation Action Item Prioritization Exercise
- Next Steps

Plan Status Update

Draft Natural Hazard Chapters

- All nine natural hazards identified in the plan have received a draft update, including: flood, coastal hazards, winter storm, tornado, high wind & thunderstorm, drought & extreme heat, and emerging infectious diseases.

  - These chapters have received a thematic and visual update, as well as updates to data, tables, text, vulnerability assessments (where applicable), and mapping (where applicable).
  - The drafts have been sent to stakeholders for review and comment.
  - Stakeholders were provided with a feedback form with each draft natural hazard chapter. This form included newly recommended action items.
- The Hazard Identification and Risk Assessment Method (Appendix A) was completed and provided to stakeholders. This appendix is also available on the project website (www.talbothazardplan.org).
- The Mitigation Action Items Status Report (Appendix B) was completed and provided to stakeholders.

Outreach – Public and Social Media

- The project website was launched at the beginning of summer; it has since received hundreds of unique visitors. The website is posted on Talbot County's DES social media (e.g., Facebook) which drives traffic to the public survey.
- The **public survey** currently has 368 unique responses.
  - Municipal response breakdown: Easton (145), Oxford (45), Queen Anne (3), St. Michaels (35), Trappe (19), Unincorporated (89).
  - Preliminary results indicate the public is **most concerned** with Emerging Infectious Diseases, Coastal Hazards, and Flood.
  - Those action items identified as "on schedule" or "delayed" are being assessed to determine if they will be refined and integrated into the Plan Update.
- Full results are available in *Appendix B: Mitigation Action Items Status Report*.

Mitigation Action Item In-Person Workshop

- Members of the HMPC met in-person at the Talbot County Community Center to provide feedback on the 28 mitigation action items in the plan update.
- **Project sheets** were developed for each mitigation action item, including the following information:
  1. **Hazard**
  2. **Location**
  3. **Background/Issue**
  4. **Ideas for Integration**
  5. **Responsible Agency**
  6. **Partners**
  7. **Potential Funding**
  8. **Cost Estimate**
  9. **Benefits (losses avoided)**
  10. **Timeline**
  11. **Goals**

- Working in small groups, stakeholders present at the workshop were asked to complete the project sheets to the greatest extent possible based upon their group's knowledge and expertise.
    - Groups were based on Talbot County's Community Pillars and some pillars were combined to make three (3) working groups in total:
        - **Health, Safety, Welfare**
        - **Education** & **Economic Stability**
        - **Infrastructure** & **Environmental**
    - These three groups worked on completing their mitigation action items project sheets for an hour before reporting their findings to the larger stakeholder group. Groups were asked to share the following:
        - "What are your group's major takeaways?"
        - "Which mitigation action item(s) does your group think should be considered high priority?"
        - "Does your group have any other comments?"
- Comments and information gathered from the HMPC during this workshop will be incorporated into the plan update within *Chapter 12: Mitigation & Resilience Goals, Objectives, and Action Items.*
- Additionally, two new action items were added during this workshop, including:
    - Flood-Proofing Easton Utilities Head-End Building
    - Sanitary Sewer Pump Station Relocation

Mitigation Action Item Prioritization Exercise

- Individuals were asked to complete a **Mitigation Action Item Prioritization Questionnaire.** The purpose of this questionnaire is to determine high priority action items.
    - For each action item, the following six (6) yes/no/null 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/Municipalities 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 its Municipalities?
        6. Is this project consistent with environment goals?
- Results of this prioritization exercise will be incorporated into the plan update and provided to HMPC members.
- Based on the results of the questionnaire, **12 action items** were determined to be "**high priority**" by the HMPC.

NEXT STEPS

- Meeting #3 Notes - distributed to all stakeholders and uploaded to project website.
- Scheduling the first THIRA meeting (estimated timeframe: December thru February 2022)
    - The THIRA Appendix will include the following threats: Complex Coordinated Terrorist Attack, Active Assailant, and Cyber-Attack/Threat

    - Developing the THIRA will require input from stakeholders via small-group meetings. Be on the lookout for an invitation.
- Results from the public survey will be integrated into the plan update
- Complete draft of natural hazard chapters for HMPC review (December 2021)

APPENDIX F:
Public Outreach Documentation

PLAN UPDATE

Appendix F: Public Outreach Documentation details the meetings, trainings, and public outreach activity that occurred during the Plan Update process, 2021/2022.

The following table documents core team, hazard mitigation planning committee, municipal, public, and regional collaboration meetings. Also documented are important project dates, including project website updates, dates the draft plan was available for public review, and instances where the hazard mitigation plan update process was shared via media and social media.

Talbot County Hazard Mitigation Planning, Training, And Public Outreach Initiatives				
Date	**Meeting, Training, or Outreach Activity**	**Target Audience**	**Materials Provided**	**Comments/Input**
05/17/21	Core Team Planning Meeting	Core Planning Team	WebEx Meeting, HMRP Planning Team/Stakeholder Listing, Handout	Discussed the update process, new content/ideas, stakeholder engagement and public outreach strategies. Identified members of the Plan Update stakeholder group.
05/26/21	HMRP Stakeholder Meeting #1	HMRPC Stakeholders	WebEx Meeting- Agenda & Meeting Notes (PDF)	The kick-off meeting highlighted the following: hazard mitigation overview, FEMA Plan requirements, project timeline, stakeholder responsibilities, the project website/social media, hazard risk survey, and development of action items and projects.
06/01/21	Stakeholder Survey	HMRPC Stakeholders	Survey Monkey Link	Stakeholders were requested to complete a survey to gather their unique perspective on hazards included in the Plan. Due June 15, 2021.
06/01/21	Mitigation Action Item Update Form	HMRPC Stakeholders	Fillable PDF Form	Stakeholders were tasked with completing a status update of existing mitigation action items from the 2017 HMRP, focusing on those items relating to their area of expertise. Due June 15, 2021
06/07/21	Email Reminder	HMRPC Stakeholders	Email	An email was sent reminding stakeholders of the deadline to complete the survey as well as the mitigation action item update form.
06/08/21	Data Request	Core Planning Team	Email	Photos of hazard events specific to Talbot County were requested for use on the project website.
06/18/21	Project Website Review Due Date	HMRPC Stakeholders, Core Planning Team	Notes and Comments from stakeholders	The project website will be updated based on stakeholder input and will be published when all changes are made.
07/01/21	Project Website Published	HMRPC Stakeholders, Public	Website Link	The project website, after stakeholder review, was published, indexed on google, and made available to the public.
7/27/2021	Small Group Meeting - Emerging Infectious Diseases	Core Team and Health Officials	Draft Emerging Infectious Diseases chapter provided as read-ahead	A small-group meeting was held with local health officials to discuss the development/draft of the newly created Emerging Infectious Disease chapter.
7/28/2021	News Submission	myeasternshoremd.com	N/A	Filled out a news submission form to have details of the HMRP Update distributed to the public via newsletter
7/28/2021	Project Website Update	Core Planning Team	N/A	Added a section called "FloodSmart: The Cost of Flooding" to the Hazard Risk and Vulnerability page. Linked to https://www.floodsmart.gov/flood-insurance-cost/calculator
7/29/2021	Regional Presentation	LEPC Members	Slideshow	Presented at Talbot's LEPC Meeting, discussed hazard mitigation and sought feedback.
7/29/2021	Social Media Material	Core Team, Planning Committee, Stakeholders	Image	Created an image meant to be shared on social media to advertise the Public Survey.
7/30/2021	Press Release	Public	Press Release, link to project website, link to public survey.	A press release in the Star Democrat (a newspaper serving the Eastern Shore region) shows the plan update process, including project details and the project website. The release encourages public participation and links to the public survey.
8/3/2021	Social Media Post	Public	Link to project website and public survey	Post on DES Facebook page promoting the project website and the public survey
8/17/2021	Regional Planning Meeting	Eastern Shore Planners	Survey, draft of the Upper Eastern Shore Regional Recovery Plan, and jurisdiction round table.	The Eastern Shore Planners Meeting discussed the Upper Eastern Shore Regional Recovery Plan and included a jurisdictional round table in which Talbot County announced that they are in the process of updating their hazard mitigation plan.

Talbot County Hazard Mitigation Planning, Training, And Public Outreach Initiatives				
Date	**Meeting, Training, or Outreach Activity**	**Target Audience**	**Materials Provided**	**Comments/Input**
8/18/2021	Municipal Questionnaire	Municipalities	Questionnaire/Packet	The Municipal Questionnaire was mailed to: Easton, Oxford, Queen Anne, St. Michaels, and Trappe. It included a one pager letter detailing the purpose of the questionnaire.
9/9/2021	Municipal Meeting	St. Michaels	Results of stormwater study conducted for the town	A WebEx was hosted with St. Michaels to discuss their municipal questionnaire answers and further discuss their current projects and action items.
9/9/2021	Sea Level Rise Commission – St. Michaels	St. Michaels Sea Level Rise Commission	N/A	Staff (and HMPC members) from the Town of St. Michaels updated their Sea Level Rise Commission on the hazard mitigation plan update process.
9/22/2021	HMRP Stakeholder Meeting #2	HMRPC Stakeholders	WebEx Meeting, Agenda and Meeting Notes (PDF)	Agenda: Hazard Mitigation Overview, Project Timeline, Plan Update Progress Report, Draft Natural Hazard Chapters, Outreach Activities (Municipal, Public, Social Media), Mitigation Action Items Status Update, Mitigation Action Items Workshop, Next Steps
9/24/2021	Social Media Image	Core Team, Planning Committee, Stakeholders	Image	Created an image meant to be shared on social media to advertise the Public Survey.
9/24/2021	Meeting Notes	Core Team, Planning Committee, Stakeholders	PDF	Meeting notes from the second stakeholder meeting were sent to the stakeholder group and uploaded to the project website.
9/27/2021	Social Media Post	Public	Link to project website and public survey	Post on DES Facebook page promoting the project website and the public survey
10/17/2021	Website Update	Public	Mapping Images	Shoreline Erosion, Social Vulnerability, and FEMA SFHA mapping for Talbot County was added to the website. The mapping was in relation to vulnerabilities such as structures, critical facilities, and population centers.
11/19/2021	HMRP Stakeholder Meeting #3	Core Team, Planning Committee, Stakeholders	In-person Workshop, Handouts, Agenda, PPT, Polls, Ranking Exercise	The stakeholders and HMPC met for an in-person Mitigation Action Item Workshop at the Talbot Community Center. HMPC members completed project sheets, provided feedback, and ranked action items for prioritization. Two new action items were added by Easton Utilities during this workshop.
12/16/2021	Core Team Planning Meeting THIRA	Core Team	WebEx, PowerPoint Presentation	Met with THIRA core planning team to discuss the planning process moving forward with THIRA. Set a date for the kick-off meeting at the beginning of January 2022.
12/17/2021	Website Update	Public	Mapping Images and Results	Added Culvert Inventory and Culvert Rating Maps (2) to the project's "Plan Update" section.
12/21/2021	Core Team Coordination	Geneva Schaffle	Email	Coordinated with Geneva Schaffle regarding dam safety outreach for the 4 low hazard dams located in Talbot County. Suggested that Scott Bass (Acting Director of MD Dam Safety Inspection and Compliance) be contacted for information regarding these dams and any potential concerns for Talbot County and recommendations or action items.
1/13/22	Website Update	Public	Draft Natural Hazard Chapters 4 through 10 and a Review Form	Draft Natural Hazard Chapters were uploaded to the project's website and a form one created to gather public feedback. Public comments gathered from the project's website were discussed by the HMPC for inclusion within the plan update. Updates were made as necessary based upon public feedback.
1/21/22	Website Update	Public	Draft Chapter 11: Mitigation and Resilience Goals, Objectives, and Action Items	The draft of Chapter 11: Mitigation and Resilience Goals, Objectives, and Action Items was uploaded to the project's website for public review and comment. Public comments related to mitigation strategies were review by the HMPC prior to inclusion in the HMRP. Updates based on public comment were made as necessary to Chapter 11.

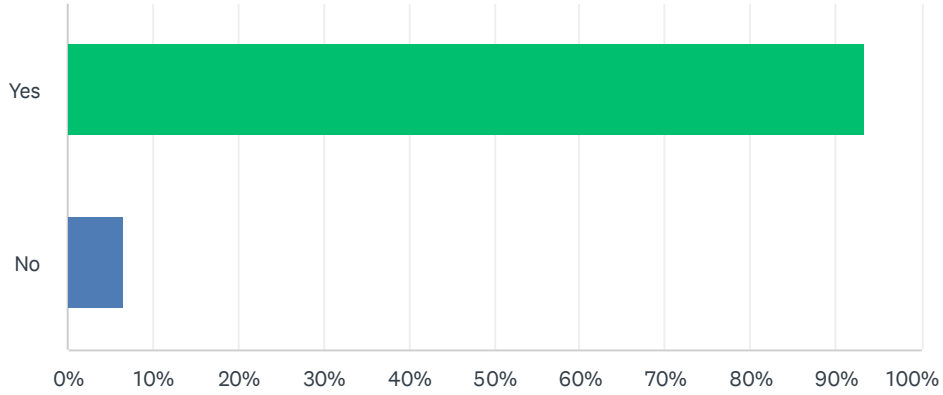
Talbot County Hazard Mitigation Planning, Training, And Public Outreach Initiatives				
Date	**Meeting, Training, or Outreach Activity**	**Target Audience**	**Materials Provided**	**Comments/Input**
2/2/22	Core Planning Team and Dam Safety Coordination	Core Team and County Dam Safety	Mapping of the 4 low hazard dams in Talbot County and their inundation areas.	Mapping was created for the four low hazard dams in Talbot County and updates related to dams in Talbot County were provided by Scott Bass, Acting Chief of Dam Safety Inspection and Compliance Division. Additional updates were provided by John Roche, Chief, Dam Safety Permits Division.
2/10/2021	Talbot County DES FB Page: Social Media Outreach	Public	Social media post with links to the project website and public comment form.	"Please Share 📣📲📣 Talbot County is updating our Hazard Mitigation and Community Resilience Plan and we need your help! Mitigation is actions taken to reduce the risk from hazards that pose a threat to our area. Talbot County's Hazard Mitigation Plan takes into account the threats and hazards that pose risk to our area, the make-up of our county (geographically and culturally), and facets of our community that allow us to adapt and bounce back in order to create mitigation strategies for the next five years. Please take the time to visit our website and give us your feedback on our plan! https://www.talbothazardplan.org/ The entire draft plan and an insight into our planning process over the last year are available on our website. You can leave your comments directly here https://www.talbothazardplan.org/publicreviewcommentform For any questions, feel free to contact the Department of Emergency Services at 410-770-8160 or gschaffle@talbgov.org"
2/10/2021	Public Plan Review	Public	Draft Plan	The public survey information was posted on the Town of Oxford's Facebook page in August of 2021 and was also posted within the Oxford Community News and Chat Group at the same time. The draft plan review invitation was posted on Oxford's website home page on February 10, 2022. Notices were provided.
2/10/2022	Email	Public and Stakeholders	Email (Draft Plan, project website link)	A link to the Draft Plan on the project website was sent to stakeholders, encouraging feedback and involvement in reviewing the plan update.
2/15/2022	Municipal Meeting	Town of Oxford	Critical and Public Facility Maps	The Town of Oxford discussed updates and modifications to their critical and public facilities represented within the draft plan. Updates were made to the facilities based upon feedback gathered during the call.
3/1/2022	Talbot County, Oxford, MDEM Mitigation Discussion	Talbot County, Town of Oxford, and Maryland	N/A	Meeting discussed preliminary questions from Oxford and Talbot County regarding mitigation projects to reduce risk to homeowners in flood zones within Oxford. Mitigation plan/action items were discussed along with funding sources.
3/2/2022	Emergency Services Advisory Board	Emergency Services Advisory Board and its stakeholders	N/A	The HMP was discussed as public feedback comments were disseminated to this group and their stakeholders. Discussion on critical facilities as it pertains to Emergency Services. Discussion on support of this plan and projects for the department in years to come.
3/2/2022	Email	Public and Stakeholders	Email (Draft Plan, project website link)	A link to the Draft Plan on the project website was sent to stakeholders, encouraging feedback and involvement in reviewing the plan update.

APPENDIX G:

Public Survey Results

Q1 Do you live in Talbot County?

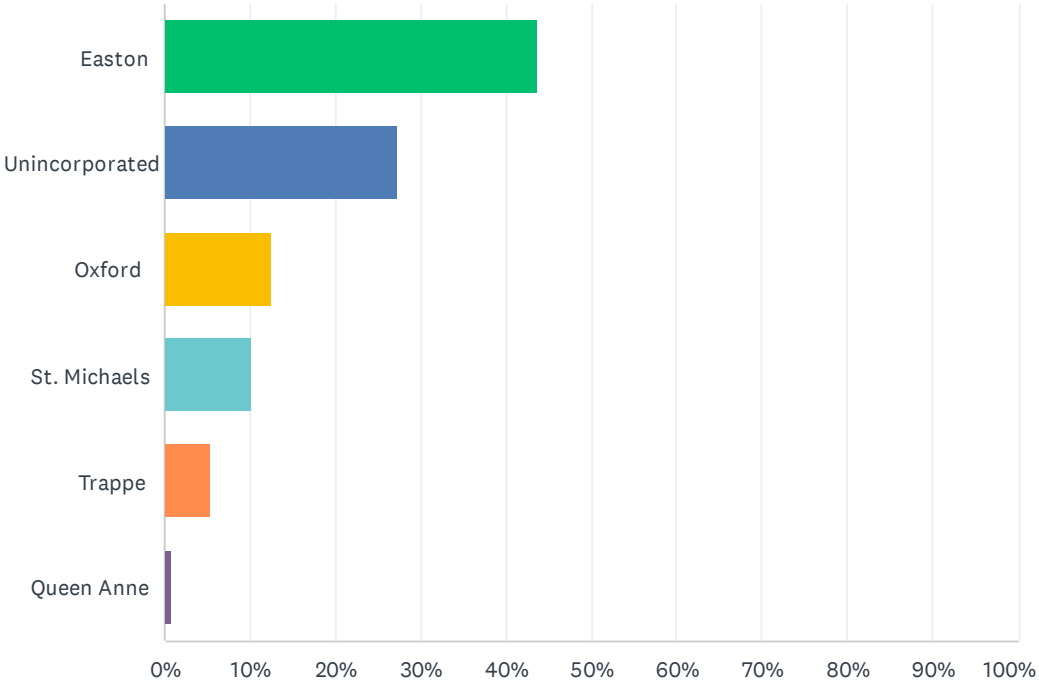
Answered: 390 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	93.33%	364
No	6.67%	26
TOTAL		390

Q2 If you live in a municipality, please indicate which community.

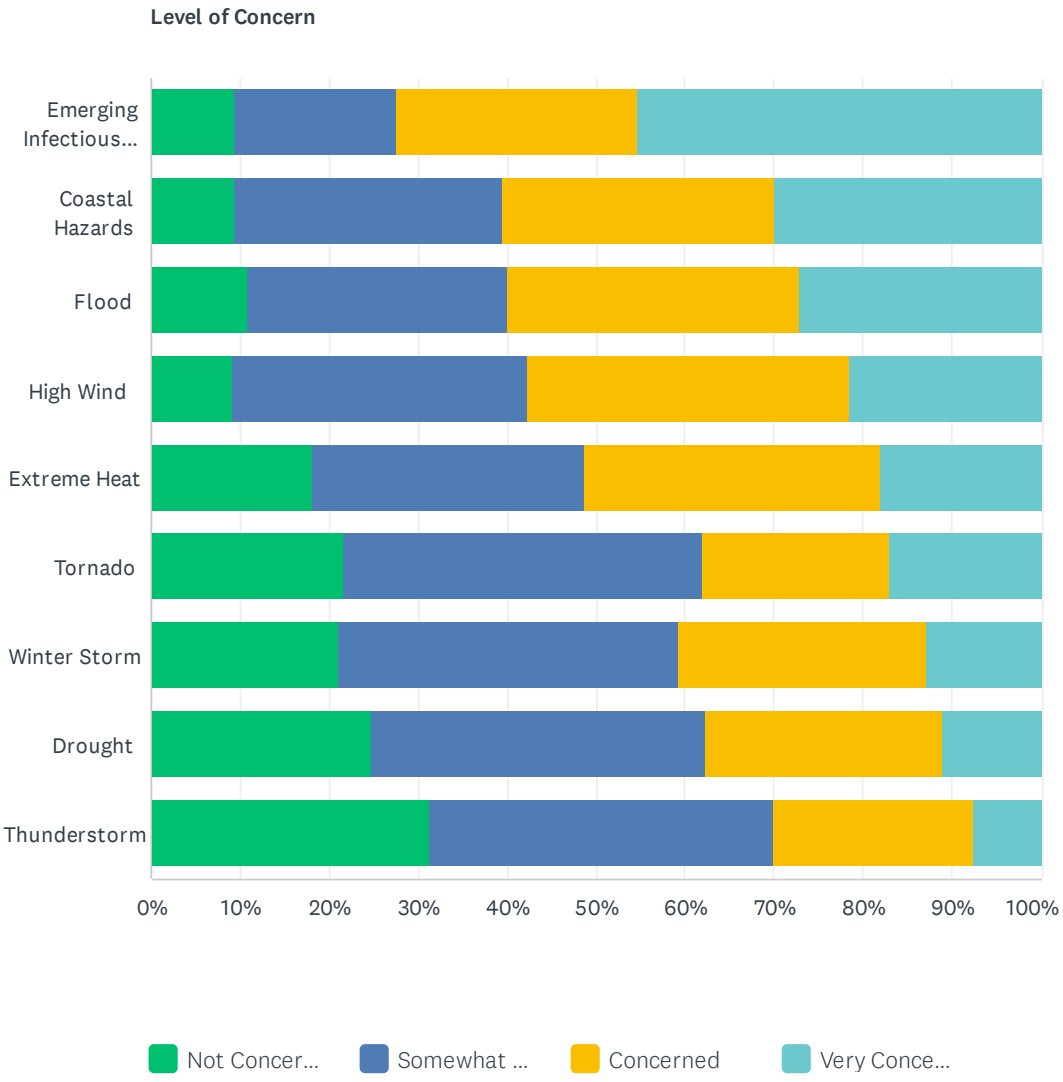
Answered: 355 Skipped: 35



ANSWER CHOICES	RESPONSES	
Easton	43.66%	155
Unincorporated	27.32%	97
Oxford	12.68%	45
St. Michaels	10.14%	36
Trappe	5.35%	19
Queen Anne	0.85%	3
TOTAL		355

Q3 Please indicate your level of concern for each hazard using the drop down menu.

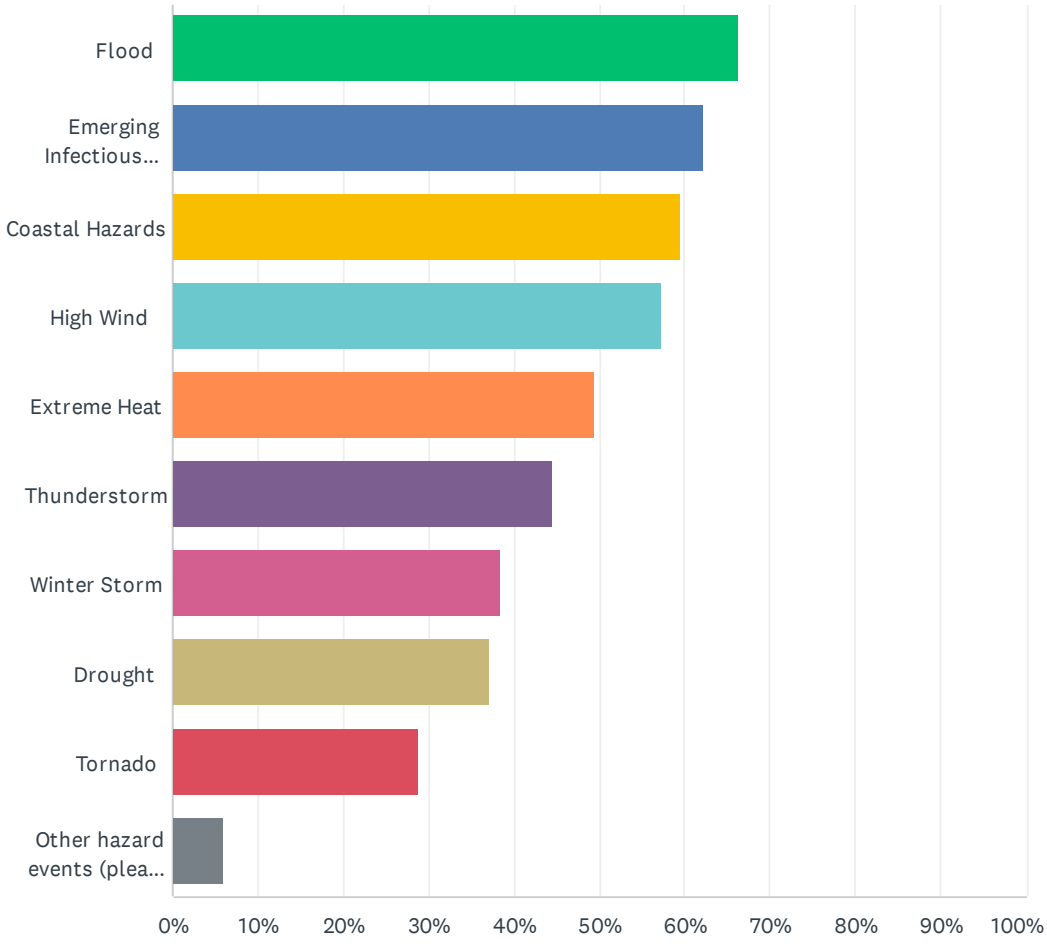
Answered: 357 Skipped: 33



Level of Concern	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	TOTAL
Emerging Infectious Disease	9.32% 33	18.36% 65	26.84% 95	45.48% 161	354
Coastal Hazards	9.32% 33	30.23% 107	30.51% 108	29.94% 106	354
Flood	10.86% 38	29.14% 102	32.86% 115	27.14% 95	350
High Wind	9.14% 32	33.14% 116	36.29% 127	21.43% 75	350
Extreme Heat	18.29% 64	30.29% 106	33.43% 117	18.00% 63	350
Tornado	21.78% 76	40.11% 140	21.20% 74	16.91% 59	349
Winter Storm	21.02% 74	38.35% 135	27.84% 98	12.78% 45	352
Drought	24.79% 87	37.61% 132	26.50% 93	11.11% 39	351
Thunderstorm	31.21% 108	38.73% 134	22.54% 78	7.51% 26	346

Q4 Please choose from the below list to indicate which hazard events you feel may particularly affect your community. (Please check all that apply.)

Answered: 350 Skipped: 40



ANSWER CHOICES	RESPONSES	
Flood	66.29%	232
Emerging Infectious Disease	62.29%	218
Coastal Hazards	59.43%	208
High Wind	57.43%	201
Extreme Heat	49.43%	173
Thunderstorm	44.57%	156
Winter Storm	38.29%	134
Drought	37.14%	130
Tornado	28.86%	101
Other hazard events (please describe)	6.00%	21
Total Respondents: 350		

Q5 Are you concerned with any other hazards not identified in this survey?

Answered: 145 Skipped: 245

#	RESPONSES	DATE
1	loss of communication	2/18/2022 6:34 AM
2	people burying trash and open burning	2/17/2022 4:52 PM
3	No	2/17/2022 10:46 AM
4	drinking water -- water treatment has been neglected	2/10/2022 4:10 PM
5	As a shoreline property owner with 1 foot of erosion per year (documented) for 10 years… still can't get riprap approval to protect further erosion… let alone restore.	2/10/2022 12:47 PM
6	Sea level rise. Loss of residential, agricultural, and commercial land to SLR and increased salt water flooding.	11/24/2021 12:47 PM
7	Too much development, more than this land can safely handle, leading to concerns with sewage and trash. Concern with trash and pesticides and poisons/medications in our drinking water. I am afraid to drink tap water here.	11/24/2021 12:42 PM
8	Polluted waterways	10/8/2021 11:06 AM
9	Covid	9/28/2021 1:45 PM
10	Joe Biden being our president	9/28/2021 4:13 AM
11	Other people that can't drive in emergencies whether it be snow ice flooding high winds and causing hazards for others. Better use of ham radio operators like myself as a reporting system.	9/27/2021 11:03 PM
12	No	9/27/2021 4:12 PM
13	No	9/27/2021 12:46 PM
14	No	9/27/2021 11:09 AM
15	Hazardous material transportation in rte 50	9/27/2021 11:03 AM
16	No	9/23/2021 10:11 AM
17	Over building; environmental waste in the ground, water, and air.	9/3/2021 1:12 PM
18	no	9/3/2021 11:22 AM
19	no	9/2/2021 4:55 PM
20	internet outages	8/28/2021 7:31 AM
21	Any event that would result in long-term loss of electricity.	8/27/2021 1:20 PM
22	No	8/26/2021 9:37 PM
23	Most of the people who cut lawns -- eitehr their own or for hire3, cut the GRASS too short and with the heat we get a yard full of weeds. Then they use chemicals to try to kill those weeds. If they learned to cut the GRASS to the proper length, our air would be healthier and the run-off would not impact the Bay. Lastly, we would have fewer weed seeds/pollen in the air.	8/20/2021 10:45 AM
24	Tree limbs coming down, even in mild storms.	8/19/2021 6:49 PM
25	Interruptions in 'the grid' - power/water/internet	8/16/2021 6:37 PM
26	If traffic is considered a hazard, then yes I am concerned about traffic through Talbot Co.	8/15/2021 11:51 AM
27	Not a hazard but I am very concerned with digital infrastructure during an event. I live in the town of Easton and have terrible cell service and with a high percentage of civilians dependant	8/15/2021 9:45 AM

	on cell service that calls for assistance during an event may not make it to the proper resources.	
28	Riots, Looting, Civil Unrest	8/15/2021 7:41 AM
29	Coastal erosion	8/14/2021 8:39 PM
30	No	8/14/2021 7:20 AM
31	No	8/13/2021 8:21 PM
32	Increased RT. 50 traffic & uncontrolled building without proper infrastructure for the future.	8/13/2021 5:27 PM
33	civil division caused by politics	8/13/2021 4:29 PM
34	Yes. Not sure how to express this as an event, but it may be similar to coastal hazards in the way it exists but is getting worse: ecological imbalances that lead to overgrazing by deer, land being overrun by invasive species (from English ivy to Callery pear trees), and massive losses of insect populations (that fuel the food web and control populations of pests on plants).	8/13/2021 4:24 PM
35	Manmade disaster -- toxic spills, terrorist attack, nuclear accident Calvert Cliffs	8/12/2021 6:48 PM
36	water quality	8/11/2021 12:13 PM
37	nor'easters	8/9/2021 5:45 PM
38	carcinogens in water and soil	8/9/2021 3:22 PM
39	No	8/9/2021 9:22 AM
40	Speeding tourists causing accidents all over our area.	8/8/2021 6:41 PM
41	No	8/7/2021 1:36 PM
42	I am concerned about local authorities overstepping their boundaries and violating the Constitution	8/6/2021 8:30 PM
43	Toxic spills	8/6/2021 6:01 PM
44	Electric grid failure Catastrophic explosion at Calvert Cliffs Pollution or depletion of aquifer	8/6/2021 4:31 PM
45	Water quality	8/6/2021 3:40 PM
46	Sea level rise increases magnitude of impact of all the indicated storm and flooding events	8/6/2021 12:24 PM
47	No	8/6/2021 6:17 AM
48	roundup and other environmental poisons	8/5/2021 4:14 PM
49	Disease carrying transients and permanents.	8/5/2021 11:32 AM
50	Erosion	8/5/2021 9:54 AM
51	Hurricane	8/5/2021 9:50 AM
52	no	8/5/2021 9:40 AM
53	Pollution in local waters of the Bay	8/5/2021 9:07 AM
54	No	8/5/2021 8:28 AM
55	The increase in bacteria and parasites in our waterways.	8/5/2021 7:01 AM
56	No	8/5/2021 12:35 AM
57	Invasive species and the disappearance of marine animals that the watermen, sport fishers and community depends on for survival.	8/4/2021 7:29 PM
58	Bay/shoreline deterioration and related impacts on local food and labor economy	8/4/2021 5:29 PM
59	No	8/4/2021 5:23 PM
60	Cyber - Cellular Attacks	8/4/2021 4:49 PM
61	Fire	8/4/2021 4:14 PM

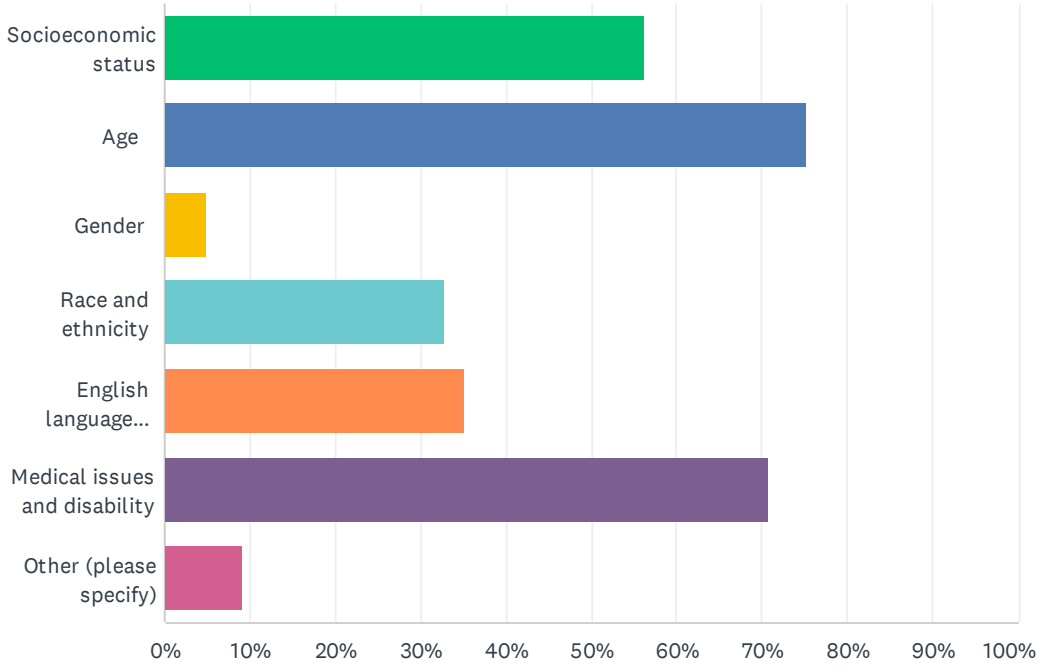
62	No	8/4/2021 4:09 PM
63	No	8/4/2021 2:17 PM
64	no	8/4/2021 1:21 PM
65	No	8/4/2021 12:42 PM
66	No	8/4/2021 12:34 PM
67	No	8/4/2021 12:22 PM
68	no	8/4/2021 11:56 AM
69	Speeding on Morris Street and other roads.	8/4/2021 10:46 AM
70	No	8/4/2021 10:19 AM
71	Democratic propaganda	8/4/2021 10:17 AM
72	I would like to see some real teeth in mitigation strategies for infectious diseases.	8/4/2021 10:02 AM
73	No	8/4/2021 9:32 AM
74	No housing for people who need to move.	8/4/2021 9:31 AM
75	no	8/4/2021 8:27 AM
76	Road ditches not maintained causing streets to flood and block escape from rising waters	8/4/2021 6:47 AM
77	No	8/4/2021 6:29 AM
78	Pollution affecting public health	8/4/2021 6:23 AM
79	No	8/4/2021 6:21 AM
80	Cyberattack on infrastructure that causes loss of power, water, fuel, etc.	8/4/2021 5:08 AM
81	No	8/4/2021 12:47 AM
82	Power loss and no option for sewer hookup that may lead to exacerbation of climate and environmental disasters.	8/3/2021 11:46 PM
83	No	8/3/2021 11:42 PM
84	No	8/3/2021 10:40 PM
85	No	8/3/2021 9:04 PM
86	Fire with exposure to the community of hazardous chemicals. Active shooter.	8/3/2021 8:59 PM
87	No	8/3/2021 8:52 PM
88	Traffic lights on 50, there needs to be a warning before airport road stating lights ahead. Like they do at 404. And the same at the south end of the bypass. Too many accidents resulting in serious injury and death in the last 2 years	8/3/2021 7:50 PM
89	water pollution. Sewer drainage.	8/3/2021 7:17 PM
90	Fire	8/3/2021 6:55 PM
91	No	8/3/2021 6:54 PM
92	No	8/3/2021 6:42 PM
93	No.	8/3/2021 6:03 PM
94	Rural area without broadband	8/3/2021 5:17 PM
95	No	8/3/2021 5:12 PM
96	No	8/3/2021 4:44 PM
97	Over population, destruction of wetlands	8/3/2021 4:42 PM

98	Zombies	8/3/2021 4:27 PM
99	Prolonged power outages	8/3/2021 4:22 PM
100	Yes	8/3/2021 4:19 PM
101	emerging infectious diseases for local our local flora and fauna.	8/3/2021 4:06 PM
102	none	8/3/2021 4:02 PM
103	no	8/3/2021 3:49 PM
104	Speeding down ALL our roads from tourists as well as locals that is getting MUCH MUCH worse and our police are unable to do anything for fear for their lives or some imagined racist event. Also INCREASED CRIME for the same reasons mentioned.	8/3/2021 3:38 PM
105	No	8/3/2021 3:18 PM
106	no	8/3/2021 3:13 PM
107	no	8/3/2021 2:50 PM
108	No	8/3/2021 2:44 PM
109	Vehicular Traffic-safety and volume. Also see drinking water above.	8/3/2021 2:40 PM
110	no	8/3/2021 2:20 PM
111	No	8/3/2021 2:18 PM
112	Exit from Glebe rd onto Tunis Mills rd. Tree to right obstructs vision of oncoming traffic.	8/3/2021 2:18 PM
113	Rising crime, breakdown of social norms	8/3/2021 2:16 PM
114	no	8/3/2021 2:03 PM
115	Getting more and more days with tidal water up in our yard and further and further up in the yard.	8/3/2021 1:44 PM
116	no	8/3/2021 1:42 PM
117	No	8/3/2021 1:34 PM
118	Rising sea levels	8/3/2021 1:30 PM
119	Stormwater - this is sort of covered in coastal hazards/flood, but water specifically from large rainfall events has been notable the last few years.	8/3/2021 1:29 PM
120	no	8/3/2021 1:26 PM
121	No	8/3/2021 1:24 PM
122	No, I am big and brave.	8/3/2021 1:23 PM
123	Truck traffic on Rt. 50 is at increased risk of traffic accidents due to residential and commercial growth on the Eastern Shore. The potential for a chemical spill or leak from a transient vehicle or industrial accident should be examined and drill conducted. Particularly at the intersection of Dover Rd. and 50, where an evacuation of the Country School could be necessitated.	8/3/2021 1:23 PM
124	Socioeconomic factors (especially when driven by political pressure) which adversely affect individuals and families with limited earnings/resources.	8/3/2021 1:08 PM
125	No	8/3/2021 1:01 PM
126	Not at this time	8/3/2021 12:50 PM
127	Covid 19	8/3/2021 12:46 PM
128	No	8/3/2021 12:44 PM
129	Rise in racism and violence brought on by white supremacists especially due to our proximity to DC and our remote nature.	8/3/2021 12:44 PM

130	No	8/3/2021 12:42 PM
131	No	8/3/2021 12:37 PM
132	Ignorance. Failure to respect, understand and follow science. We’re all in this together.	8/3/2021 12:35 PM
133	cyber attack	8/3/2021 12:30 PM
134	No	8/3/2021 12:29 PM
135	No	8/3/2021 12:18 PM
136	Nuclear, chemical	8/3/2021 12:12 PM
137	No	8/3/2021 12:10 PM
138	No	8/3/2021 12:10 PM
139	Not that I can think of.	8/3/2021 11:56 AM
140	Light pollution	8/3/2021 11:51 AM
141	No	8/3/2021 11:42 AM
142	nope	8/3/2021 11:39 AM
143	Climate change	8/3/2021 9:19 AM
144	No	8/1/2021 11:17 AM
145	Over development that will make the community's response more difficult.	7/25/2021 6:37 PM

Q6 In terms of social vulnerability, do you feel that a specific group or groups in the County are particularly at risk for or could be harmed by any of the hazard events listed in question 3? This could be due to age, location, occupation etc. This question is not intended to be limited to certain groups - we are eager to learn of any and all types and sizes of groups you think might be at particular risk.

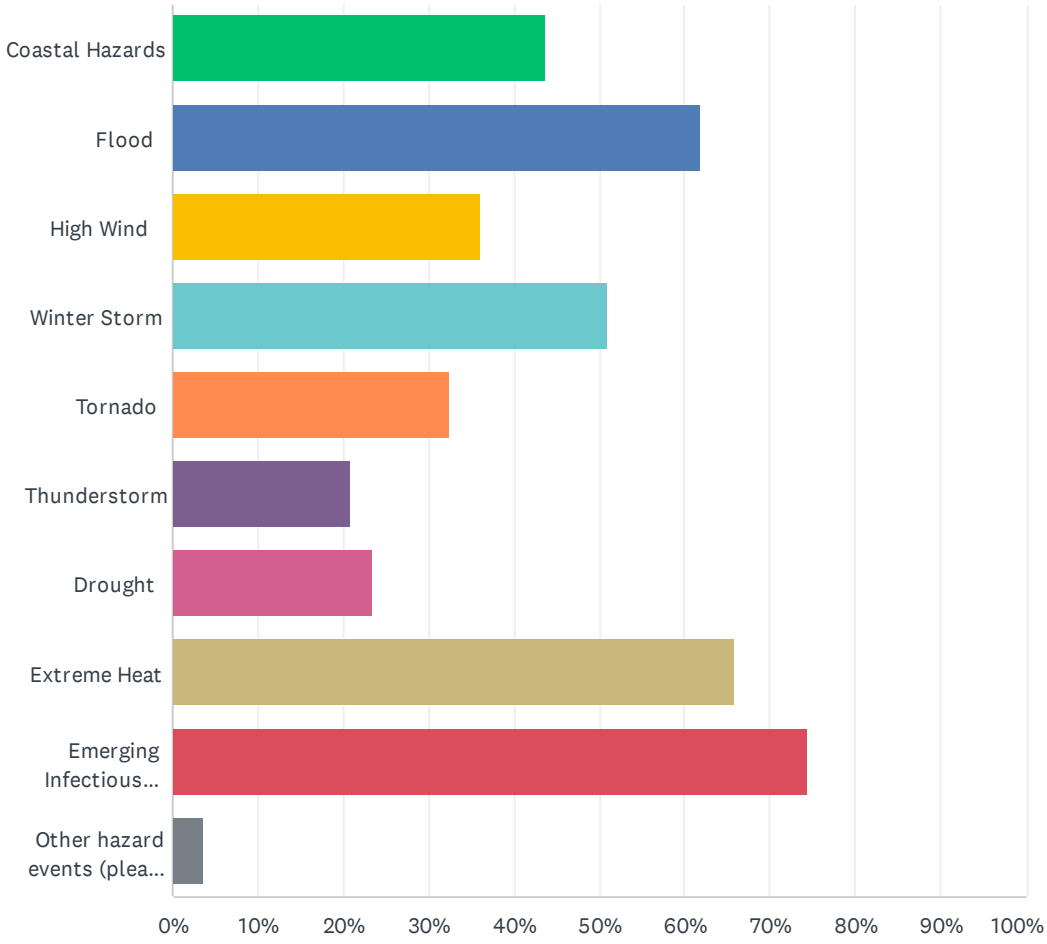
Answered: 307 Skipped: 83



ANSWER CHOICES	RESPONSES	
Socioeconomic status	56.35%	173
Age	75.24%	231
Gender	4.89%	15
Race and ethnicity	32.90%	101
English language proficiency	35.18%	108
Medical issues and disability	70.68%	217
Other (please specify)	9.12%	28
Total Respondents: 307		

Q7 Based on the group(s) you have selected in the previous question, please select which hazard events you feel may particularly affect those group? (Multiple options may be chosen.)

Answered: 302 Skipped: 88



ANSWER CHOICES	RESPONSES	
Coastal Hazards	43.71%	132
Flood	61.92%	187
High Wind	36.09%	109
Winter Storm	50.99%	154
Tornado	32.45%	98
Thunderstorm	20.86%	63
Drought	23.51%	71
Extreme Heat	65.89%	199
Emerging Infectious Disease	74.50%	225
Other hazard events (please describe)	3.64%	11
Total Respondents: 302		

Q8 In your opinion, what steps could be undertaken to reduce or eliminate the risk of future hazard damages?

Answered: 157 Skipped: 233

#	RESPONSES	DATE
1	I'm afraid there's nothing can be done about rising sea levels.	2/19/2022 12:09 PM
2	strengthen communication channels, more reliable and stronger cell phone service	2/18/2022 6:36 AM
3	that's not my area of expertise -- I sure hope we have some people in Talbot County who have that expertise, if not hire someone who does	2/17/2022 4:54 PM
4	No comment	2/17/2022 10:47 AM
5	I honestly don't know, but forming committees that are aware and know the hazards that are involved may be best to work on each of the conditions	2/14/2022 9:18 AM
6	proper communication and education. Don't assume everyone uses twitter and social media to receive important information, don't assume everyone has a cell phone or internet.As we have seen with covid a good number of people are just not going to listen and/or beleive anything the government tells them	2/10/2022 9:41 PM
7	Slow climate change	2/10/2022 4:47 PM
8	Better shore protection, addressing health care for seniors and others for which transportation - including evacuation - can be a problem. Incorporating protections while building new housing developments.	2/10/2022 4:14 PM
9	Better permit common sense/ help in addressing property shoreline erosion issues. Citizen’s, shoreline property owners should receive the same common sense considerations as the County’s properties… aka, public boat ramps, parking lots, bridge areas, low area roads…	2/10/2022 12:55 PM
10	more communication about events happening or upcoming. A variety of communication avenues	2/10/2022 10:48 AM
11	Expanding broadband for alerts in all areas of the county	2/10/2022 10:40 AM
12	Build and develop only in suitable areas, infill.	11/29/2021 1:27 PM
13	More funding toward mitigation measures and efforts to curb climate change	11/29/2021 12:34 PM
14	Increase local energy production through solar power generatio to reduce relance on regional power grid which may be disrupted (also mitigates climate change). Using brown-fields, commercial roof tops, and commercial parking lots - not agricultural on forest land - as the site for solar arrays. Surveillance and warning system for tornados. Capacity for rapid setup of shelters after natural disasters or extreme heat events. Mandate that natural shoreline area w/ marsh (no rip-rap) to absorb tidal surges. Reduce paved and impervious surfaces . Require new developments to have a neutral or positive effect on stormwater runoff, etc.	11/24/2021 12:51 PM
15	Stop the development of this area! Too many homes and people for the land to support. More convenient recycling and trash in town for tourists. Stop the use of single-use plastics. Make homes more energy efficient. Concern of all the electric usage of so many technology devices that people don't think about - more energy consumer education of the true use of various technology devices and ways to save energy in one's home.	11/24/2021 12:44 PM
16	Protecting our land and waterways will help many of the issues .	10/8/2021 11:08 AM
17	Better system of communication direct to those affected, from education and training, to steps to take to protect yourself	9/27/2021 11:06 PM
18	Vaccines once proven effective should be required except for limited specific reasons.	9/27/2021 9:08 PM
19	Continuing to receive updates through cell phones messaging	9/27/2021 1:44 PM

20	Smart infrastructure planning and preparation	9/27/2021 12:47 PM
21	Reduce global warming	9/27/2021 12:33 PM
22	Address global warming!	9/27/2021 12:15 PM
23	Sorry I don’t have time to answer this question. Feel free to contact me for a discussion	9/27/2021 11:54 AM
24	buried/in ground power & telephone lines	9/27/2021 11:29 AM
25	More communications and outreach.	9/23/2021 11:12 AM
26	can't control the influence of weather	9/3/2021 11:24 AM
27	reliable internet county wide, FIOS storm drain improvements	8/28/2021 7:36 AM
28	For homes and businesses - especially care facilities - it would be helpful to have a program to reduce the cost of generators or other emergency propane/gas back ups for when electricity goes out. Also, I think our warning systems for flash floods could be improved.	8/27/2021 1:22 PM
29	bi-lingual signage	8/27/2021 12:51 PM
30	Uncertain	8/26/2021 9:38 PM
31	vote in different legislators	8/20/2021 10:46 AM
32	Provide free or reduced cost tree assessments for elderly and disabled.	8/19/2021 6:51 PM
33	A detailed coastal assessment for all Talbot County.	8/18/2021 1:23 PM
34	Outreach and information centers	8/18/2021 12:54 PM
35	Better outreach into the community and communication	8/18/2021 12:41 PM
36	Good Lord - I have no idea except to make sure there is some way to COMMUNICATE!	8/16/2021 6:39 PM
37	Planning by officials. Keeping up to date on technology.	8/15/2021 11:53 AM
38	Training, offering FEMA style two week emergency supplies at or below cost, possibly a federal or state rebate if they register or get vaccinated, offer a bumper sticker that has Talbot logo with something catchy like “#TalbotPrepared”	8/15/2021 7:46 AM
39	Continue with education and warnings about impending weather hazards and how to prepare and survive them. You already do this in a variety of ways! Thank you!	8/14/2021 8:45 PM
40	NA	8/14/2021 7:22 AM
41	Increased funding to support county positions responsible for hazard mitigation and emergency services. This county grievously under pays flood mitigation and other emergency type positions within the county system. We need to pay for more experienced and talented position candidates to bring hazard mitigation and emergency services into the future of climate change hazards mitigation. Also, increased funding for a paid professional fire department system.	8/13/2021 8:29 PM
42	Based on income, provide housing upgrades (insulation, etc.) and include solar/other renewables.	8/13/2021 5:31 PM
43	Reduce energy consumption Resource conservation	8/13/2021 4:41 PM
44	Stop all building and improvements on flood-prone areas	8/13/2021 4:32 PM
45	Making tough decisions to reduce climate change by limiting fossil fuel use. Public meetings that show models of impacts of weather events	8/13/2021 4:27 PM
46	Local alerts that could be accessed by a phone call as well as on internet (not Facebook). Example: where roads are flooded,power lines down, shelter information, bi-lingual or machine translation	8/12/2021 6:52 PM
47	living shoreline, oyster restoration, go after Virginia for over crabbing, go after upstate New York for pollution run off	8/11/2021 12:15 PM
48	I don’t know	8/9/2021 10:47 AM
49	Education	8/9/2021 9:25 AM

50	Not sure	8/9/2021 9:23 AM
51	No additional steps needed. Talbot DES does amazing work with communication and response. On my other hazard about accidents, perhaps patrolling route 50 and bypass during day instead of just at night.	8/8/2021 6:44 PM
52	Stop making everything an emergency. Stop lockdowns and stupid mandates	8/6/2021 8:31 PM
53	The County should issue PSA to let people know about the EMS app. It is fairly helpful.	8/6/2021 6:03 PM
54	Need a better Congressman as issues are larger than Talbot. Also more support in Annapolis from all branches of government	8/6/2021 4:37 PM
55	Address sea level rise in low lining areas of our Towns and waterfront communities	8/6/2021 12:25 PM
56	Citizens of TC can take personal responsibility for their physical and property wellbeing.	8/5/2021 6:31 PM
57	good public information sources, warnings	8/5/2021 4:15 PM
58	Reduce impervious surfaces, increase natural shorelines and forested areas, engage with our immigrant community; establish, staff, and advertise a 24-hour human staffed emergency information hotline. The elderly, those without English proficiency, and those without skill at using the internet need to be able to reach a human who can solve their problems or refer them to another human who can.	8/5/2021 1:27 PM
59	The Federal and State sources of funding need to simplify the grant application process and get the money to the groups that can best apply the funds. The local governments need to actively investigate and develop plans to reduce the risks.	8/5/2021 1:00 PM
60	Smart maintenance, upgrading, health screening	8/5/2021 11:37 AM
61	Educate continuously and remind people that things are always changing and evolving. That doesn't always mean doing something new but possibly returning to an old way of things. We have to be ready to accept the challenges put before us.	8/5/2021 10:22 AM
62	Wake up to global warming	8/5/2021 9:53 AM
63	education	8/5/2021 9:41 AM
64	More shoreline erosion control. Perhaps subsidy for homeowners in extreme low lying areas to raise their house.	8/5/2021 9:09 AM
65	Please post the changing wind and tide information in real time during storms. Due to different shore locations this information is critical for individual decisions for action	8/5/2021 8:36 AM
66	Better communication with the public, education of the public (in people's first language) and proactively taking preventive measures in advance.	8/5/2021 7:06 AM
67	Advance warning of imminent events via text message is most helpful. Giving notifications of website address to get more thorough information.	8/5/2021 3:36 AM
68	Response in place	8/4/2021 11:37 PM
69	Reduce emissions, support efforts to bolster shorelines. Most importantly protect waterways from big businesses who are edging out to the watermen. Work to eliminate invasive species that cause disruption to our ecosystems.	8/4/2021 7:33 PM
70	Improved infrastructure and support services (both public works and medical support)	8/4/2021 5:30 PM
71	Continued flood controls , living shoreline, etc	8/4/2021 5:25 PM
72	Improved communications and infrastructure with redundancy built-in	8/4/2021 4:52 PM
73	fund relevant studies to assess the impacts	8/4/2021 4:23 PM
74	Be aware of the weather	8/4/2021 4:10 PM
75	Advance notice and preparation.	8/4/2021 1:23 PM
76	Plans for helping aging population when loss of electric, climate threats, health threats	8/4/2021 1:02 PM
77	Use of all communication sources including television, radio, social media, and text messaging with options for languages other than English	8/4/2021 1:01 PM

78	The County, State, and Municipalities taking a more proactive approach to safety concerns. To include rented properties (lots of Slum Lords in Talbot County who do not manage their properties nor tenants properly), HOAs that don't follow their own rules, etc.	8/4/2021 12:57 PM
79	Plenty of warning for residents to make plans	8/4/2021 12:43 PM
80	Improve street drainage; close off streets that are flooded to prevent "floor tourism."	8/4/2021 12:31 PM
81	Continued education targeting these groups.	8/4/2021 11:57 AM
82	Maintain sufficient numbers of emergency personnel.	8/4/2021 11:11 AM
83	Build up the causeway in Oxford	8/4/2021 10:18 AM
84	Translated Resources for other languages, more support for neighbors. Outreach to make sure those individuals have a support system set up so that in a crisis situation they know who to call for help when needed.	8/4/2021 9:35 AM
85	Uncertain	8/4/2021 9:33 AM
86	Don’t allow over development of area this increases risk of flooding / costal problems puts strain on infrastructure	8/4/2021 9:15 AM
87	Increased awareness and multi language communication “What if” plans shared with community prior to hazard	8/4/2021 6:31 AM
88	less concentrated development that contributes to flooding from rainfall runoff. Placing more emphasis and priority on development with restrictions on impervious surfaces that increases runoff and land/soil erosion	8/4/2021 6:28 AM
89	Encourage personal responsibility/advance planning	8/4/2021 6:22 AM
90	Unsure. Those who are not financially stable, don’t have healthcare or property insurance, poor diet, etc are always hit the hardest in disasters.	8/4/2021 5:12 AM
91	Continue to do our part to improve the environment. Also, get vaccinated.	8/3/2021 11:48 PM
92	Nobe	8/3/2021 11:43 PM
93	Climate change initiatives, proactive measures along shorelines, community outreach and education	8/3/2021 11:42 PM
94	Emergency response/transport	8/3/2021 9:27 PM
95	Have emergency plans ready.	8/3/2021 8:54 PM
96	Support efforts that transform our economic and energy sectors in order to create communities that can better weather the weather!	8/3/2021 8:47 PM
97	Better advanced warning system. The only way I know what is happening in the area is through Facebook	8/3/2021 7:52 PM
98	Emergency Plans of notifying community	8/3/2021 7:19 PM
99	Pay attention to SCIENCE	8/3/2021 6:57 PM
100	Unsure	8/3/2021 6:55 PM
101	beyond our control	8/3/2021 6:23 PM
102	Education of the public	8/3/2021 6:17 PM
103	Help property owners in low-lying and flood prone areas with lifting their properties, via grants and identifying contractors who are willing to do this type of work. Also have marina owners do their part in helping mitigate this issue as well.	8/3/2021 6:05 PM
104	Community-wide mask mandates for control of airborne infectious diseases, cooling or warming centers for extreme heat or winter storms. Plan for checking on vulnerable people.	8/3/2021 6:05 PM
105	Guidance on mitigation strategies and preparation	8/3/2021 5:13 PM
106	Address rising tides in our town.	8/3/2021 5:11 PM

107	Effective communication that reaches EVERYONE regardless of technology. Preparation, preparation, preparation. Educating everyone on possible scenarios and how to prepare.	8/3/2021 4:57 PM
108	More education on these areas to the community at large	8/3/2021 4:45 PM
109	Am not sure.....	8/3/2021 4:24 PM
110	Practice emergency sheltering for most vulnerable groups: Disabled, aged	8/3/2021 4:22 PM
111	update infrastructures, rebuild coastlines, run utilities underground	8/3/2021 4:09 PM
112	Improvement in housing for low income/moderate income person; additional programs to help elderly/disabled persons on fixed income.	8/3/2021 4:05 PM
113	More follow through on the education we provide. Everyone does a fantastic job educating the public (ESPECIALLY the vulnerable, low income, race/ethnic groups etc...) BUT they still won't change their behaviors because of the inconvience and extra work involved and "....it's someone else's job" or "...the rich can pay for it...". Fines should be instituted for non compliance....i.e. Reduction in electric use during heat extremes, water reduction in droughts, cutting back overgrowth or notifiying State/local roads of need for cutting, cleaning up their own yards with trash/junk, recycling etc....Making the homeowner actually BE responsible, not just talk about it. Communities as well with community cleanups and support.	8/3/2021 3:47 PM
114	Prevent deforestation and limit new development that impacts forest and landscape growth.	8/3/2021 3:37 PM
115	We must communicate and make sure everyone is educated on the hazards.	8/3/2021 3:20 PM
116	unknown	8/3/2021 2:51 PM
117	Proof of vaccination	8/3/2021 2:45 PM
118	Community outreach-information on self-help preparations given to: Schools/Churches/Fraternal Organizations/Farmers/Businesses, etc.	8/3/2021 2:44 PM
119	Improved affordable housing	8/3/2021 2:39 PM
120	Develop effective tracking systems Implement effective warning systems Identify effective evacuation systems	8/3/2021 2:23 PM
121	Education efforts regarding preventative measures and risk factors if you live in specific areas of the County.	8/3/2021 2:21 PM
122	Emergency alerts	8/3/2021 2:18 PM
123	Much more enviromental study for new subdivision developments	8/3/2021 2:18 PM
124	Keeping track of the elderly	8/3/2021 2:08 PM
125	diversify the communication, provide additional 'safe havens' for heat, cold, and water.	8/3/2021 2:04 PM
126	Better actual measurement of official ‘high water days’, levels with some fixed baseline of a selected past year. ‘’You can’t manage what you don’t measure’ and public needs to be able to easily see this data.	8/3/2021 1:51 PM
127	Increased county-wide notification and communication when the potential for issues arises; public education	8/3/2021 1:33 PM
128	a) infrastructure investment into stormwater management, b) planning for future climate scenarios, c) figure out a way to do coastal retreat without bankrupting the county's property tax revenue	8/3/2021 1:31 PM
129	Collaboration and listening, community building and relationships. Too many organizations on the Eastern Shore working to do the same things, get folks around the table and collaborate.	8/3/2021 1:29 PM
130	It's not my job to tell you how to do yours.	8/3/2021 1:27 PM
131	Just say no. The tornado cannot legally enter your residence if you do not grant access.	8/3/2021 1:26 PM
132	That's a tough question! I appreciate why you would ask, but respectfully suggest that this should have been multiple choice (with "other"). I will say that it is obvious the "haves" have all the advantages (accessible resources to build/rebuild, insurance to cover losses, access to	8/3/2021 1:12 PM

	alternative lodging (eg 2nd homes), while the "have nots" have limited access to inadequate resources.	
133	Big question for a little space!	8/3/2021 12:54 PM
134	it's mother nature, you can't stop it, all you can do is communicate the threat to people. In my personal experience it is wrong to assume people have high speed internet, it is wrong to assume people use cell phones and I live in Royal Oak but have an Easton physical address and I will get phone warnings about Easton Cable which make no sense and not Bay Hundred notices because you think I live in Easton when in fact I am right in the middle of Royal OAk. Big problem there in communicating things	8/3/2021 12:49 PM
135	Education in equity Education in every aspect of community out reach Education Preparedness	8/3/2021 12:49 PM
136	This mitigation plan	8/3/2021 12:45 PM
137	Plan ahead	8/3/2021 12:43 PM
138	updated risk assessment for each hazard type and identify realistic and practical mitigation factors for each type	8/3/2021 12:40 PM
139	Make sure information is in English and Spanish. Encourage people to have a plan for emergencies. Get vaccinated.	8/3/2021 12:39 PM
140	Support serious climate change research and action. Support science for pandemic mitigation	8/3/2021 12:36 PM
141	proper planning for events	8/3/2021 12:31 PM
142	I am not sure.	8/3/2021 12:30 PM
143	County has a good process in effect	8/3/2021 12:26 PM
144	It's hard to reduce or eliminate risk of severe weather since we have no control over it. About all we can do is make plans and have facilities available to respond. e.g. shelters, evacuation routes etc.	8/3/2021 12:24 PM
145	Education, Mitigation projects, Enhanced Early Warning, Enhanced education in K-12 Schools Public and Private	8/3/2021 12:23 PM
146	First hand knowledge that there is a threat	8/3/2021 12:22 PM
147	Continue weather event preparations and partnerships. Evaluate and make recommended improvements to infrastructures such as roads and bridges.	8/3/2021 12:22 PM
148	Trump 2024	8/3/2021 12:21 PM
149	None	8/3/2021 12:15 PM
150	I’m not sure	8/3/2021 12:12 PM
151	Educating the public. Having easily accessible public cooling/heating areas depending on the weather. Have emergency shelters available along with transportation to planned shelters.	8/3/2021 12:03 PM
152	You can’t control Mother Nature.	8/3/2021 11:58 AM
153	Storm water management enhancements, especially in the St. Michaels area. Prohibit building, not just in the flood zones, but consider even further inland.	8/3/2021 9:22 AM
154	I fell the County currently does an adequate job of recovering after an emergency. I do believe that they could be more pro-active before events occur. Communicating and being more open to discussions with residents would help. Ensuring that ditches, spillways, and run-off areas are better maintained,	8/1/2021 11:20 AM
155	Pre-plan for these hazards. Take steps to engage the community. Assess and identify community resources so that when disaster strikes equipment and people can be quickly mobilized	7/30/2021 8:37 AM
156	SHORE UP AREAS TAKE MEASURES TO PROTECT AGAINST THESE FROM HAPPENING CREATE OTHER WAYS OF DEALING WITH HESE SITUATIONS	7/30/2021 12:38 AM
157	You cannot control weather, but you can control over development and unwise development	7/25/2021 6:40 PM

that exacerbates the effects of the hazards you discuss here.