Sussex County Delaware

Multi-Jurisdictional Hazard Mitigation Plan (HMP)

Prepared by The Olson Group Ltd.

July 2022

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RECORD OF CHANGES

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1. INTRODUCTION

PURPOSE

The purpose of the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan Update (from now on referred to as the "Plan") is to continue providing guidance for hazard mitigation in Sussex County. It identifies hazard mitigation goals, objectives, and recommended actions and initiatives for County and jurisdictional governments to reduce injury and damage from natural hazards.

This Plan meets the requirements for a local hazard mitigation plan under Final Rule, 44 CFR 201.6, published by the Federal Emergency Management Agency (FEMA) in September 2009.

This Plan update keeps Sussex County qualified to obtain all disaster assistance, including all categories of Public Assistance, Individual Assistance, and Hazard Mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93288, as amended. In addition, future enhancements of the State All-Hazard Mitigation Plan will allow the State to obtain more significant funding for hazard mitigation planning and projects (20 percent of Federal Stafford Act disaster expenditures versus 7.5 percent for a standard state plan). It also keeps the State eligible for the annually funded Building Resilient Infrastructure and Communities (BRIC) Program, and the Flood Mitigation Assistance Program.

Without this Plan, all eligible local jurisdictions would be ineligible to receive various disaster recovery programs. Including the Public Assistance Program to repair or replace damaged public facilities and the Fire Management Assistance Program to help the State and communities recover from the costs of major disasters. In contrast, the State and local communities would remain eligible for certain emergency assistance and Human Services programs available through the Stafford Act.

ORGANIZATION OF THE PLAN

The Plans organization parallels the structure provided in the Final Rule, 44 CFR 201.4. It has seven sections, appendices containing mitigation assessment annexes., supporting documentation, and adoption resolutions. In addition, there are references to the CFR throughout the Plan. Where possible, these provide specific section and subsection notations to aid the review process.

- Section 1: Introduction
- Section 2: Planning Process

Section 3: Hazard Identification

- Section 4: Risk Assessment
- Section 5: Capabilities and Resources
- Section 6: Mitigation Strategy
- Section 7: Plan Monitoring and Maintenance
- Appendix A: Jurisdictional Mitigation Assessment Annexes
- Appendix B: Acronyms
- Appendix C: Meeting Documentation
- Appendix D: Adoption Resolutions for Sussex County and the Participating Jurisdictions
- Appendix E: Formal Approval Letters for Sussex County and the participating jurisdictions

MISSION STATEMENT

Continue to develop and update a comprehensive pre-and post-disaster hazard mitigation program guided by the adoption of stormwater management practices, the implementation of codes and regulations, the protection of critical facilities and infrastructure, the adoption of education and outreach efforts, pre-event planning and preparedness, and the identification of projects designed to reduce the vulnerability of individuals, families, households, businesses, infrastructure and critical facilities to the adverse effects of natural hazards.

GOALS AND OBJECTIVES

The Hazard Mitigation Steering Committee supported updating the goals, objectives, and mitigation actions. The mitigation actions address or solve local mitigation issues and problems. Therefore, the Sussex County Hazard Mitigation Steering Committee developed the following mission statement for the Sussex County All-Hazard Mitigation Plan and the following goals for hazard mitigation.

1. Sussex County and participating jurisdictions will continue to adopt enhanced stormwater management practices.
2. Sussex County and participating jurisdictions will continue to adopt and enforce codes and regulations designed to reduce the impact of natural hazards.
3. Sussex County and participating jurisdictions will continue to retrofit and protect critical facilities and infrastructure from natural and human-caused hazards.
4. Sussex County and participating jurisdictions will continue to enhance education and outreach strategies to improve the dissemination of information to the public regarding hazards, including the steps to reduce their impact.
5. Sussex County and participating jurisdictions will continue to improve pre-event planning and preparedness activities.
6. Sussex County and participating jurisdictions will continue to identify and implement sound hazard mitigation projects.

Work continues with local agencies and departments to develop projected timelines and potential funding sources for the actions identified in the mitigation strategy with specific mitigation actions in Section 6 and the Jurisdictional Mitigation Assessment Annexes of the Plan.

PLANNING PROCESS

This Plan update is the product of the efforts of a cross-section of people from the County, jurisdictions, and other interested parties. This effort builds on several mitigation planning initiatives dating back to 2004.

Staff from the Sussex County Emergency Operations Center led the Sussex County All-Hazard Mitigation Plan Update development effort, directed by the Director of the Emergency Operations Center.

The Sussex County Hazard Mitigation Steering Committee (HMSC), assembled by the Sussex County Emergency Operations Center and DEMA Natural Hazards Section, provided guidance and assisted with the development of the All-Hazard Mitigation Plan Update, including review of previous hazard mitigation planning initiatives, development of mitigation strategies, and the strategy implementation plan. In addition, the HMSC and the Hazard Mitigation Working Group (HMWG) members provide expertise and perspective on all aspects of the planning process, including land-use planning, building codes, transportation, and infrastructure. Representation included members from the local government, law enforcement, fire service, licensing & inspections, emergency management community, state agencies, public works, emergency medical professionals, and building officials.

Once the Plan update is promulgated by the Sussex County Council and approved by FEMA, the Committee will function as an advisor to the State Hazard Mitigation Officer on hazard mitigation efforts, including future reviews and revisions.

PARTICIPATING JURISDICTIONS

Participation by local agencies was critical in the development of the Plan. Sussex County and 21 jurisdictions (See list below) participated by identifying potentially vulnerable facilities along with agency-specific goals to address their vulnerabilities through mitigation actions and initiatives.

City of Lewes	Town of Bridgeville	Town of Henlopen Acres
Town of Slaughter Beach	Town of Blades	Town of Laurel
Town of Georgetown	Town of Delmar	Town of Millsboro
City Rehoboth Beach	Town of Dewey Beach	Town of Millville
City Seaford	Town of Ellendale	Town of Milton
Town of South Bethany	Town of Fenwick Island	Town of Ocean View
Town of Bethany Beach	Town of Frankford	Town of Selbyville
Sussex County		

NON-PARTICIPATING JURISDICTIONS

- Town of Greenwood
- Town of Dagsboro
- Town of Bethel

In determining jurisdictional participation in the planning process was adequate for this Plan and the FEMA plan review process, the following were established as minimum criteria:

1. Attendance by a representative of each jurisdiction at two (2) meetings where the development of the Plan was discussed.
2. Completion of portions of the capability assessment survey regarding the identity and participation of floodplain administrators and the status and update intervals for master plans, zoning plans, and
3. Identification and documentation of at least two (2) mitigation actions for identified hazards.
4. Adoption of the Plan after the Plan's designation as "approvable pending adoption" is received from DEMA and FEMA.

HAZARDS AND RISKS

In the hazard identification, analysis, and vulnerability assessment, completed as part of the plan update, the HMSC and HMWG identified and considered the following hazard that has significant potential to affect the people, environment, economy adversely, and property of Sussex County:

Eleven (11) Natural

- Drought
- Earthquake
- Beach/Soil Erosion
- Extreme Heat/Cold
- Flooding
- Hail
- Hurricane Wind (Straight Line Winds)
- Thunderstorm
- Tornado
- Wildfire
- Winter Storm (Severe Weather)

Five (5) Human-caused

- Active Shooter
- Terrorism
- Dam/Levee Failure
- Hazmat
- Pipeline Failure

One (1) Technological

- Cyber Terrorism

Based on the findings, analysis, and results of surveys presented to both HMSC and HMWG, the hazards, their definition, and the priority can be found in Section 3.

INTERIM FINAL RULE REQUIREMENT FOR ADOPTION AND APPROVAL

Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation the plan has been formally adopted by the governing body of the jurisdiction requesting approval (e.g., City Council, County Council Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan **must** document that it has been formally adopted.

Requirement §201.6(a)(3): multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, if each jurisdiction has participated in the process. Statewide plans will not be accepted as multi-jurisdictional plans.

ADOPTION AND APPROVAL PROCEDURE

On, (**ENTER DATE),** the Federal Emergency Management Agency (FEMA) Region 3 determined that the Plan was "approvable pending adoption." On, **(ENTER DATE),** the Sussex County Hazard Mitigation Working Group met and recommended that Sussex County and the participating jurisdictions should adopt the Plan. The Plan was submitted to the Sussex County Council as well as the appropriate entity for each participating jurisdiction for review and adoption. The resulting Adoption Resolutions were then submitted to FEMA Region 3 for approval. FEMA subsequently issued formal approval letters to Delaware Emergency Management Agency (DEMA) for Sussex County and each participating jurisdiction that adopted the Plan. DEMA, in turn issued approval letters to the approved jurisdictions.

2. PLANNING PROCESS

Requirement §201.6(c)(1): *[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Requirement §201.6(b): *An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.
2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process.
3. Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

PLANNING PROCESS

This section describes the planning process undertaken by Sussex County and The Olson Group Planning Team in preparation for the Plan update.

The Plan update was prepared following the process established in the State and Local Mitigation Plan Development Guides produced by the Federal Emergency Management Agency (FEMA) and 44 CFR 201.6 Local Mitigation Plan. The process includes four basic steps.

1. Organize resources.
2. Assess risks.
3. Develop a mitigation plan.
4. Implement the plan and monitor progress.

RESOURCE ORGANIZATION

Sussex County Emergency Operations was the lead agency for developing the Plan update. At the beginning of the process, a consultant firm, The Olson Group Ltd, was hired to provide technical support to the County and all the member jurisdictions. In addition, several individuals and organizations worked together to develop the Plan update. These participants were organized into two different committees, including:

- Sussex County Hazard Mitigation Steering Committee (HMSC)
- Sussex County Hazard Mitigation Working Group

The Sussex County Hazard Mitigation Steering Committee was comprised principally of representatives from the Operations Center, Local Emergency Planning Committee (LEPC), and Delaware Emergency Management Agency (DEMA). This committee was formed to provide focus and leadership on behalf of the participating jurisdictions in developing these Plan updates. The Hazard Mitigation Steering Committee met regularly during the planning process to receive progress reports from the consultant, review and comment upon draft documents and procedures, implement relevant tasking, and coordinate efforts within the County and participating jurisdictions.

The following table identifies the Hazard Mitigation Steering Committee.

Name & Title	Organization
Joe Thomas, Director	Sussex County EOC
Charles Stevenson, LEPC Chair	Sussex County EOC
Jeff Shockley, Sussex County Floodplain Manager	Sussex County Planning and Zoning
Megan Nehrbas, GIS Manager	Sussex County GIS Office
Nicole Carey– State Mitigation Planner	DEMA
Phillip Cane – State Mitigation Officer	DEMA
Joshua Norris- Hazard Mitigation Planner	FEMA Region III
Adam Montella, Project Manager	The Olson Group, Ltd. (OGL)
Andrew Forcucci, Director of Planning	The Olson Group, Ltd. (OGL)
Anthony Mangeri, HMP, SME Advisor	The Olson Group, Ltd. (OGL)
Scott Sleeman, Planner	The Olson Group, Ltd. (OGL

Table 2-1. Steering Committee

METHODOLOGY

The general workflow for the project consisted of the following steps:

- The Olson Group developed preliminary update versions of documents and planned sections for review by the HMSC. The documents were presented in approximately the same sequence as the information presented in the Plan.
- HMSC representatives reviewed and directed OGL to revise the documents and plan sections.
- HMSC representatives were also responsible for examining work-in-progress with participating jurisdictions and including any revisions.
- OGL worked directly with local jurisdictions in one-on-one sessions to identify and document mitigation actions included in Section 6.
- OGL provided a Committee Draft Plan to all participants via the HMSC for review and comment.
- HMSC representatives directed OGL to make any revisions in their respective County plans before submittal to DEMA and FEMA for review.

The Sussex County representative on the HMSC was the County EOC Director and guided the participating Sussex County jurisdictions via the Sussex County HMWG. The HMWG included all local OEM coordinators and related agencies within the County. The OGL planning team members attended the HMWG meetings. In addition, the planning team typically presented work-in-progress updates like presentations provided to the HMSC.

The guidance provided to the HMWG by the County EOC Director at the meetings and via e-mail correspondence included the following:

- **Data Collection** – A “wish list” of desired information was provided by The Olson Group and relayed to the participating jurisdictions via the local OEM coordinators. A copy of the “wish list” is included in ***Appendix A.***
- **Critical Infrastructure Inventory** – The Olson Group provided the HMWG with spreadsheets with default data listings per HAZUS-MH. The HMWG members reviewed the information and provided revisions compiled for use in developing mitigation actions. The Olson Group also provided directions for capturing more detailed information regarding critical infrastructure for use in this Plan update and future planning efforts via the County EOC Director.
- **Jurisdictional Stakeholder Engagement** – HMSC identified the stakeholders to enlist in the planning effort, including other local departments, schools, and hospitals. The HMWG members were then responsible for following up with potential stakeholders. Stakeholders sometimes participated with the local coordinators in the one-on-one meetings to identify and document mitigation actions.
- The HMWG was responsible for representing their community, serving as the point of contact between their community and the HMSC, and completing necessary planning tasks, including:
- **Data Collection** - As described above, the participating jurisdictions were asked via the “wish list” to provide updates to background information and existing plans.
- **Identification of Local Mitigation Actions** – OGL conducted one-on-one jurisdictional working sessions with local coordinators and, in some cases, other jurisdictional stakeholders to identify and document specific updates to mitigation actions.
- **Reviewing the Plan Products of the HMSC** – As noted above, presentations were made regularly to the HMSC by the EOC Director and OGL to review work-in-progress and secure their agreement with the recommendations made by OGL and the directions provided by the EOC Director. In most cases, an agreement was reached without dissent. However, in some instances, HMWG members requested additional information. In addition, HMWG members were responsible for reviewing their individual jurisdiction’s mitigation actions.

The following table identifies the Hazard Mitigation Working Group Committee and participating local jurisdictions.

Name	Organization	Name	Organization
Aaron Moore	Town of Ellendale	Kathy Lock	Town of Slaughter Beach
Ann Marie Townshend	City of Lewes	Kenneth Cimino	Town of Ocean View
Bethany DeBussy	Town of Bridgeville	Kristy Rogers	Town of Milton
Bill Zolper	Dewey Beach	Lisa Marks	Town of Blades
Cheryl Lynch	Town of Frankford	Maureen Hartman	Town of South Bethany
Eric Evans	Town of Millville	Mike Bailey	Town of Seaford
Evan Miller	City of Rehoboth Beach	Pat Schuchman	Town of Fenwick Island
Gene Dvornick	Georgetown	Sara Bynum-King	Town of Delmar
Jamie Burk	Town of Millsboro	Stacey Long	Town of Selbyville
Jamie Smith	Town of Laurel	Teresa Tieman	Town of Bethany Beach
Jeff Sellman	North Shores	Thomas Roth	Town of Henlopen Acres

Table 2-2. Hazard Mitigation Working Group

PUBLIC COMMENT

During the development of this Plan Update, public participation was actively solicited. As a result, Sussex County hosted public presentations/meetings, provided drafts of the plan update for review, and invited comments on the plan's contents. The public and interested parties were notified of the sessions via a public notice on Sussex County websites, participating jurisdiction's websites, newspapers, and email notifications for each meeting. For individuals who do not have internet access to the online discussion, a phone number with a meeting code provided in all official notifications.

PLANNING TIMELINE

The planning process occurred through planning workshops, online collaboration, and stakeholder outreach. ***Appendix C***, Meeting Documentation, captures the documentation for all meetings, including the agenda and attendees as described below and a summary of the hazard mitigation planning process and survey results.

KICK-OFF MEETING

Sussex County conducted the Kick-Off Meeting on July 26, 2021. The meeting included the Director of Sussex County Emergency Operations and the Olson Group, Ltd (OGL) contractual staff. The purpose was to validate the planning project's scope, intent, and schedule and allow us to discuss expectations regarding the Hazard Mitigation Plan. In addition, a pre-meeting was held with the same individuals to discuss and finalize the agenda and PowerPoint presentation for the initial planning meeting.

INITIAL PLANNING WORKSHOP

The Initial Planning Workshop occurred on October 29, 2021, via teleconference. The Initial Planning Workshop was the first opportunity to introduce and interface with the Hazard Mitigation Steering Committee and Hazard Mitigation Working Group. Committee members were represented from the local jurisdictions, Delaware Emergency Management Agency (DEMA) and FEMA Region 3. The meeting provided stakeholders with an overview of the HMP planning process, and Olson Group Ltd. introduced the planning surveys and data collection requirements.

SURVEY VALIDATION MEETING

The Survey Validation Meeting occurred on January 21, 2022, via teleconference with the Sussex County Emergency Management Director and the Olson Group Ltd. The meeting was to present the analysis of the survey results submitted by both the HMSC and the HMWG.

JURISDICTIONAL INTERVIEWS

The Jurisdictional Interviews were conducted via teleconference and voicemail between March 16 through April 19, 2022. This meeting aimed to review and update county and jurisdictional capabilities that may have changed, improved, or degraded, since the 2016 Hazard Mitigation Plan update. It is also to determine the ability of a local jurisdiction to implement a mitigation strategy and identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects.

PROJECT UPDATE MEETING

The Project Update Meeting occurred on April 14, 2022, via teleconference between Olson Group Ltd. and Sussex County Emergency Operations Director. The purpose was to provide updated status on the plan development, scheduling of the Mid-Term Planning Meeting, and Public Comment Workshop. Discussions on the need for a non-binding MOU from each jurisdiction assuring their participation in the process. Also discussed was the requirement to send FEMA an official HMP extension request to June 2022.

MID-TERM PLANNING MEETING

The Mid-Term Planning Meeting occurred on April 22, 2022, via teleconference. The purpose of the meeting was to validate the hazards and their priority, along with the updated timeline with the Hazard Mitigation Steering Committee and Hazard Mitigation Working Group. Committee members were represented from the local jurisdictions, Delaware Emergency Management Agency (DEMA) and FEMA Region 3.

HAZUS DISCUSSION MEETING

The Hazus Discussion Meeting occurred on April 22, 2022, via teleconference. The purpose of the meeting was to discuss the Hazus run, the tables, charts, maps, the analysis, and the time frame still pending from the GIS department.

HMP PUBLIC COMMENT MEETING

The first public comment meeting was held on May 2, 2022. The Olson Group Ltd., in conjunction with the Director of Sussex County Emergency Operations facilitated the meeting to review for public comment the hazards that were identified, and the associated risk and impacts to Sussex County. This meeting allowed for public comment and questions regarding the process.

HMP UPDATE/PUBLIC COMMENT MEETING #2

The second public comment meeting was held on May 17, 2022. The Olson Group Ltd., in conjunction with the Director of Sussex County Emergency Operations facilitated the meeting to review for public comment the first 4 sections (Introduction, Planning, Hazard Identification, Mitigation Strategy, and Monitoring and Maintaining of the HMP. This meeting allowed for public comment and questions regarding the process.

FINAL PROJECT/PUBLIC COMMENT MEETING #3 (TBD)

The following table provides the meeting schedule, and organizations that were represented.

Date	Meeting	Attendees
July 26, 2021	Project Kick Off Meeting	Sussex EOC, Olson Group
October 29, 2021	Initial Planning Workshop	Sussex EOC, HMSC, HMWG, Olson Group
January 21, 2022	Survey Validation Meeting	Sussex EOC, Olson Group
March 16-April 19, 2022	Jurisdictional Interviews	Various Jurisdictions
April 12, 2022	Project Update Meeting	Sussex EOC, Olson Group
April 22, 2022	Mid-Term Planning Meeting	Sussex EOC, HMSC, HMWG, Olson Group
April 22, 2022	Hazus Update Discussion	Sussex EOC, GIS, Olson Group
May 2, 2022	HMP Public Comment Meeting #1	Sussex EOC, HMSC, HMWG, Olson Group, Public
May 17, 2022	Plan Update Meeting/Public Comment #2	Sussex EOC, HMSC, HMWG, Olson Group, Public
TBD	Final Project/Public Comment #3	Sussex EOC, HMSC, HMWG, Olson Group, Public

Table 2-3. Meeting Schedule

RISK ASSESSMENT

Following general mitigation planning practice and the established FEMA process, risk assessment forms the basis for this Plan update by quantifying and verifying information about how natural and human-made hazards affect Sussex County and the participating jurisdictions.

The processes used to complete the hazard identification and risk assessments and the results of these activities are described in Sections 3 and 4 of this Plan update. The evaluation determined several aspects of the risks of hazards faced by the County and the participating jurisdictions:

- Natural hazards are most likely to affect Sussex County.
- How often hazards are expected to impact Sussex County?
- Expected severity of the dangers.
- Areas of Sussex County that are likely to be affected by risks.
- Threats may impact Sussex County's assets, operations, people, and infrastructure.
- How private and commercial assets, procedures, and infrastructure may be affected by hazards.
- Expected future losses if the risk is not mitigated.

During the initial plan development, the HMSC first identified all hazards to impact the County. Next, using a rating system (explained in Section 3), the HMSC reviewed and validated the updated list of hazards. The results of this update process were discussed and validated by the HMWG. These hazards are described in the Hazard Identification, Profiling, and Prioritization portion of the Plan *(Section 3).*

As a result of an in-depth examination of the characteristics of the list of hazards, the HMSC made qualitative determinations that allowed further refinement of the focus of this Plan update to the most predominant risks to the area. The results of this prioritization process were also discussed and validated by the HMWG.

The consultants performed detailed risk assessments for each hazard, i.e., calculations of future expected damages, expressed in dollars where appropriate. The risk assessment results were also available to the public during public presentations. This work's whole process and results are presented in the Risk Assessment portion of this Plan Update (Section 4).

As part of the development of the Plan update and to the extent possible, Floodplain Administrators were engaged in Plan development and review in many jurisdictions. In some cases, the Jurisdictional Coordinator who led work on this Plan update was the Floodplain Administrator for the community. Floodplain administrators' involvement in the process is shown in ***Table 2-4***. Proposed efforts to increase outreach to Floodplain Administrators will enhance participation in the next Plan update.

Jurisdictions	Floodplain Administrator Name	Method of Involvement
Town of Bethany Beach	Susan Frederick	Jurisdictional Point of Contact
Town of Blades	Lisa Marks	Jurisdictional Point of Contact
Town of Bridgeville	Bethany DeBussy	Jurisdictional Point of Contact

Jurisdictions	Floodplain Administrator Name	Method of Involvement
Town of Delmar	Sara Bynum-King	Jurisdictional Point of Contact
Dewey Beach	Bill Zolper	Jurisdictional Point of Contact
Town of Ellendale	County	
Town of Fenwick Island	Patricia J Schuchman	Jurisdictional Point of Contact
Town of Frankford	County	
Town of Georgetown	Jeff Ward	Jurisdictional Point of Contact
Town of Henlopen Acres	Richard Kollar	Jurisdictional Point of Contact
Town of Laurel	Jamie Smith	Jurisdictional Point of Contact
City of Lewes	Anne-Marie Townsend	Jurisdictional Point of Contact
Town of Millsboro	Jamie Burke	Jurisdictional Point of Contact
Town of Millville	Eric Evans	Jurisdictional Point of Contact
Town of Milton	Tom Quass	Jurisdictional Point of Contact
Town of Ocean View	Kenneth Cimino	Jurisdictional Point of Contact
City of Rehoboth Beach	Matthew Janis	Jurisdictional Point of Contact
City of Seaford	Mike Bailey	Jurisdictional Point of Contact
Town of Selbyville	County	
Town of Slaughter Beach	Robert Clendaniel	Jurisdictional Point of Contact
Town of South Bethany	Maureen Hartman	Jurisdictional Point of Contact

Table 2-4. Sussex County Floodplain Administrator Involvement

Prior to adoption by the County and the participating jurisdictions, notice was sent to adjacent jurisdictions and other interested parties that the Draft and Final Plan Updates were available for review. Minutes of meetings (and attendee lists) and copies of relevant correspondence are included in ***Appendix C.***

ADDITIONAL KEY DOCUMENTS AND SOURCES

Existing Documents	Method of Incorporation
FEMA: Disaster Declarations database and other general hazard data	Used in hazard identification and risk assessment (HIRA) development and history of loss data for multiple hazards
FEMA: National Flood Insurance Program Flood Maps (Flood Insurance Rate Maps, Digital Flood Insurance Rate Maps (DFIRM)	Preliminary DFIRM data were used in developing HIRA, strategies, and mitigation actions
FEMA: Community Status Book, Community Rating System Eligible Communities	Used in developing capability assessments and mitigation actions
FEMA: Tornado Activity in the United States	Used in developing HIRA and history of loss data
SuFEMA: Severe Repetitive Loss data	Used in developing HIRA, strategies, and mitigation actions
FEMA: The National Risk Index	Used to determine vulnerabilities
Flood Factor	Used to determine past floods, current risks, and future projections
National Oceanic and Atmospheric Administration (NOAA)/National Climatic Data Center database	Used in developing history and description ofmajor hazard events for multiple hazards
NOAA Coastal Service Center-Historic Hurricane Tracks Database	Used in developing HIRA, strategies, and mitigation actions
NOAA National Severe Storms Laboratory database	Used in developing HIRA, strategies, and mitigation actions
The United States Army Corp of Engineers (Risk estimates)	Used in developing HIRA, strategies, and mitigation actions
2020 US Census	Used in developing various risk assessments and establishing planning context based on population
US Geological Survey (USGS) National Hazard Seismic Mapping Project	Used in developing HIRA and history of loss data

Existing Documents	Method of Incorporation
USGS Large Floods in the United States database	Used in developing HIRA and history of loss data
US Environmental Protection Agency Toxic Release Inventory	Used in developing hazard identification, strategies, and mitigation actions
US Department of Transportation Hazardous Materials Incident Data	Used in developing hazard identification, strategies, and mitigation actions
Delaware Department of Natural Resources and Environmental Control Flood Planning Tool	Provides interactive map application designed to aid in researching of flood risk

Table 2-5. Additional Key Documents and Sources

STATE OF DELAWARE ALL-HAZARD MITIGATION PLAN

Delaware completed the 2018 All-Hazard Mitigation Plan Update to meet the requirements of CFR Section 201.4(d), which mandates that States update their mitigation plans every three years "to reflect changes in development and progress in statewide mitigation efforts and changes in priorities."

The State All-Hazard Mitigation Plan Update demonstrates Delaware's commitment to reducing risks from natural hazards and serves as a guide for state and local decision-makers as they commit resources to minimize the effects of natural hazards on lives and property. It is designed to outline a strategy to reduce risks from natural hazards in Delaware and aid State and local emergency management officials in developing hazard reduction programs.

DEMA intends to use the All-Hazard Mitigation Plan Update to provide data to local and regional governments to support their mitigation planning processes and guide best practices.

The statewide mitigation strategies, goals, objectives, methods of incorporating a cross-section of relevant disciplines, hazard-specific information, and specific data sources are present within the State Hazard Mitigation Plan Update and were utilized to develop the Sussex County Hazards Hazard Mitigation Plan.

SUSSEX COUNTY

Delaware is a *Home Rule* State, which means that the authority to create laws and control land use resides within the jurisdictional governments and not with County governmental entities.

Counties throughout Delaware are expected to act in the best interest of and protect the citizens residing within the confines of their County. State statutes give limited authority to the counties, but the more significant powers rest with the individual jurisdictions.

LOCAL JURISDICTIONS

Upon initiating the Plan development process, the EOC Director made initial contacts with the HMWG. Concurrent with that effort, all the local OEM coordinators were made aware of the significance of this plan update effort. A comprehensive "wish list" of documents, data sources, maps, studies, emergency operations plan, land use data, laws, and ordinances were provided to the local OEM coordinators with the request to collect as many items as possible.

In some cases, information that may exist at the jurisdictional level was not uniformly provided or available. Therefore, during the next five years, Sussex County Emergency Operations Center (SCEOC) and the local jurisdiction coordinators will be taking steps to locate, review and incorporate all the indicated documents in the next plan update.

MITIGATION PLAN UPDATE

The HMSC developed a series of goals and objectives in response to the results of the original risk assessment. A capability assessment review and update were also conducted to help determine the capacity of the County and the participating jurisdictions to implement hazard mitigation projects. In addition, the HMSC and the consultant worked with the participating jurisdictions individually to identify potential problems and hazard mitigation project solutions to include in the Mitigation Strategy Plan Update. The Mitigation Strategy Plan was discussed and validated by the HMWG. The results of these efforts are detailed in Sections 5 and 6.

IMPLEMENT THE PLAN AND MONITOR PROGRESS

Finally, the HMSC validated a process for ongoing monitoring and revisions to the Plan over the next five years. Section 7 details the plans for monitoring, evaluation, and plan update procedures.

3. HAZARD IDENTIFICATION

Requirement: 44CFR §201.6(c)(2)(i): *[The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*

Requirement: 44CFR §201.6(c)(2)(ii): *[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

Requirement: 44CFR §201.6(c)(2)(ii): *[The risk assessment]* ***must*** *also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

HAZARDS AND RISKS MATRIX

Based upon the hazards and risks identified in the Sussex County Multi-Jurisdictional All Hazard Mitigation Plan 2016 update, the HMSC and the HMWG identified the hazards and risks it felt could have the most significant impact on the community.

The Hazards and Risks Identification Survey and the Hazards and Risks Validation Survey submitted by the HMSC and the HMWG evaluated and scored each hazard and risk on the Severity of Impact (SOI), Probability of Event (POE), and Long-Term Impacts (LTI) an event would have on facilities in the community. High priority hazards scored between 19-25, medium priority hazards scored between 14-19, low priority hazards scored between 8-13, and non-rated hazards scored a seven or below.

Probability of Event

Severity of Impact

	Unlikely	Somewhat Likely	Likely	Most Likely	Highly Likely
Catastrophic	5	10	15	20	25
Critical	4	8	12	16	20
Minimal	3	6	9	12	15
Negligible	2	4	6	8	10
Insignificant	1	2	3	4	5
	Not Severe	**Minimal Severity**	**Somewhat Severe**	**Moderate Severity**	**Most Severe**

Long Term Impact

Table 3-1. Threats and Hazards Matrix

HAZARD IDENTIFICATION AND HISTORY

Per The Code of Federal Regulations (CFR) requirements, at the outset of the plan update process, the Sussex County Hazard Mitigation Steering Committee and the Sussex County Hazard Mitigation Working Group identified eleven (11) natural, four (4 human-caused, and one (1) technological hazard and their risks as the focus of the Plan update.

These hazards were identified per the experience of the HMSC and the HMWG and in accordance with other references (e.g., County EOP, State EOP, the Delaware State Hazard Mitigation Plan, etc.). The resulting preliminary hazard ranking list is shown in ***Table 3-2***.

Hazard	Hazard Type (1)	Hazard Ranking (2)	Hazard Priori ty (3)	Hazard Score (4)	County EOP (5)	2018 Delaware HMP(6)
Flooding (Riverine and Coastal)	N	1	H	25	Y	Y
Hurricane/Tropical Storms	N	2	H	20	Y	Y
Severe Thunderstorms	N	3	H	15	Y	Y
Drought	N	4	H	15	Y	Y
Extreme Heat/Cold	N	5	M	15	Y	Y
Hazmat	H/C	6	M	12	Y	Y
Winter Storms	N	7	M	12	Y	Y
Tornado	N	8	L	12	Y	Y
Hailstorms	N	9	L	12	Y	Y
Terrorism	H/C	10	L	10	Y	Y
Beach/Soil Erosion	N	11	(N/R)	8	Y	Y
Cyber Terrorism	T	12	(N/R)	8	Y	Y
Dam Levee Failure	H/C	13	(N/R)	8	Y	Y

Hazard	Hazard Type (1)	Hazard Ranking (2)	Hazard Priori ty (3)	Hazard Score (4)	County EOP (5)	2018 Delaware HMP(6)
Pipeline Failure	H/C	14	(N/R)	6	Y	Y
Earthquake	N	15	(N/R)	6	Y	Y
Wildfire	N	16	(N/R)	6	Y	Y

Table 3-2. Hazard Ranking

Notes:

1. Hazard Type:
    a. N= Natural
    b. H/C= Human-Caused
    c. T= Technological
2. Hazard Ranking:
    a. 1-16
3. Hazard Priority:
    a. H= High
    b. M= Medium
    c. L= Low
    d. N/R= non-ranked; there was insufficient loss data to generate a ranking but are considered asignificant risk to the County and jurisdictions.
4. Hazard Score: See Hazard Matrix
5. Hazard identified in County plan.
6. Hazard identified in State plan.

CALCULATED PRIORITY RISK INDEX (CPRI)

The following Calculated Priority Risk Index (CPRI) ratings, as shown below, are provided as a tool for local governments to analyze their risks. The CPRI ratings should not be construed as a precise way for determining risk. The ratings are a way to quantify and summarize the information from the risk and vulnerability assessment. Each identified hazard was evaluated and given a score, and can be found at the end of each section.

Rating Range	Priority
3.00 – 4.00	High
2.00 – 2.99	Medium
1.00 – 1.99	Low
0.00 – 0.99	Negligible

Table 3-3. Calculated Priority Risk Index Rating

CLIMATE CHANGE

Natural hazards, such as floods, tornadoes, hurricanes, and severe winter storms, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. In addition, technological accidents or acts of terrorism can cause human-caused hazards. The State of Delaware faces a variety of natural hazards, including flooding, tornadoes, ice storms, tropical systems, and earthquakes. Human-caused hazards include technological accidents, railroad spills, and industrial chemical releases. Although not a direct hazard, future conditions, such as climate change and sea-level rise, can increase the adverse effects of severe storms and flood events. These hazards are discussed in detail in Section 3 - Hazard Identification.

Through hazard mitigation planning, we can minimize the impact of natural and human-caused hazards on people and the built environment. Through proper planning and implementation of policies and projects identified in the Plan, we can reduce the likelihood that these events will result in disasters. This Plan is a logical, information-driven process that systematically identifies and guides the implementation of specific actions and the creation of policies designed to make Sussex County safer from the threat of natural and human-caused hazards including terrorism.

Sussex County is vulnerable to the effects of climate change. The U.S. Environmental Protection Agency defines climate change as any significant change in the measures of climate lasting for an extended period, including substantial changes in temperature, precipitation, and wind patterns. According to the Delaware Department of Resources and Environmental Control, challenges posed by changing conditions include extreme temperatures, heavier rainfall, and sea-level rise. Due to the state being a low-lying area, it is particularly vulnerable to sea-level rise.

EFFECTS OF SEA LEVEL RISE ON COASTAL FLOODING

Coastal flooding will be exacerbated by rising seas that have been occurring globally. Global mean sea levels have risen approximately 8 inches in the past 100 years. According to the International Panel on Climate Change's (IPCC) 5th report for Policy Makers, glacier mass loss and ocean thermal expansion from warming explain about 75% of the observed global mean sea level rise (high confidence) since the early 1970s. Over the period 1993 to 2010, global mean sea level rise is, with high confidence, consistent with the sum of the observed contributions from ocean thermal expansion due to warming (1.1 [0.8 to 1.4] mm yr.–1), from changes in glaciers (0.76 [0.39 to 1.13] mm yr.–1), Greenland ice sheet (0.33 [0.25 to 0.41] mm yr.–1), Antarctic ice sheet (0.27 [0.16 to 0.38] mm yr.–1), and land water storage (0.38 [0.26 to 0.49] mm yr.–1). The sum of these contributions is 2.8 [2.3 to 3.4] mm yr. 1.

Sea level rise around Delaware has been observed at twice the global mean sea level rise. Figure 4.1-1 shows the linear rate of sea-level rise at Lewes to be 3.42 mm/yr., equating to about 0.400 m / 15.7 inches from 1900 through 2016. This is about twice the rate, and therefore twice the amount, of global mean sea-level rise observed since 1900. Along with global mean sea-level rise resulting from the ocean thermal expansion and melting of the land-based ice sheets, other processes in this region add positively to the increase of sea level relative to the land surface, such as:

- Geologic land subsidence due to the glacial isostatic adjustment from the Laurentide ice sheet during the last Ice Age,
- Changing nearby ocean circulation patterns, and
- Gravitational effects from melting ice sheets of Greenland and Antarctica.

Due to these multiple factors contributing to the relative sea-level rise, this region has become known as a hotspot for potential damage and vulnerability to sea-level rise.

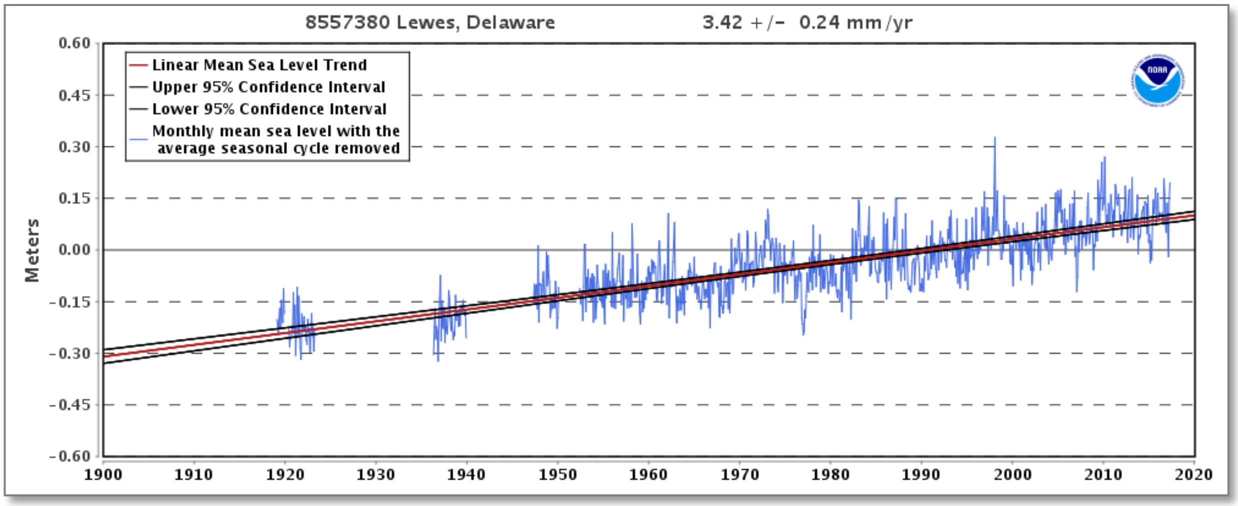

Figure 3-1. *Monthly mean sea level for NOAA Lewes tide station from 1919 through 2016. Linear MSL trend and 95% confidence interval shown in red and black, respectively. Data referenced to NTDE 1983-2001 MSL.*[1]

The following section profiles the 18 hazards listed above and acted upon during the planning process. The overviews include a description of the hazard, location and extent of the hazard, severity of the hazard, documented impacts on life and property, and past occurrences.

[1] *NOAA CO-OPS Tides and Currents SLR Trends website.*

FLOODING: RIVERINE/COASTAL (HIGH)

HAZARD PROFILE

A flood is an excess of water on land that is usually dry. Floods are typically caused by weather events that deliver more precipitation to a drainage basin than can be easily absorbed or stored within the basin. Flooding is a significant natural hazard throughout the United States. Causes include heavy precipitation, snowmelt, ice jams, dam failures, hurricanes, reservoir overflows, and local thunderstorms. Floodwaters can damage structures, topple trees, destroy infrastructure, sweep people and vehicles away, and alter landscapes. Floods can occur quickly and without warnings, such as flash floods or floods caused by dam breaks, or build slowly, becoming more significant over time. There may be a lag time between precipitation and the time when the flood peaks, which in some situations may allow for warning and evacuating populations.

Flooding is the most frequent and costly natural hazard in the United States. It is a hazard that has caused more than 10,000 deaths nationwide since 1900. In the Five years since the 2016 Plan update, 561 flood-related deaths nationally, but there were zero fatalities in Delaware.

Widespread floods are usually long-term events that may last for several days. The primary types of widespread flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surges, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, nor'easters, and other large coastal storms. Finally, urban flooding occurs when manufactured development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Flash flooding usually occurs from a dam or levee failure within minutes or hours of heavy rainfall, or a sudden release of water held by an ice jam. Slow-moving thunderstorms cause most flash flooding in a local area or heavy rains associated with hurricanes and tropical storms. Although flash flooding often occurs along mountain streams, it is common in urban areas where much of the ground is covered by impervious surfaces. As a result, flash flood waters move at very high speeds where "walls" of water can reach heights of 10 to 20 feet. Flash floodwaters and debris can uproot trees, roll boulders, destroy buildings, and obliterate bridges and roads.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as the floodplain) is a natural and inevitable occurrence that can be expected based on established recurrence intervals. The recurrence interval is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or more significant flood. Flood magnitude increases with increasing recurrence intervals.

Floodplains are designated by a frequent flood large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. Flood frequencies such as the 100-year flood are determined by plotting a graph of the size of all known torrents for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence each year, which is the percentage of the probability of flooding each year. For example, a 100-year flood has a 1 percent chance of occurring in any given year.

OCCURRENCES AND PROBABILITY OF THE FLOOD HAZARD

According to the National Climate Data Center (NCDC) databases, since 2016, there have been 23 flooding events and 36 coastal flooding events, as shown in *Table 3.3.* Because of the continuous and ongoing nature of the flood hazard threat, it was judged by the HMSC and the HMWG to be of significant danger and included as an identified hazard. The generated Calculated Priority Risk Index (CPRI) for Flood is shown in ***Table 3-5.***

Location	Date	Type	Deaths	Injuries
OAK ORCHARD	9/29/2016	Flood	0	0
MILTON	9/29/2016	Flood	0	0
COOL SPG	9/29/2016	Flood	0	0
GEORGETOWN	9/29/2016	Flood	0	0
REHOBOTH BEACH	9/29/2016	Flood	0	0
SLAUGHTER BEACH	9/29/2016	Flood	0	0
HARBESON	9/29/2016	Flood	0	0
GEORGETOWN ARPT	9/29/2016	Flood	0	0
MILLSBORO	9/29/2016	Flood	0	0
BETHANY BEACH	9/29/2016	Flood	0	0
HARBESON	10/9/2016	Flood	0	0
STAYTONVILLE	3/31/2017	Flood	0	0
LAUREL	7/28/2017	Flood	0	0
BROADKILL	7/29/2017	Flood	0	0
ELLENDALE	7/29/2017	Flood	0	0
LINCOLN	7/29/2017	Flood	0	0
BRIDGEVILLE	7/29/2017	Flood	0	0
FENWICK IS	8/7/2017	Flood	0	0
BETHANY BEACH	8/7/2017	Flood	0	0

Location	Date	Type	Deaths	Injuries
WILLIAMSVILLE	8/12/2017	Flood	0	0
BETHANY BEACH	8/12/2017	Flood	0	0
MILFORD ARPT	8/12/2017	Flood	0	0
FENWICK IS	9/6/2017	Flood	0	0
Total: 23 Events				
DELAWARE BEACHES (ZONE)	1/23/2016	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	2/8/2016	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	2/8/2016	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	2/9/2016	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	2/9/2016	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	5/5/2016	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	5/7/2016	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	1/23/2017	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	9/19/2017	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	9/19/2017	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	3/4/2018	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	3/4/2018	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	9/9/2018	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	9/9/2018	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	9/10/2018	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	9/10/2018	Coastal Flood	0	0

Location	Date	Type	Deaths	Injuries
INLAND SUSSEX (ZONE)	10/27/2018	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/27/2018	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	10/10/2019	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/10/2019	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	10/11/2019	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/11/2019	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	10/11/2019	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/11/2019	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/30/2020	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	10/30/2020	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	2/1/2021	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	2/1/2021	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	5/29/2021	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	5/29/2021	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/11/2021	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	10/11/2021	Coastal Flood	0	0
INLAND SUSSEX (ZONE)	10/29/2021	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	10/29/2021	Coastal Flood	0	0
DELAWARE BEACHES (ZONE)	1/3/2022	Coastal Flood	0	0
TOTAL: 59 Events				

Table 3-4. Sussex County Flood Event History[2]

A straightforward basis for predicting the risk of future flooding is to use the current flood risk as identified by the flood insurance rate maps published by the FEMA. Based on the areas identified, Sussex County is at risk of flooding from coastal flooding and a lack of wastewater management plans. In addition, flooding will continue to be a common occurrence without mitigation efforts.

The HMSC and the HMWG determined that this type of incident is likely to occur and pose catastrophic but minimal severity to long-term impacts to the community.

CPRI FOR DEGREE OF RISK

The generated Calculated Priority Risk Index (CPRI) for flooding is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
4 x .45	+	2 x .30	+	2 x .15	+	2 x .10	=	2.9

Table 3-5. CPRI for Degree of Risk for Flooding

[2] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE

HURRICANE/TROPICAL STORMS (HIGH)

HAZARD PROFILE

Hurricanes, tropical storms, and nor'easters classified as cyclones, are any closed circulation developing around a low-pressure center where the winds rotate counterclockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. Tropical cyclones are formed as a developing center moves over warm water, the pressure drops in the center of the storm, and as the pressure drops, the system becomes better organized, and the winds begin to rotate around the low pressure pulling the warm and moist ocean air. Tropical cyclones can evolve from tropical depressions to a tropical storm to a hurricane as they intensify, as shown in ***Table 3-6.*** In the Northern Hemisphere, hurricane winds rotate in a counter-clockwise direction with different wind speeds and characteristics in each quadrant, with the most severe effects in the right-front quadrant.

Name	Maximum Sustained Surface Wind Speed (Using the U.S. 1-minute average)		
Tropical Depression	33 kt or less	38 mph or less	62 km/hr. or less
Tropical Storm	34kt to 63 kt	39 mph to 73 mph	63 km/hr. to 118 km/hr.
Hurricane	64 kt or more	74 mph or more	119 km/hr. or more

Table 3-6. Tropical Definitions[3]

The Saffir-Simpson Hurricane Scale ***(Table 3-7)*** defines hurricane strength by categories, with a Category 1 storm being the weakest and Category 5 being the strongest. Depending on where and how hurricanes strike, a lower category storm can inflict more significant damage than a higher category storm.

Category	Wind Speeds	Likely Effects
1	74 to 95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage.
2	96 to 110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers. Small craft in unprotected anchorages break moorings.
3	111 to 130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures, mobile homes are destroyed.

[3] Tropical Definitions (weather.gov)

Category	Wind Speeds	Likely Effects
		Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain may be flooded well inland.
4	131 to 155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Major damage to lower floors of structures near the shore. Terrain may be flooded well inland.
5	155 mph or more	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Major damage to lower floors of all structures located near the shoreline. Massive evacuation of residential areas may be required.

Table 3-7. Saffir-Simpson Hurricane Scale[4]

A nor'easter is a cyclonic storm that moves along the East Coast of North America with winds that blow from a northeasterly direction. They may occur at any time but are most common and strongest in winter. These storms are usually most intense near New England and Canada. Nor'easters can produce heavy snow and rain, may bring gale-force winds greater than 58 miles per hour, and can cause rough seas, coastal flooding, and beach erosion.[5] ***Table 3-8*** below shows an intensity scale proposed for nor'easters that are based upon levels of coastal degradation.

Storm Class	Beach Erosion	Dune Erosion	Over wash	Property Damage
1 (Weak)	Minor changes	None	No	No
2 (Moderate)	Modest; mostly to lower beach	Minor	No	Modest
3 (Significant)	Erosion extends across beach	Can be significant	No	Loss of many structures at local level
4 (Severe)	Severe beach erosion and recession	Severe dune erosion or destruction	On low beaches	Loss of structures at community-scale

[4] https://www.nhc.noaa.gov/aboutsshws.php
[5] NOAA, from http://www.noaa.gov/features/03_protecting/noreasters.html 2 Glossary of Meteorology (1959)

Storm Class	Beach Erosion	Dune Erosion	Over wash	Property Damage
5 (Extreme)	Extreme beach erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive at regional-scale; millions of dollars

Table 3-8. Dolan-Davis Nor'easter Intensity Scale[6]

TROPICAL STORMS

- Tropical Storms Fay made landfall in July 2020, causing approximately $220 million in insured losses to the region, causing one death and minor injuries.
- Tropical Storm Isaias violently blew through Delaware in August 2020 dumping about an inch of rain. Most of the damage was caused by high winds, which caused widespread power outages, and tornado warnings with damage estimates over $20 million.

Location	Date	Type	Deaths	Injuries
DELAWARE BEACHES (ZONE)	7/10/2020	Tropical Storm Fay	0	0
INLAND SUSSEX (ZONE)	7/10/2020	Tropical Storm Fay	0	0
DELAWARE BEACHES (ZONE)	8/4/2020	Tropical Storm Isaias	0	0
INLAND SUSSEX (ZONE)	8/4/2020	Tropical Storm Isaias	0	0
TOTAL 5				

Table 3-9. Tropical Storms

[6] Dolan, Robert, and Robert E. Davis. "An Intensity Scale for Atlantic Coast Northeast Storms." *Journal of Coastal Research*, vol. 8, no. 4, 1992, pp. 840–53. *JSTOR*, http://www.jstor.org/stable/4298040. Accessed 27 Jun. 2022.

OCCURRENCES AND PROBABILITY OF THE HURRICANE/TROPICAL STORM HAZARD

According to the National Climatic Data Center (NCDC) databases, since completion of the 2016 Plan update, there have been no Hurricane events that have affected the region.[7]

Due to the continuous and ongoing nature of the hurricane hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard. The generated CPRI for Hurricane Wind is shown in ***Table 3-10*** below.

CPRI FOR DEGREE OF RISK

The generated Calculated Priority Risk Index (CPRI) for Hurricane/Thunderstorm Wind is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
4 x .45	+	2 x .30	+	2 x .15	+	2 x .10	=	2.9

Table 3-10. CPRI for Degree of Risk for Hurricane/Tropical Storms

[7] https://www.ncei.noaa.gov/access

SEVERE THUNDERSTORMS (HIGH)

HAZARD PROFILE

According to the National Weather Service, more than 100,000 thunderstorms occur yearly. Only about 10 percent of these storms are classified as "severe." Although thunderstorms generally affect a small area when they occur, they are very dangerous because of their ability to generate tornadoes, hailstorms, strong winds, flash flooding, and dangerous lightning. While thunderstorms can occur in all regions of the United States, they are most common in the central and southern states because atmospheric conditions in those regions are ideal for generating these powerful storms. Thunderstorms are caused when air masses of varying temperatures meet. Rapidly rising warm moist air serves as the "engine" for thunderstorms. These storms can occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Lightning is a discharge of electrical energy from positive and negative charges buildup within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air cause thunder. On average, 89 people are killed by lightning strikes in the United States. The National Weather Service collected data for thunder days, the number and duration of thunder events, and lightning strike density for the 30 years from 1948 to 1977. A series of maps showed the annual average thunder event duration, the annual average number of thunder events, and the mean annual density of lightning strikes. *Figure 3-1* illustrates thunderstorm hazard severity based on the yearly average number of thunder events from 1948 to 1977.

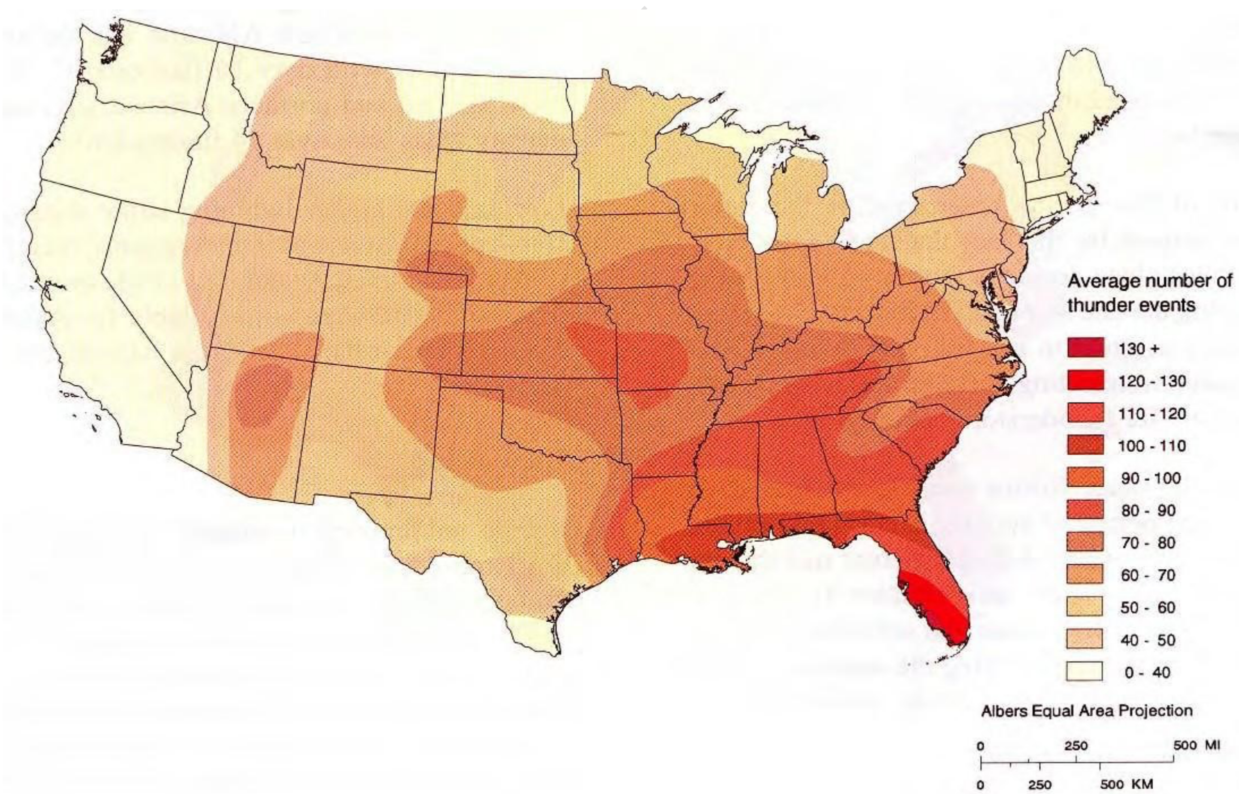

Figure 3-1: Annual Average Number of Thunder Events

OCCURRENCES AND PROBABILITY OF THE THUNDERSTORM HAZARD

According to the National Climatic Data Center (NCDC) databases, since 2016 there have been 105 significant occurrences of thunderstorm resulting in over $50 thousand in damages and 13 lightning events causing very minor property damage with only 1 reported injury as shown in ***Tables 3-11 and 3-12***.

Location	Date	Events	Type	$	Injuries	Deaths
Sussex County	2016-2022	115	Thunderstorm Winds	$50,000	0	0

Table 3-11. Sussex County Thunderstorm Winds Event History

Location	Date	Events	Type	$	Injuries	Deaths
Sussex County	2016-2022	13	Lightning	$500.00	1	0

Table 3-12. Sussex County Lightning Event History[8]

Due to the continuous and ongoing nature of the thunderstorm winds hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated Calculated Priority Risk Index (CPRI) for Thunderstorm is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
4 x .45	+	2 x .30	+	2 x .15	+	2 x .10	=	2.9

Table 3-13. CPRI for Degree of Risk Index for Thunderstorms

8 **https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE**

DROUGHT (HIGH)

HAZARD PROFILE

A drought is “a period of abnormally dry weather sufficiently prolonged for the lack of water to cause a serious hydrologic imbalance in the affected area.”2 Droughts are extended periods of dry weather that cause problems such as crop damage, affect water supplies, and increased fire danger. Droughts are often brought on by a lack of rainfall or snow over a long period, although the amount of time that low precipitation amounts take to impact an area varies in different geographic locations.

The Palmer Drought Severity Index (PDSI). ***Table 3-14*** is the primary classification system used for droughts in the United States and is based on supply and demand. The PDSI assesses total moisture using temperature and precipitation to compute water supply and demand and soil moisture and is most effective for long-term predictions. PDSI also describes extended wet conditions using corresponding numbers, with zero representing near-normal conditions. NOAA publishes weekly national and regional Palmer Drought maps. In addition, other indices can be used for specific situations, ecosystems, or terrain.

PDSI	Description
4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

Table 3-14. Palmer Drought Severity Index[9]

[9] NOAA - National Oceanic and Atmospheric Administration

DROUGHT CLASSIFICATION

Droughts are frequently classified as one of the following four types:

- **Meteorological droughts** are typically defined by the level of "dryness" when compared to an average or standard amount of precipitation over a given period.
- **Agricultural droughts** relate common characteristics of drought to their specific agricultural-related impacts. The emphasis tends to be placed on soil water deficits, water needs based on different stages of crop development, and water reservoir levels.
- **Hydrological drought** is directly related to the effect of precipitation shortfalls on surface and groundwater supplies. Human factors, particularly changes in land use, can alter the hydrologic characteristics of a basin.
- **Socio-economic drought** results from water shortages that limit the ability to supply water-dependent products in the marketplace.

OCCURRENCES AND PROBABILITY OF THE DROUGHT HAZARD

According to the NCDC databases, since 2016 there has been no significant periods of drought events being reported. Due to the continuous and ongoing nature of the drought hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated CPRI for Drought is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
3 x .45	+	2 x .30	+	1 x .15	+	4 x .10	=	2.05

Table 3-15. CPRI for Degree of Risk for Drought

EXTREME HEAT/COLD (MEDIUM)

HAZARD PROFILE

Extreme heat can be defined as temperatures that hover 10 degrees or above the average high temperature for the region, last for prolonged periods, and are often accompanied by high humidity. Under normal conditions, the human body's internal thermostat produces perspiration that evaporates and cools the body. However, evaporation is slowed in extreme heat and high humidity, and the body must work harder to maintain an average temperature. Elderly persons, young children, persons with respiratory difficulties, and those who are sick, or overweight are more likely to become victims of extreme heat. In addition, because men sweat more than women, they are more susceptible to heat-related illness because they become more quickly dehydrated. Studies have shown a significant rise in heat-related disease occurs when excessive heat persists for more than two days. Heat-related disorder probabilities are shown in *Figure 3-2*, with *Table 3-17* showing the history of extreme heat events in Sussex County. Spending at least two hours per day in air conditioning can significantly reduce the number of heat-related illnesses.

Extreme heat in urban areas can create health concerns when stagnant atmospheric conditions trap pollutants, thus adding unhealthy air to sweltering temperatures. In addition, the "urban heat island effect" can produce significantly higher nighttime temperatures because asphalt and concrete (which store heat longer) gradually release heat at night.

Along the eastern seaboard of the United States, periods of hotter than average temperatures, often with high humidity levels, can occur in the summer. These extreme temperature events can last a day to a week or longer. It is usually considered a heatwave in this area when the temperature rises above 90 degrees Fahrenheit, accompanied by high humidity. NOAA states that a *heatwave* is a period of abnormally and uncomfortably hot and unusually humid weather. Typically, a heat wave lasts two or more days. NOAA's National Weather Service has created the Heat Index (HI) that combines relative humidity and actual air temperature to accurately measure how hot the air feels to the human body and then demonstrate the potential health effects.

NWS Heat Index — Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Figure 3-2. NOAA's National Weather Heat Index[10]

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[10] NOAA- http://w1.weather.gov/glossary/index.php?letter=h

Location	County/Zone	Date	Type	Deaths	Injuries
INLAND SUSSEX (ZONE)	INLAND SUSSEX (ZONE)	08/2021	Excessive Heat	0	0

Table 3-16. Sussex County Extreme Heat Event History[11]

Severe winter weather may include one or more of the following: snowstorms, blizzards, sleet, freezing rain, ice storms, and extreme cold temperatures. Extreme cold temperatures are characterized by the ambient air temperature dropping to approximately 0 degrees Fahrenheit or below.

A rapid accumulation of snow characterizes significant snowstorms. At the same time, a blizzard is categorized as a snowstorm with winds of 35 miles per hour or greater and visibility of less than ¼ mile for three or more hours.

These storms can immobilize a region and cause treacherous roadways, power outages, and property damage or collapse.

Although there is no widely used scale to classify snowstorms, the National Weather Service (NWS) developed the Northeast Snowfall Impact Scale (NESIS). NESIS ranks as high-impact Northeast snowstorms with large areas of 10-inch snowfall accumulations. The index utilizes population information and meteorological measurements to indicate the storm's impacts on society. The five categories are Extreme (5), Crippling (4), Major (3), Significant (2), and Notable (1). NOAA's NWS, in cooperation with a team of universities and other agencies, developed the current wind chill temperature index (WCT) formula in 2001. WCT uses wind speed at 5 feet (the average height of a human's face), incorporates heat loss from the body, is based on a human face model, utilizes 3 miles per hour as the calm wind threshold, uses a consistent standard for skin tissue resistance and assumes a clear night sky for solar radiation. Since 2016, there have been no extreme cold events in Sussex County.

OCCURRENCES AND PROBABILITY OF THE EXTREME HEAT/COLD HAZARD

According to the NCDC databases, since 2016, there have been no recorded deaths, injuries, or damage from extreme heat/cold events in Sussex County. However, due to the continuous and ongoing nature of the extreme heat/cold hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated Calculated Priority Risk Index (CPRI) for Extreme Heat/Cold is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
3 x .45	+	1 x .30	+	1 x .15	+	3 x .10	=	2.1

Table 3-17. CPRI for Degree of Risk for Extreme Heat/Cold

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11 https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE

HAZMAT (MEDIUM)

HAZARD PROFILE

Hazardous materials (HazMat) incidents can apply to fixed facilities and mobile, transportation-related accidents in the air, by rail, on the Nation's highways, and the water. HazMat incidents consist of solid, liquid, and gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design, as with an intentional terrorist attack. A HazMat incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over extended periods. In addition to the immediate release, explosions and fires can result from a release, and persons, vehicles, water, wind, and possibly wildlife can also extend contaminants beyond the initial area.

HazMat incidents can also occur because of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents, may also hinder response efforts. For example, in the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread taxological concern.

According to the Pipeline and Hazardous Materials Administration, there have been approximately 149 hazardous material incidents in the State since 2007. However, none of these incidents are reported to have an associated death or significant injury related to the incident. And only two incidents resulted in non-hospitalized injuries.

OCCURRENCES AND PROBABILITY OF HAZMAT HAZARD

According to data from Sussex County EOC, the County responded to 307 hazardous materials incidents from 2017 to 2022. Incidents have included release of Ammonia, Anhydrous Ammonia, Diesel Fuel and Fuel Oils, Hexamethylene Diamine, Mineral Oil and Propane Gas, overturned semi-trucks and methamphetamine labs.

Date	Number of Incidents
2017	81
2018	92
2019	92
2020	90
2021	22

Table 3-18. Hazardous Materials Incidents in Sussex County

CPRI FOR DEGREE OF RISK

The generated Calculated Priority Risk Index (CPRI) for Hazmat Incident is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
3 x .45	+	1 x .30	+	1 x .15	+	3 x .10	=	2.1

Table 3-19. CPRI for Degree of Risk for Hazmat Incident

WINTER STORMS (MEDIUM)

HAZARD PROFILE

A winter storm can range from a moderate snow over a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Some winter storms may be large enough to affect several states, while others may affect only a single community. In addition, many winter storms are accompanied by low temperatures and heavy and blowing snow, which can severely impair visibility.

Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Sleet, raindrops that freeze into ice pellets before reaching the ground, usually bounce when hitting a surface and do not stick to objects. However, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small ice accumulations can cause a significant hazard, especially on power lines and trees. An ice storm occurs when freezing rain falls and freezes immediately upon impact. Communications and power can be disrupted for days, and even small ice accumulations may cause extreme hazards to motorists and pedestrians.

OCCURRENCES AND PROBABILITY OF WINTER STORMS HAZARD

According to the NCDC databases, since 2016, there were eight major winter storm warning events in Sussex County.[12]

Location	County/Zone	Date	Type	Deaths	Injuries
INLAND SUSSEX (ZONE)	INLAND SUSSEX (ZONE)	01/2016	Winter Storm	0	0
DELAWARE BEACHES (ZONE)	DELAWARE BEACHES (ZONE)	01/2016	Winter Storm	0	0
DELAWARE BEACHES (ZONE)	DELAWARE BEACHES (ZONE)	01/2017	Winter Storm	0	0
INLAND SUSSEX (ZONE)	INLAND SUSSEX (ZONE)	01/2017	Winter Storm	0	0
INLAND SUSSEX (ZONE)	INLAND SUSSEX (ZONE)	12/2017	Winter Storm	0	0
INLAND SUSSEX (ZONE)	INLAND SUSSEX (ZONE)	01/2022	Winter Storm	0	0

[12] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE

Location	County/Zone	Date	Type	Deaths	Injuries
DELAWARE BEACHES (ZONE)	DELAWARE BEACHES (ZONE)	01/2022	Winter Storm	0	0
INLAND SUSSEX (ZONE)	INLAND SUSSEX (ZONE)	01/2022	Winter Storm	0	0

Table 3-20. Sussex County Winter Storm Event History (2016-Present)

Although there have been no recorded deaths, major injuries, or significant damage from winter storm events in Sussex County since the plan update in 2016, as shown in ***Table 3-20***, this hazard was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.[13]

CPRI FOR DEGREE OF RISK

The generated CPRI for Winter Storms is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
3 x .45	+	1 x .30	+	1 x .15	+	3 x .10	=	2.1

Table 3-21. CPRI for Degree of Risk for Winter Storms

13 **https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE**

TORNADO (LOW)

HAZARD PROFILE

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air, forcing the warm air to rise rapidly.

According to the NWS, tornado wind speeds typically range from 40 to 200 mph. However, the most violent tornadoes (EF5) have rotating winds of 200 mph or more and can cause extreme destruction and turn ordinarily harmless objects into deadly missiles.

Each year, an average of over 1,325 tornadoes is reported nationwide, resulting in an average of 100 deaths and 1,500 injuries.[14] They are more likely to occur during the spring and early summer months of March through June. Tornadoes can occur at any time of day. However, they are more likely to form in the late afternoon and early evening. Smaller tornadoes can touch down briefly. However, despite the smaller size, short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and tens of miles long.

MAGNITUDE OR SEVERITY

The destruction caused by tornadoes ranges from light to devastating depending upon the storm's intensity, size, and duration.

Typically, tornadoes cause the most significant damage to structures of light or wood-framed construction such as residential homes (particularly mobile homes) and tend to remain localized in impact. The traditional Fujita Scale for tornadoes, introduced in 1971, was developed to measure tornado strength and associated damages. However, in February 2007, an "enhanced" Fujita (EF) Scale was implemented, with somewhat lower wind speeds at the higher F-numbers and more thoroughly refined structural damage indicator definitions. ***Table 3-23*** provides a summary of the EF Scale. Assigning an EF Scale rating to a tornado involves the following steps:

- Conduct an aerial and ground survey over the entire length of the damage path.
- Locate and identify damage indicators in the damage path.
- Consider the wind speeds of all damage indicators and assign an EF Scale category for the highest wind speed consistent with wind speeds from the other damage indicators.
- Record the basis for giving an EF scale rating to a tornado event; and
- Record other pertinent data related to the tornado event.

EF-Scale Number	3 Second Gusts (MPH)
F0	65-85
F1	86-110

[14] https://www.spc.noaa.gov/climo/online/monthly/newm.html#2020

EF-Scale Number	3 Second Gusts (MPH)
F2	111-135
F3	136-165
F4	166-200
F5	200 +

Table 3-22. Enhanced Fujita (EF) Scale for Tornadoes[15]

OCCURRENCES AND PROBABILITY OF TORNADOS

According to the NCDC databases, since 2016, there was four EF-1 events and one EF-2 events that occurred in area, with minimal damage, and 1 injury reported.[16]

Location	County/Zone	Date	Type	Magnitude	Deaths	Injuries
GREENWOOD	SUSSEX CO.	06/2017	Tornado	EF0	0	0
BETHEL	SUSSEX CO.	04/2019	Tornado	EF2	0	1
HARBESON	SUSSEX CO.	04/2019	Tornado	EF1	0	0
CHESTNUT KNOLL	SUSSEX CO.	08/2020	Tornado	EF1	0	0
MILFORD ARPT	SUSSEX CO.	07/2021	Tornado	EF1	0	0

Table 3-23. 2016-2021 Historical Occurrences

Tornadoes are high-impact, low-probability hazards. The net impact depends on the storm intensity and development vulnerability in its path. Because the direction of each tornado is unique to each event, general descriptions of impacts in the study area can be drawn from the impacts of previous storms. Communities rarely activate Emergency Operation Centers before tornadoes due to the short warning times, but such activation may become necessary after extreme events with catastrophic damage that displace residents.

In the Sussex County area, a high-intensity tornado, while rare, can be expected to impact everything within the storm's path:

- homes, especially those constructed before the use of building codes

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[15] National Weather Service (NWS). (2022). The enhanced Fujita scale (EF scale). National Weather Service. https://www.weather.gov/oun/efscale

[16] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE

- infrastructure, especially above-ground power lines in the commercial zones and bridges throughout the region
- cars and private property
- landscape elements such as trees, fences, and shrubs
- even human lives

Downed trees can block roadways, impede traffic, and block access and egress if any of the region's thoroughfares are impacted. In addition, manufactured homes are particularly vulnerable to damage in the event of tornadoes, particularly if placed outside of flood zones and before building codes were in effect requiring foundation tie-downs.

Tornadoes associated with tropical cyclones are more predictable and occur in September and October when the incidence of low storm systems is most significant. They usually form around the perimeter of the storm and most often to the right and ahead of the storm center's storm path as it comes ashore. These tornadoes commonly occur as part of large outbreaks and move in an easterly direction. Again, tracking, and prior notification by the National Weather Service and local news media help save lives locally.

CPRI FOR DEGREE OF RISK

The generated CPRI for Tornados is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duratio n	=	CPR I
1 x .45	+	2 x .30	+	4 x .15	+	1 x .10	=	1.75

Table 3-24. CPRI for Degree of Risk for Tornados

HAILSTORMS (LOW)

HAZARD PROFILE

Hailstorms are an outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation—as balls or irregularly shaped masses of ice greater than 0.75 in. (1.91 cm).

The size of hailstones is a direct function of the size and severity of the storm. High-velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients are relative to elevation above the surface, increasing suspension time and hailstone size. ***Figure 3-3*** on the following page shows the annual frequency of hailstorms in the United States.

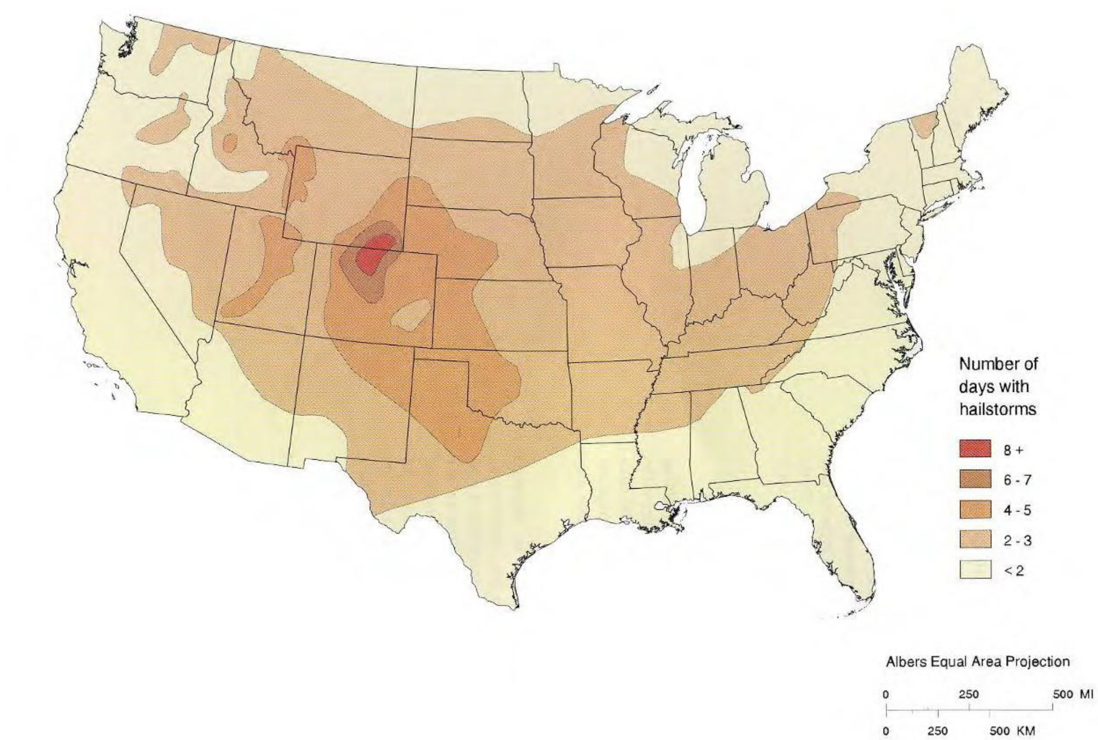

Figure 3-3: Annual Frequency of Hailstorms in the United States[17]

[17] Federal Emergency Management Agency

OCCURRENCES AND PROBABILITY OF HAILSTORMS

According to NCDC databases, since 2016 there have been nine hail events within SussexCounty that resulted in no losses.[18]

Location	County/Zone	Date	Type	Magnitude	Deaths	Injuries
REDDEN	SUSSEX CO.	05/2016	Hail	0.75 in.	0	0
DELMAR STATE LINE AR	SUSSEX CO.	05/2017	Hail	0.75 in.	0	0
BLADES	SUSSEX CO.	08/2019	Hail	1.00 in.	0	0
LAUREL	SUSSEX CO.	08/2019	Hail	0.75 in.	0	0
DEWEY BEACH	SUSSEX CO.	08/2019	Hail	1.25 in.	0	0
PHILLIPS HILL	SUSSEX CO.	09/2019	Hail	1.00 in.	0	0
BLADES	SUSSEX CO.	04/2021	Hail	1.00 in.	0	0
BRIDGEVILLE	SUSSEX CO.	04/2021	Hail	1.00 in.	0	0
ANGOLA BEACH	SUSSEX CO.	07/2021	Hail	1.00 in.	0	0

Table 3-25. 2016-2021 Historical Occurrences

Hail was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated CPRI for hailstorms is shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duratio n	=	CPR I
2 x .45	+	1 x .30	+	3 x .15	+	1 x .10	=	1.75

Table 3-26. CPRI for Degree of Risk for Hail

[18] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE

TERRORISM (LOW)

HAZARD DESCRIPTION

18 USC defines "Domestic Terrorism:" as activities that— (A) involve acts dangerous to human life that is a violation of the criminal laws of the United States or any State; (B) appear to be intended— (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping; and (C) occur primarily within the territorial jurisdiction of the United States.[19]

In its guidance on integrating human-caused hazards into State and local hazard mitigation plans (FEMA Publication 386-7), the Federal Emergency Management Agency has established a set of categories that can be applied to the profiling of intentional acts of terrorism. These categories are contamination, energy release (i.e., explosives, arson), and service disruption.

Contamination, as it relates to terrorist activity, refers to the intentional release of chemical, biological or radiological agents and nuclear hazards. Contamination can apply to human and animal life, a geographic area, agriculture/food supplies (as in agroterrorism"), and even the electronic world of computers and information via the Internet and e-mail (as in "cyber terrorism.")

According to Jane's Chem-Bio Handbook, chemical agents are liquid or aerosol contaminants that can be dispersed using sprayers or other aerosol generators by liquids vaporizing from puddles or containers or munitions. Chemical agents may pose viable threats for hours to weeks, depending on the agent used and the conditions in the exposed area. This hazard is especially volatile because persons, vehicles, water, and even the wind can carry contamination beyond the initial target zone.

Chemicals may also be corrosive or otherwise damaging *over time* if not dealt with appropriately. Biological agents are liquid or solid contaminants that can be dispersed using sprayers or aerosol generators or by point or line sources such as munitions, underground deposits, or moving sprayers. Biological hazards may pose a danger for a period of hours to years, depending on the agent used and the conditions in which it exists. Contamination can be spread via water and wind, while infection can be spread via humans and animals.

FEMA's Radiological Emergency Management Course states that radiological agents can also be dispersed using sprayers or aerosol generators or by point or line sources such as munitions, underground deposits, and moving sprayers. Radiological contaminants can be hazardous for seconds and years, depending on the material used. The initial effects of a radiological attack are likely to be localized to the site of the attack. However, depending on meteorological conditions, the subsequent behavior of contaminants may become more dynamic. Nuclear hazards include the detonation of a nuclear device underground, on the Earth's surface, in the air, or at a high altitude. Heat flashes and blast waves resulting from a detonation would last for seconds. However, nuclear radiation and fallout hazards can continue for years. In addition, an electromagnetic pulse resulting from a high-altitude detonation lasting for a few seconds can affect unprotected electronic systems. The initial light, heat, and blast effects of a subsurface, ground, or airburst are static and are determined by the device's characteristics. The fallout of radioactive contaminants may be dynamic depending on meteorological conditions.

[19] United States Code 18. (2021). https://www.govinfo.gov/content/pkg/USCODE-2011-title18/pdf/USCODE-2011-title18.pdf

OCCURRENCES AND PROBABILITY OF A TERRORISM HAZARD

Domestic Terrorists (DT) can face state and federal charges for applicable criminal violations, including weapons, explosives, threats, attacks on federal officials or facilities, hate crimes, arson, violence against animal enterprises, and material support to terrorists. Under 18 U.S.C. § 2339(a), it is a crime to provide material support or resources to another knowing or intending to be used in preparation for or conducting certain terrorism-related offenses. However, unlike a violation of 18 U.S.C. § 2339(b), the recipient of the material support need not be a designated foreign terrorist organization.

From FY 2015 through FY 2019, approximately 846 DT subjects were arrested by or in coordination with the FBI, as follows:

Fiscal Year (FY)	Total Charged	Federal Charges	State/Local Charges
2015	211	130	81
2016	229	169	60
2017	186	109	77
2018	113	54	52
2019	107	63	42

Table 3-27. Arrest for Domestic Terrorism (FBI, 2021)[20]

PRIORITIZATION AND RATIONALE OF THE TERRORISM HAZARD

Although there have been no previously recorded deaths, injuries, or damage from terrorism in Sussex County, this hazard was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated CPRI for terrorism is shown below. Terrorism remains an un-ranked hazard.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
1 x .45	+	1 x .30	+	1 x .15	+	1 x .10	=	1.0

Table 3-28. CPRI for Degree of Risk for Terrorism

[20] Strategic Intelligence Assessment and Data on Domestic Terrorism. (2021, May). www.fbi.gov/file-repository/fbi-dhs-domestic-terrorism-strategic-report

BEACH/SOIL EROSION (NON-RATED)

HAZARD PROFILE

Coastal erosion removes material from a coastal profile due to an imbalance in the supply and export of material from a particular section. It takes place in the form of scouring at the foot of the cliffs or dunes or the sub-tidal foreshore. Coastal erosion occurs mainly during strong winds, high waves, high tides, and storm surge conditions and results in coastline retreat and loss of land.

The processes will vary according to the coast types in question, cliff, coarse gravel, or sandy beaches. What is clear from this description is that coastal erosion is a dynamic process. It is often event-driven (a storm), and its consequences may be at least partially reversed during calmer periods. Such events are superimposed on the long-term coastal evolution. Coastal behavior also has a spatial dimension: the long-shore currents may permanently remove sediment from the shore, but they may also bring new deposits elsewhere. Therefore, it is essential to describe these processes concerning the concept of the coastal cell.[21]

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over land or in streams and channels. Water erosion over land may result from raindrops, shallow sheets of water flowing off the ground, or shallow surface flow, concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms such as hurricanes may cause significant erosion by combining high winds with heavy surf and storm surge to impact the shoreline significantly.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography climate or rainfall, and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the content of these soils increases at the clay and organic material level, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be beneficial in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the runoff velocity. The area's topography also affects runoff, including size, shape, and slope. The greater the slope length and gradient, the more potential a location has for erosion. Climate can affect the amount of runoff, mainly the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or for a long time, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementing erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with increasing settling out of the soil particles due to water or wind. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been vegetation restoration.

[21] Concepts & Science for Coastal Management: - http://www.conscience-eu.net/what_is_coastal_erosion_and_when_is_it_a_problem/index.htm

PRIORITIZATION AND RATIONALE OF THE EROSION HAZARD

Although there have been no previously recorded deaths, injuries, and quantifiable damage from erosion in Sussex County, there have been events along areas of waterway currently not utilized or owned and was judged by the HMSC and the HMWG to be of significant danger to the future of the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

There has been no measurable loss data to generate a CPRI rating for erosion. Thus, erosion remains unranked as shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
0 x .45	+	0 x .30	+	0 x .15	+	0 x .10	=	0

Table 3-29. CPRI for Degree of Risk for Erosion

CYBER TERRORISM - SOFTWARE/HARDWARE (NON-RATED)

HAZARD DESCRIPTION

Cyber-terrorism is a relatively new concept. According to the National Strategy for Homeland Security, terrorists may seek to cause widespread disruption and damage, including casualties, by attacking electronic and computer networks linked to critical infrastructures such as energy, financial, and securities networks. In addition, terrorist groups are known to exploit information technology and the Internet to plan attacks, raise funds, circulate propaganda, gather information, and communicate. In terms of hazard mitigation, cyber terrorism is often explored as a component in business continuity planning.

Software threats are malicious pieces of computer code and applications that can damage your computer and steal your personal or financial information. For this reason, these dangerous programs are often called malware (short for “malicious software”).

Software disasters are challenging because they can affect any system element and are difficult to detect until after the damage has been done.

Accidental and malicious activity can lead to financial losses, operational capacity loss, and hardware systems damage. Vulnerabilities have been detected in communications systems, medical systems, utility systems, and more. Further, educational institutions account for one-quarter of all data breaches in the United States.

Loss of hardware function could result from physical damage to the IT hardware, hardware malfunction, or a software event. In addition, loss of hardware could mean loss of critical information or service disruption.

Physical damage to any part of a hardware system could cause massive failures and result in loss of function throughout Sussex County.

Physical damage includes:

- Major, accidental damage to hardware that is easily repaired or replaced.
- Major, unintentional damage to hardware that is not easily replaced or repaired, for example, from construction or structural event.
- Major damage caused by malicious activity.
- Hurricane, flood, or leak that causes water damage.
- Seismic or construction event causes the hardware to move around and break.
- Electrical event or fire.

A hardware malfunction could lead to temporary or permanent loss of function in part or all a system. In addition, a malfunction in any element could interrupt network functions, medical operations, and other processes.

Hardware threats are easy to detect in comparison with software threats.

Hardware threats cause more damage to the network than software because a software threat can only harm the data, while a hardware threat can harm both device and data (Computer Networking Notes, 2018).

OCCURRENCES AND PROBABILITY OF A CYBER ATTACK

Table 3-30 identifies the top ten deadliest computer viruses.

Virus	Date	Description	**Damages**
ILOVEYOU		▪ Used social engineering to get people to click on the attachment, in this case, a love confession. The attachment was a script that poses as a TXT file, due to Windows at the time hiding the actual extension of the file. ▪ Once clicked, it will send itself to everyone in the user's mailing list and proceed to overwrite files with itself, making the computer unbootable. ▪ 10% of all computers infected.	$15 Billion
Code Red	2001	▪ The worm targeted computers with Microsoft IIS web server installed, exploiting a buffer overflow problem in the system. It leaves little trace on the hard disk as it can run entirely on memory, with a size of 3,569 bytes. ▪ Once infected, it will proceed to make a hundred copies of itself but due to a bug in the programming, it will duplicate even more and ends up eating the systems resources. ▪ 1.2 million servers affected	$2.4 Billion
Melissa	1999	▪ It started as an infected Word document that was posted up on the atlases UseNet group, claiming to be a list of passwords for pornographic sites. ▪ This got people curious and when it was downloaded and opened, it would trigger the	$80 Million

Virus	Date	Description	**Damages**
		macro inside and unleash its payload.	
Sasser	2004	▪ Slows down and crashes the computer, while making it hard to reset without cutting the power), the effects were incredibly disruptive, with millions of computers being infected, and important, critical infrastructure affected. ▪ More than a million infections taking out critical infrastructures, such as airlines, news agencies, public transportation, hospitals, public transport	$500 Million
Zeus	2009	▪ Zeus is a Trojan horse made to infect Windows computers so that it will perform various criminal tasks. ▪ Compromised thousands of FTP accounts and computers from large multinational corporations and banks such as Amazon, Oracle, Bank of America, and Cisco. Controllers of the Zeus botnet used it to steal the login credentials of social network, email, and banking accounts. ▪ One million computers infected (25% from US) ▪ Money mules are used to smuggle and transfer cash to the ringleaders in Eastern Europe.	$3 Billion
Conficker	2009	▪ The malware was able to infect more than 9 million computers all around the world, affecting governments, businesses, and individuals.	$9 Billion

Virus	Date	Description	**Damages**
		▪ It was one of the largest known worm infections to ever surface.	
Stuxnet		▪ Believed to have been created by the Israeli Defense Force together with the American Government, ▪ Stuxnet is an example of a virus created for the purpose of cyberwarfare, as it was intended to disrupt the nuclear efforts of the Iranians. ▪ It was estimated that Stuxnet managed to ruin one fifth of Iran's nuclear centrifuges and that nearly 60% of infections were concentrated in Iran.	N/A
Mydoom	2004	▪ Became one of the fastest spreading email worm since ILOVEYOU. ▪ The author is unknown, and it is believed that the creator was paid to create it since it contains the text message, "Andy; I'm just doing my job, nothing personal, sorry," ▪ The payload itself is twofold: first it opens a backdoor to allow remote access and second it launches a denial-of-service attack on the controversial SCO Group. ▪ It was believed that the worm was created to disrupt SCO due to conflict over ownership of some Linux code.	$38 Billion
Crypto Locker		▪ Trojan horse ransomware targeted at computers running Windows. It uses methods to spread itself, such as email, and	$665 Million

Virus	Date	Description	Damages
		once a computer is infected, it will proceed to encrypt certain files on the hard drive and any mounted storage connected to it with RSA public key cryptography. ▪ The only way to unlock the files is to pay a ransom by a deadline. ▪ The number of infections is estimated to be $500,000	
Flashback	2011	▪ This is one of the few Mac malwares to have gain notoriety as it showed that Macs are not immune. ▪ The Trojan was first discovered in 2011 by antivirus company Intego as a fake flash install.	N/A

Table 3-30. Top 10 Deadliest Viruses[22]

CPRI FOR DEGREE OF RISK

The generated CPRI for Cyber Terrorism is shown below. Cyber Terrorism remains an un-ranked hazard.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
0 x .45	+	0 x .30	+	0 x .15	+	0 x .10	=	0

Table 3-31. CPRI for Degree of Risk for Cyber Terrorism

[22] Gerencer, T. (2020, November 4). The top 10 worst computer viruses in history | HP® tech takes. Laptop Computers, Desktops, Printers, Ink & Toner | HP® Official Site. https://www.hp.com/us-en/shop/tech-takes/top-ten-worst-computer-viruses-in-history

DAM-LEVEE FAILURE (NON-RATED)

HAZARD DESCRIPTION

Dams are manufactured structures that serve a variety of uses such as flood protection, power production, agriculture, water supply, and forming recreational areas. They are typically constructed of earth, rock, or concrete and come in all shapes and sizes. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding and other impacts affecting lives and property. Dams can fail because water heights or flows are above the capacity the structure was designed for (including flooding) or because the structure failed in some way. Structures fail for many reasons, including lack of maintenance, erosion, seismic events, insufficient design, development or alteration of the floodplain, or improper construction. Concrete/masonry dams usually fail from the loss of a section or undermining, while the primary causes of earthen dam failure are overtopping, piping failure, and foundation failure. In addition, concrete or masonry dams tend to fail suddenly, while earthen dams usually take longer.

DAM HAZARD POTENTIAL CLASSIFICATIONS

Dam safety inspections and monitoring have become essential tools in evaluating dam failure risk, ensuring proper maintenance, and prioritizing actions. The ranking of assessments is often based on a classification system according to the potential impact a dam failure or mis operation would have on nearby populations and property. FEMA utilizes a Hazard Potential Classification System for Dams that categorizes them as Low, Significant, or High, as in ***Table 3-32***.

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low (L)	None Expected	Low and Generally Limited to Owner
Significant (S)	None Expected	Yes
High (H)	Probable; One or More Expected	Yes

Table 3-32. Dam Hazard Potential Classification System[23]

Low Hazard Potential Dam: Any dam whose failure or mis-operation is ***unlikely to cause*** loss of human life but may cause minor economic and or environmental losses.

Significant Hazard Potential Dam: Any dam whose failure or mis-operation will cause ***possible*** loss of human life, economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.

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[23] FEMA

High Hazard Potential Dam: Any dam whose failure or mis-operation will cause ***probable*** loss of human life[24].

OCCURRENCES AND THE PROBABILITY OF THE DAM FAILURE HAZARD

Dam failure can result from natural events, human-induced events, or a combination. Losses due to natural events such as hurricanes, earthquakes, or landslides are significant because there is generally little or no warning. However, the most common cause of dam failure is prolonged rainfall that produces flooding. Sussex County has experienced no dam failures within the last five years. The at-risk inventory within the state and County are listed in ***Table 3-33 and 3-34*** on the following pages.

	Delaware State Dam Inventory	
Overview		84 dams on the NID
Ownership		67 publicly owned 17 privately owned
Hazard Classification		63 high hazard potential 6 significant hazard potential 15 low hazard potential

Table 3-33. Delaware State Dam Inventory

Sussex County High & Significant Potential Dam Inventory		
High Hazard Potential	• City of Laurel Sewage Lagoon (1) • City of Laurel Sewage Lagoon (2) • City of Laurel Sewage Lagoon (3) • Selbyville Wastewater Lagoon • Clendaniel Pond Dam • Abbotts Pond Dam • Betts Pond Main Dam • Betts Pond Route 113 Dam • Burton Pond Dam • Chipman Pond Dam	• Hearns Pond Dam • Horseys Pond Dam • Ingram Pond Dam • Marshall Millpond Dam • Millsboro Pond Dam • Portsville Mill Pond Dam • Records Pond Dam • Red Mill Pond Dam Reynolds Pond • Shoals Branch Dam

[24] http://www.dnrec.delaware.gov/swc/Documents/SoilPPT/damsafety_files_/frame.htm

Sussex County High & Significant Potential Dam Inventory		
	• Concord Pond Dam • Craigs Pond • Cubbage Pond Dam • Fleetwood Pond Dam • Griffith Lake Dam	• Swiggetts Pond Dam • Trap Pond Dam • Wagamons Pond Dam • Williams Pond Dam • Waples Pond Dam
Significant Hazard Potential	• Goslee Mill Pond Dam • Morris Millpond Dam • Collins Pond Dam • Davis Pond Dam • Trussams Pond Dam	
Low Hazard Potential	• Diamond Pond Dam • Gordons Pond Dam • Hudson Pond Dam	

Table 3-34. Sussex County High & Significant Potential Dam Inventory

PRIORITIZATION AND RATIONALE OF THE DAM FAILURE HAZARD

There have been no dam failures within Sussex County thus there are no recorded deaths, injuries, or damage. The HMSC and the HMWG find the potential impacts from dam failure to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated CPRI for dam failure is shown below. Dam failure remains an unranked hazard.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
0 x .45	+	0 x .30	+	0 x .15	+	0 x .10	=	0

Table 3-35. CPRI for Degree of Risk for Dam Failure

PIPELINE FAILURE (NON-RATED)

HAZARD DESCRIPTION

The energy infrastructure of the United States is comprised of many components, including the physical network of pipes for oil and natural gas, electricity transmission lines, and other means for transporting energy to the Nation's consumers. This infrastructure includes facilities that convert raw natural resources into energy products, the rail network, trucking lines, and marine transportation. (U.S. Department of Energy, 2003) Much of this infrastructure is aging, and with the challenges of keeping the infrastructure up to date with the latest technological advances and consumer needs, the potential for an energy pipeline failure to become a hazard in and of itself must be considered.

The two million miles of oil pipelines in the United States are the principal mode for transporting oil and petroleum products such as gasoline, and virtually all-natural gas in the United States. Natural gas pipelines transport natural gas. Liquid petroleum (oil) pipelines transport liquid petroleum and some liquefied gases, including carbon dioxide. Liquid petroleum includes crude oil and refined products made from crude oil, such as gasoline, home heating oil, diesel fuel, aviation gasoline, jet fuels, and kerosene. Liquefied ethylene, propane, butane, and some petrochemical feedstocks are also transported through oil pipelines.[25]

Pipeline systems are the safest means to move these products. The federal government rededicated itself to pipeline safety in 2006 when the PIPES Act was signed. It mandates new methods and makes commitments for new technologies to manage the integrity of the nation's pipelines and raise the bar on pipeline safety.

Pipeline systems consist of a few major components:

- Pipelines that collect products from sources, such as wells on land (gathering lines) or offshore, or from shipping, such as tankers for oil or liquefied natural gas (LNG). These systems move the product to storage, processing (such as treatment for gas or refining of petroleum).
- Transmission pipelines that transport large quantities of hazardous liquids or natural gas over longer distances; transmission lines deliver natural gas to distant power plants, large industrial customers and to municipalities for further distribution; petroleum transmission lines deliver crude oil to distant refineries or refined products to distant markets, such as airports or to depots where fuel oils and gasoline are loaded into trucks for local delivery.
- Distribution lines are a part of natural gas systems and consist of main lines that move gas to industrial customers, down to the smaller service lines that connect to businesses and homes throughout a municipality.

Along these pipelines are pump stations for liquids and compressor stations for natural gas, storage and distribution facilities and automated control facilities to manage the product movement and maintain safety. Should a pipeline fail, a drop in pressure normally triggers systems that close valves to isolate the failed pipeline.[26]

This oil pipeline infrastructure is old, requiring regular safety and environmental reviews to ensure its safety and reliability. As a result, the potential risk of pipeline accidents is a significant national concern.

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[25] General Pipeline FAQs | PHMSA (dot.gov)
[26] General Pipeline FAQs | PHMSA (dot.gov)

The energy infrastructure is vulnerable to physical and cyber disruption, which could threaten its integrity and safety. Disruptions could originate from natural events such as geomagnetic storms, earthquakes, accidents, equipment failures, or deliberate interference. In addition, the Nation's transportation and power infrastructures have grown increasingly complex and interdependent; consequently, any disruption could have far-reaching consequences.

PRIORITIZATION AND RATIONALE OF THE PIPELINE FAILURE HAZARD

There have been no pipeline failures within Sussex County. Although there have been no previously recorded deaths, injuries, or damage from pipeline failure in Sussex County, this hazard was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

The generated CPRI for pipeline failure is shown below. Pipeline failure remains an un-ranked hazard.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
0 x .45	+	0 x .30	+	0 x .15	+	0 x .10	=	0

Table 3-36. CPRI for Degree of Risk for Pipeline Failure

EARTHQUAKE (NON-RATED)

HAZARD DESCRIPTION

An earthquake is the motion or trembling of the ground produced by the sudden displacement of rock in the Earth's crust.

Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Tremors can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking.

The level of damage depends upon the amplitude and duration of the shaking, which is directly related to the earthquake size, distance from the fault, site, and regional geology.

Most earthquakes are caused by the release of stresses accumulated by the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along the borders of the Earth's ten tectonic plates.

These plate borders generally follow the outlines of the continents, with the North American plate following the continental border with the Pacific Ocean in the west but following the mid-Atlantic trench in the east. Earthquakes occurring in the mid-Atlantic trench usually pose little danger to humans.

The areas of most significant tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the most significant strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes pressure in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy, and producing seismic waves, generating an earthquake.

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges and disrupt gas, lifelines, electric, and phone service. Death, injuries, and extensive property damage are possible from earthquakes.

Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure.

MAGNITUDE OR SEVERITY

Minor earthquakes occur much more frequently than more significant earthquakes. These smaller earthquakes generally cause little or no damage. However, massive earthquakes can cause tremendous damage and are often followed by smaller aftershocks occurring for weeks after the event. This phenomenon referred to as “minor faulting,” appears during an adjustment period that may last several months.

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is calculated using the Richter Scale (***Table 3-37).*** The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for variation in the distance between the various seismographs and the epicenter of the earthquakes. The Richter Scale expresses magnitude in whole numbers and decimal fractions. For example, a magnitude 5.3 quake might be computed as a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole-number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
Less than 3.5	Generally, not felt but recorded.
3.5–5.4	Often felt, but rarely causes damage.
Under 6.0	At most, slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1–6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0–7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Table 3-37. The Richter Scale

The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of specific vital responses such as people awakening, movement of furniture, damage to chimneys, and destruction.

Although numerous intensity scales have been developed in the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli Intensity Scale. It was developed in 1931 by American seismologists Harry Wood and Frank Neumann. This scale, composed of 12 increasing levels of intensity ranging from imperceptible shaking to catastrophic destruction, is designated by Roman numerals, as shown in Table 5-38. The scale does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects.

The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects experienced at a particular place.

The lower numbers on the intensity scale deal with the way people feel the earthquake. The higher numbers on the scale are based on observed structural damage.

Structural engineers usually contribute information for assigning intensity values of VIII or above.

SCALE	INTENSITY	EARTHQUAKE EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	Instrumental	Detected only on seismographs	

SCALE	INTENSITY	EARTHQUAKE EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
II	Feeble	Some people feel it	<4.2
III	Slight	Felt by people resting; like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	<5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures; poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables destroyed; general triggering of other hazards	<8.1
XII	Catastrophic	Destruction: trees fall; ground rises and falls in waves	>8.1

Table 3-38. Modified Mercalli Intensity Scale for Earthquakes

Earthquakes in the central and eastern U.S., although less frequent than in the western U.S., are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at places as far as 60 miles from where it occurred, and it infrequently causes damage near its source. A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 300 miles from where it happened and sometimes causes damage out to 25 miles.

OCCURENCES AND PROBABILITY OF THE EARTHQUAKE HAZARD

The largest measured earthquake in Delaware was recorded on November 30, 2017. The magnitude 4.1 temblor occurred at 4:47 p.m. with an epicenter located 6 miles northeast of Dover in Bombay Hook National Wildlife Refuge, according to data reported by the U.S. Geological Survey. Analysis of the shaking associated with the Dover earthquake indicates that the source was approximately 3 km (10,000 ft) beneath the land surface in deep crystalline basement rocks and had a predominantly strike-slip direction of motion (side-ways movement along a fault zone) with a significant thrust component (some upward movement along the fault), probably along a deep pre-existing fault related to the past tectonic episodes

The Delaware earthquake of 2017 was felt throughout the state and along the eastern seaboard from central Virginia to Massachusetts. Reports compiled on the internet by the USGS, and DGS indicate a Modified Mercalli Intensity of IV felt closest to the epicenter and III around most of the region. An intensity of IV is generally associated with light shaking that is felt by many indoors but not as commonly felt outdoors. Dishes, windows, and doors may be disturbed; walls make a cracking sound, and the earthquake may have a sensation like a heavy truck striking a building. An intensity of III is commonly quite noticeable to persons indoors, especially on upper floors of buildings, but many people may not recognize it as an earthquake. It may feel like vibrations from the passing of a truck.

As of Dec 15, 2017, the Delaware Geological Survey website had received approximately 260 "felt reports" from individuals in and around Delaware, with an average intensity reply between Mercalli III and IV. Higher intensities, commonly VI, were reported closer to the epicenter, mainly in Kent County. Many of the reports are associated with the shaking of dishes, teapots, and lamps. The USGS also has received nearly 17,000 reports through the internet from throughout the northeastern United States.[27]

Although there have been no previously recorded deaths, injuries, or damage from earthquakes in Sussex County, the hazard was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

[27] **Source:** https://www.dgs.udel.edu/delaware-geology/earthquake-november-30-2017

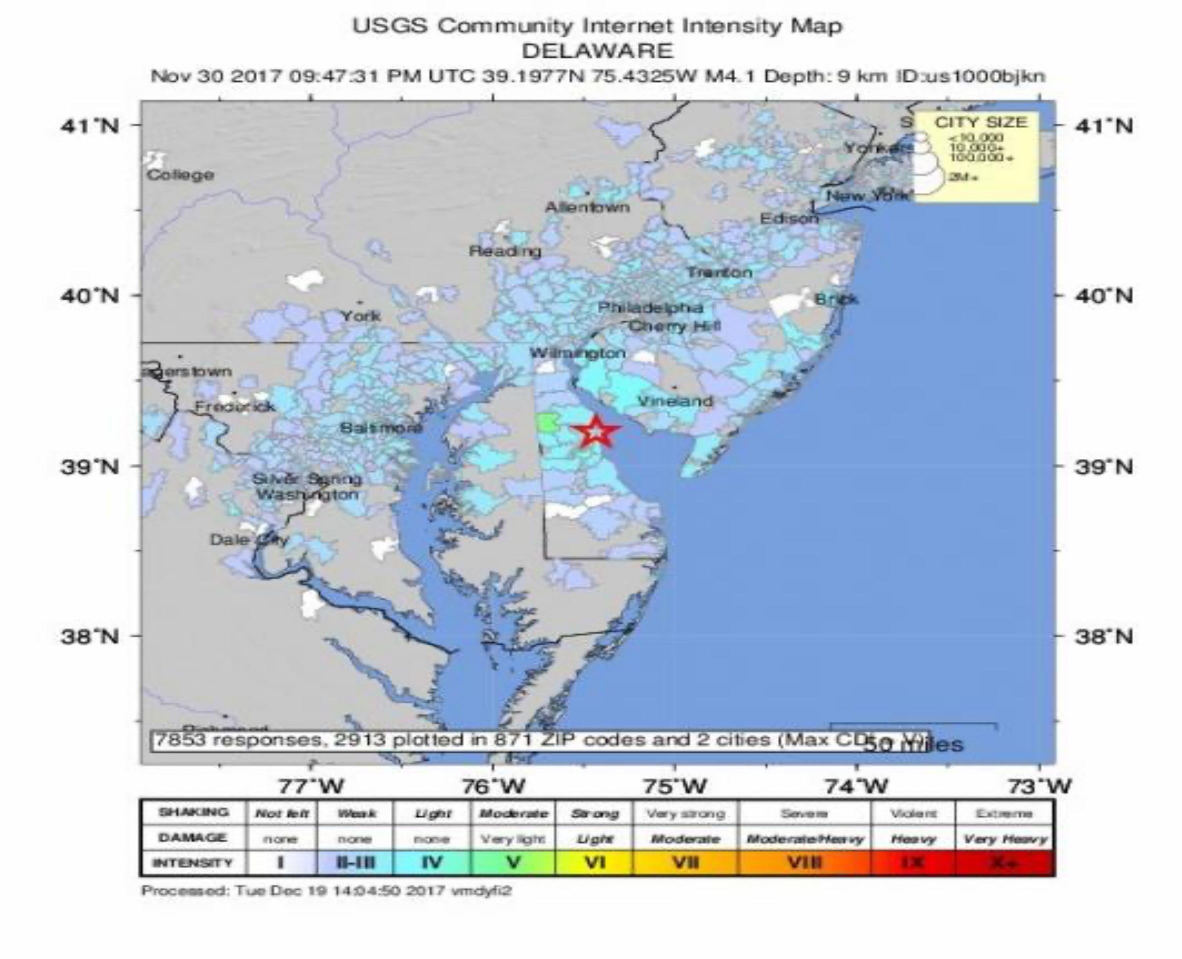

FIGURE 3-4. INTENSITY MAP OF 2017 EARTHQUAKE

CPRI FOR DEGREE OF RISK

There has been one event occurrence since the last hazard mitigation update, there is limited measurable data to generate a CPRI rating for earthquake. Thus, earthquake remains unranked as shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
0 x .45	+	0 x .30	+	0 x .15	+	0 x .10	=	0

Table 3-39. CPRI for Degree of Risk for Earthquake

WILDFIRE (NON-RATED)

HAZARD DESCRIPTION

A wildfire is any fire that burns out of control and typically occurs in grasslands, forests, and brush land. Wildfire is a natural process that is important to ecosystems, and fire suppression can lead to more severe fires due to the buildup of vegetation, which creates more fuel. However, wildfires can also endanger people's lives and destroy property when out of control. Wildfires can also cause secondary effects, including erosion, landslides, the introduction of invasive species, and changes in water quality. Wildfires can be caused by lightning strikes but are most often the intentional or unintentional result of humans.

PRIORITIZATION AND RATIONALE OF THE WILDFIRE HAZARD

Although there have been no previously recorded deaths, only one injury, and minimal damage from wildfire in Sussex County, there have been enough events for the HMSC and the HMWG to consider wildfire to be of significant danger to the community and thus included as an identified hazard.

CPRI FOR DEGREE OF RISK

There has been no event occurrence since the last hazard mitigation update, thus no measurable data to generate a CPRI rating for wildfire. Thus, wildfire remains unranked as shown below.

Probability	+	Magnitude /Severity	+	Warning Time	+	Duration	=	CPRI
0 x .45	+	0 x .30	+	0 x .15	+	0 x .10	=	0

Table 3-40. CPRI for Degree of Risk for Wildfire

PRIORITIZATION AND RATIONALE OF THE HAZARD

An analysis was performed using the Calculated Priority Risk Index (CPRI) to provide a level playing field for comparing hazards. The purpose of the CPRI is not to replace the scientific or local knowledge or to have the final say on a threat but to provide the County with a means for looking at the hazards for further vulnerability analysis. Each CPRI is accompanied by a rationale for why that hazard will be included or excluded.

CPRI values are based upon previous event history and definitions and combine the hazard's probability of future occurrence, magnitude or severity of the hazard's impacts, warning time before an event occurs, and the duration of the event. The categories are shown in ***Tables 3-41 through 3-46***.

Probability	Index Value	Description
Highly Likely	4	• Frequent significant events with a well-documented history of occurrence. • Event has up to 1 in 1 year chance of occurring. (1/1 = 100%) • History of events is 33%-100% likely per year.
Likely	3	• Occasional significant occurrences with at least two or more documented historic significant events. • Event has up to 1 in 3 year's chance of occurring. (1/3 = 33%) • History of events is 20%-33% likely per year.
Possibly	2	• Rare significant occurrences with at least one documented or anecdotal historic significant event • Event has up to 1 in 5 year's chance of occurring. (1/5=20%) • History of events is 10%-20% likely per year.
Unlikely	1	• Extremely rare with no documented history of significant events occurring. • Event has up to 1 in 10 year's chance of occurring. (1/10=10%) • History of events is 0%-10% likely per year.

Table 3-41. Probability of Future Occurrence Based on Previous Hazard Events

Magnitude/Severity	Index Value	Description
Catastrophic	4	▪ Multiple deaths ▪ More than 50% of property is severely damaged ▪ Complete shutdown of facilities for more than 1 month
Critical	3	▪ Injuries and/or illnesses result in permanent disability ▪ More than 25% of property is severely damaged ▪ Complete shutdown of critical facilities for at least 14 days
Limited	2	▪ Injuries and/or illnesses do not result in permanent disability ▪ More than 10% of property is severely damaged ▪ Complete shutdown of critical facilities for at least 1 day
Negligible	1	▪ Injuries and/or illnesses are treatable with first aid Less than 25% of property is severely damaged. ▪ Shutdown of critical facilities for 24 hours or less

Table 3-42. Magnitude/Severity of Potential Impacts Based on Previous Hazard Events

Warning Time	Index Value	Description
Less than 6 Hours	4	Less than 6 Hours warning time before event occurs
6-12 Hours	3	6-12 Hours warning time before event occurs
12-24 hours	2	12-24 Hours warning time before event occurs
24+ Hours	1	At least 24 Hours warning time before event occurs

Table 3-43. Warning Time of Hazard Event Based on Hazard Definition

Warning Time	Index Value	Description
More than 1 week	4	Event lasts more than 1 week
Less than 1 week	3	Event lasts less than 1 week
Less than 1 day	2	Event lasts less than 1 day
Less than 6 hours	1	Event lasts less than 6 hours

Table 3-44. Duration of Hazard Event Based on Hazard Definition

The HMSC and HMWG identified eleven (11) natural, four (4) human-caused, and one (1) technological hazard for consideration within this hazard mitigation plan update. Having applied the CPRI values in assessing the hazards, the prioritization of the hazards under consideration are displayed in ***Table 3-XX***. The CPRI generated values are found following in ***Table 3-XX*** on the following page

Hazard	Hazard Type	Hazard Ranking
Flooding (Riverine and Coastal)	N	1
Hurricane/Tropical Storms	N	2
Severe Thunderstorms	N	3
Drought	N	4
Extreme Heat/Cold	N	5
Hazmat	H/C	6
Winter Storms	N	7
Tornado	N	8
Hailstorms	N	9
Terrorism	H/C	10
Beach/Soil Erosion	N	11

Hazard	Hazard Type	Hazard Ranking
Cyber Terrorism	T	12
Dam Levee Failure	H/C	13
Pipeline Failure	H/C	14
Earthquake	N	15
Wildfire	N	16

Table 3-45. Overall, Hazard Ranking

CALCULATED PRIORITY RANKING INDEX SUMMARY						
Hazard	**Probability**	**Magnitude and/or Severity**	**Warning Time**	**Duration**	**CPRI Score**	**Hazard Ranking**
Flooding	1.8	.60	.30	.30	3	1
Hurricane/Tropical Storms	1.8	.60	.30	.20	2.9	2
Severe Thunderstorms	1.8	.60	.30	.20	2.9	3
Drought	.90	.60	.15	.40	2.05	4
Extreme Heat/Cold	1.35	.30	.15	.30	2.1	5
Hazmat	.90	.30	.60	.20	2	6
Winter Storms	1.35	.30	.15	.20	2	7
Tornado	.45	.60	.60	.10	1.75	8
Hailstorms	.90	.30	.45	.10	1.75	9
Terrorism	.45	.30	.15	.10	1.0	10
Beach/Soil Erosion	--	--	--	--	--	N/R

CALCULATED PRIORITY RANKING INDEX SUMMARY						
Cyber Terrorism	--	--	--	--	--	N/R
Dam Levee Failure	--	--	--	--	--	N/R
Pipeline Failure	--	--	--	--	--	N/R
Earthquake	--	--	--	--	--	N/R
Wildfire	--	--	--	--	--	N/R

Table 3-46. CPRI Hazard Ranking Index

4. RISK AND VULNERABILITY ASSESSMENT

Contents of this section

- Requirement for Hazard Identification
- Overview of Sussex County's Risk and Vulnerability Process
- Overview of Sussex County's Assets and Development Trends
  - Population
  - Critical Facilities
  - Demographics of Future Land Use
  - General Building Stock Development
  - Estimate of Potential Losses
  - Flood
  - Tsunami
  - Thunderstorm
  - Earthquake
  - Hurricane Wind
  - Wildfire o Drought
  - Dam/Levee Failure
  - Extreme Heat/Cold
  - Terrorism
  - Winter Storm
  - HazMat Incident
  - Tornado
  - Pipeline Failure
  - Hail
- Summary of Risk Assessment

Requirement for the risk and vulnerability assessment

Requirement §201.6(c)(2)(i): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Requirement §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

OVERVIEW OF SUSSEX COUNTY'S RISK AND VULNERABILITY ASSESSMENT PROCESS

A high-level, detailed risk and vulnerability assessment was completed for Sussex County for flood (riverine and coastal), severe winds (hurricanes, coastal storms, and tornados), thunderstorms, drought, extreme weather (hot/cold), winter storms, hail, earthquakes, terrorism, hazardous materials, and energy pipeline failures, due to the higher level of vulnerability for these hazards compared to others. It is important to note that this risk and vulnerability assessment is based on the best available data and represents a base-level assessment for the planning area.

The loss estimates provided in this section have resulted in an *approximation* of vulnerability. Therefore, these estimates should be used to understand relative vulnerability to hazards and potential losses. However, it is crucial to realize that uncertainties are inherent in any loss estimation methodology, arising partly from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Delays also result from approximations and simplifications necessary for a comprehensive analysis (such as abbreviated inventories, demographics, or economic parameters).

To conduct the risk and vulnerability assessment effort, two distinct hazard vulnerability assessment methodologies were applied: HAZUS-MH (FEMA's loss estimation software) and a statistical vulnerability assessment methodology. Both approaches estimate the potential impact using a standard, systematic framework for evaluation.

The HAZUS-MH vulnerability assessment methodology is parametric, in that distinct hazard and inventory parameters (for example, wind speed and building types) were modeled using the HAZUS-MH software to determine the impact (damages and losses) on the built environment. The HAZUS-MH software was used to estimate losses from wind (hurricane and tornado), earthquake, and flood hazards.

The second methodology, a statistical vulnerability assessment methodology, was applied to analyze hazards of concern outside the HAZUS-MH software's scope. The method uses a statistical approach and mathematical modeling of vulnerability to predict a hazard's frequency of occurrence and estimate impacts based on recorded or historic damage information.

HAZUS-MH is FEMA's standardized loss estimation software program, built upon an integrated geographic information system (GIS) platform (***Figure 4-1).*** This vulnerability assessment applied HAZUS-MH to produce regional profiles and estimate losses for three of the nine ranked hazards addressed in this section: flood, hurricane winds and earthquake.

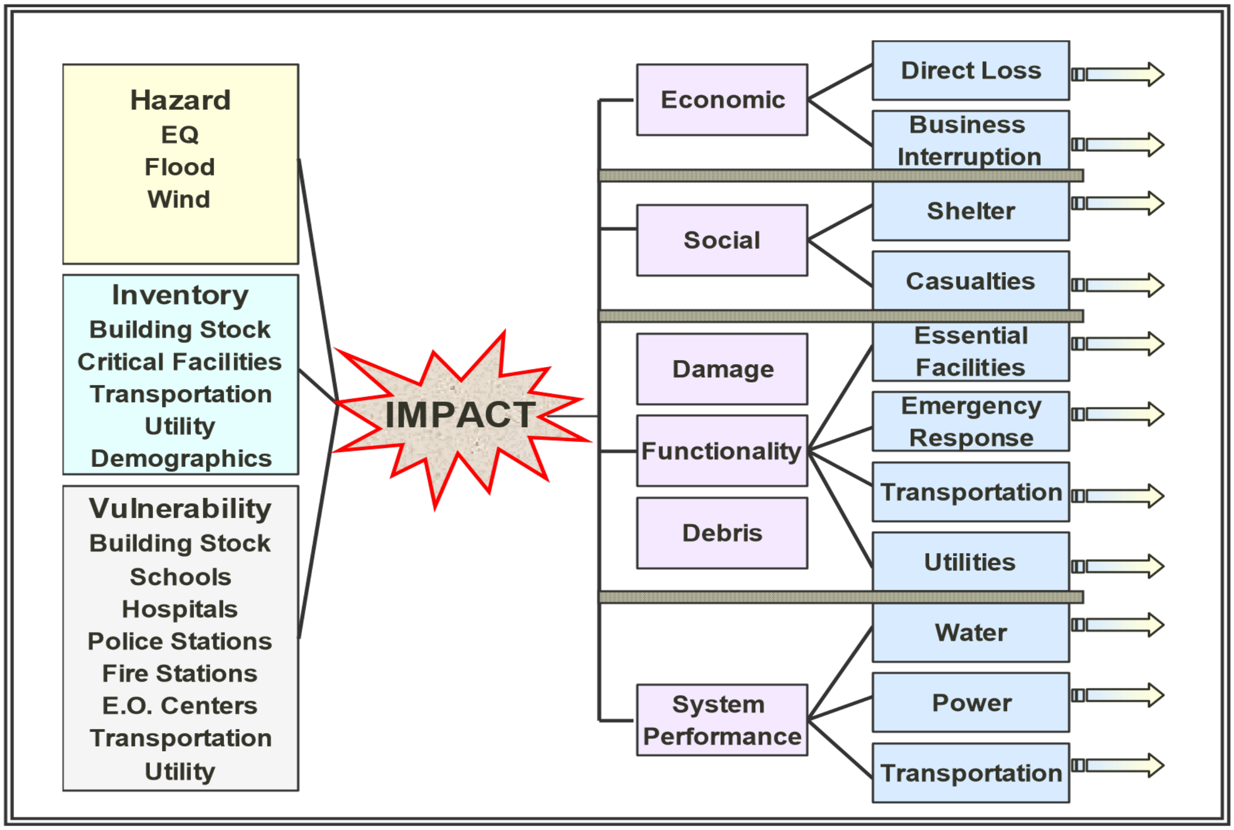

Figure 4-1. Conceptual Model of HAZUS-MH Methodology

EXPLANATION OF REGIONAL VULNERABILITY ASSESSMENT METHODOLOGY

Vulnerabilities associated with other natural hazards were analyzed using a regional assessment methodology developed and used specifically for this effort. This approach is based on the principle that any spatially; nonspecific hazard event is essentially a random occurrence within a region and has just as much chance of occurring within the study area as outside. Historical data for each hazard and statistical evaluations are performed using manual calculations. The general steps used in the statistical vulnerability assessment methodology are summarized below:

- Buffer the study area to determine the regional assessment area
- Compile hazard occurrence data for the restricted area from national and local sources
- Categorize hazard parameters for each hazard to be modeled
- Calculate the annualized occurrence and loss estimates for each regional subdivision
- Normalize the annualized occurrence and loss estimates by land area and number of housing units, respectively
- Determine the overall regional average of annualized occurrence and loss

The economic loss results are presented here using two interrelated vulnerability indicators:

- The Annualized Loss (AL) is the estimated long-term value of losses to the general building stock in any single year in a specified geographic area (i.e., city or County).

- The Annualized Loss Ratio (ALR) expresses the estimated annualized loss as a fraction of the building inventory replacement value.

The estimated Annualized Loss (AL) addresses two key components of vulnerability: the probability of the hazard occurring in the study area and the consequences of the hazard, largely a function of building construction type and quality, and the intensity of the hazard event. By annualizing estimated losses, the AL factors in historical patterns of frequent smaller events with infrequent but more significant events to provide a balanced presentation of the vulnerability.

The Annualized Loss Ratio (ALR) represents the AL as a fraction of the local building inventory replacement value. This ratio is calculated using the following formula:

"ALR = ANNUALIZED LOSSES / TOTAL EXPOSURE AT RISK"

The annualized loss ratio gauges the relationship between average annualized loss and building replacement value. This ratio can be used as a measure of relative vulnerability between areas, and, since it is normalized by replacement value, it can be directly compared across different geographic units such as metropolitan areas or counties.

It is important to note that HAZUS-MH was used to produce "worst-case scenario" results. Therefore, the outputs in this document are the result of a worst-case scenario event for each hazard, and it is understood that any smaller events would most likely create fewer losses than those calculated here.

Finally, in each loss table for specific jurisdictions, the loss is listed as negligible. Negligible means explicitly less than $5,000 in losses per jurisdiction. While not listed individually, these small losses are included in the total loss estimates.

MINOR CIVIL DIVISIONS (MCD)

Many of the tables presented in the *Risk and Vulnerability Assessment* use Minor Civil Divisions (MCDs), which are a traditional way to divide counties into subdivisions[28] (*Figure 4-2).* MCDs are recognized by the U.S. Census Bureau and are a national standard by which HAZUS-MH results are prepared (due in part to the reliance of HAZUS on U.S. Census data.) Minor Civil Divisions cover the entire country and provide a standard level of geography below the County boundary.[29]

[28] The expanded definition of a Minor Civil Division according to the U.S. Census Bureau is, "the primary governmental or administrative division of a County or statistically equivalent entity in many states and statistically equivalent entities...a Minor Civil Division is created to govern or administer an area rather than a specific population."

[29] Minor Civil Divisions are typically most common in the Eastern United States, while Census County Divisions (CCDs), a similar method of dividing counties into subdivisions, are more common in the Western United States

Figure 4-2. Minor Civil Divisions (U.S. Census 2020)

In the studies conducted for Sussex County, and cities, such as Lewes and Seaford, are separated from the MCDs in jurisdiction-level analyses. This was done to provide a more detailed cross section of the planning area and eliminate tendencies to double-count available information

Overview of Sussex county's assets and trends

To better understand a community's risks, and evaluation of which assets are exposed to hazard events must be completed. The inventory of assets that should be considered includes the population, structures, and lifelines that hazard events could impact. Section 3 provides brief descriptions of historical hazard impacts, the locations and extent of the hazards, and the implications for life and property due to each risk. This Section will describe the County's overall inventory that could be injured, damaged, or destroyed during a hazard and possible future development trends. FEMA's spatial loss estimation software, HAZUSMH, included data for several inventory categories and was used as the foundation for the inventory data for this Plan. HAZUS-MH utilizes many data sources, including Census 2010 data, Dun & Bradstreet data, and Homeland Security Infrastructure Protection data, to create the inventory database. Since this is a national inventory database, the accuracy of HAZUS-MH outputs can be improved by refining the inventory data based on local data.

NATIONAL RISK INDEX[30]

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Risk Index			
Type	**Summary**	**Sussex Score**	**Delaware Score**
Risk Index	Moderate	18.25%	13.24%
Annual Loss	Relatively Moderate	19.71 %	17.96%
Social Vulnerability	Relatively Moderate	44.15%	35.82%
Community Resilience	Relatively Moderate	55.10%	56.53%

Table 4-1. National Risk Index

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

Risk Index = Expected Annual Loss × Social Vulnerability ÷ Community Resilience

Type	Rating	Score
Coastal Flooding	Relatively High	38.37
Drought	Relatively Moderate	13.53
Earthquake	Relatively Low	4.50
Hail	Relatively Low	8.07

30 https://hazards.fema.gov/nri/

Type	Rating	Score
Heat Wave	Relatively Moderate	17.42
Hurricane	Relatively Moderate	13.01
Ice Storm	Relatively Moderate	18.31
Landslide	Relatively Low	8.60
Lightning	Relatively Moderate	20.74
Riverine Flooding	Relatively Moderate	11.68
Strong Wind	Relatively Low	13.45
Tornado	Relatively Moderate	20.04
Wildfire	Relatively Low	11.84
Winter Weather	Relatively High	33.76

Table 4-2. Hazard Risk Index

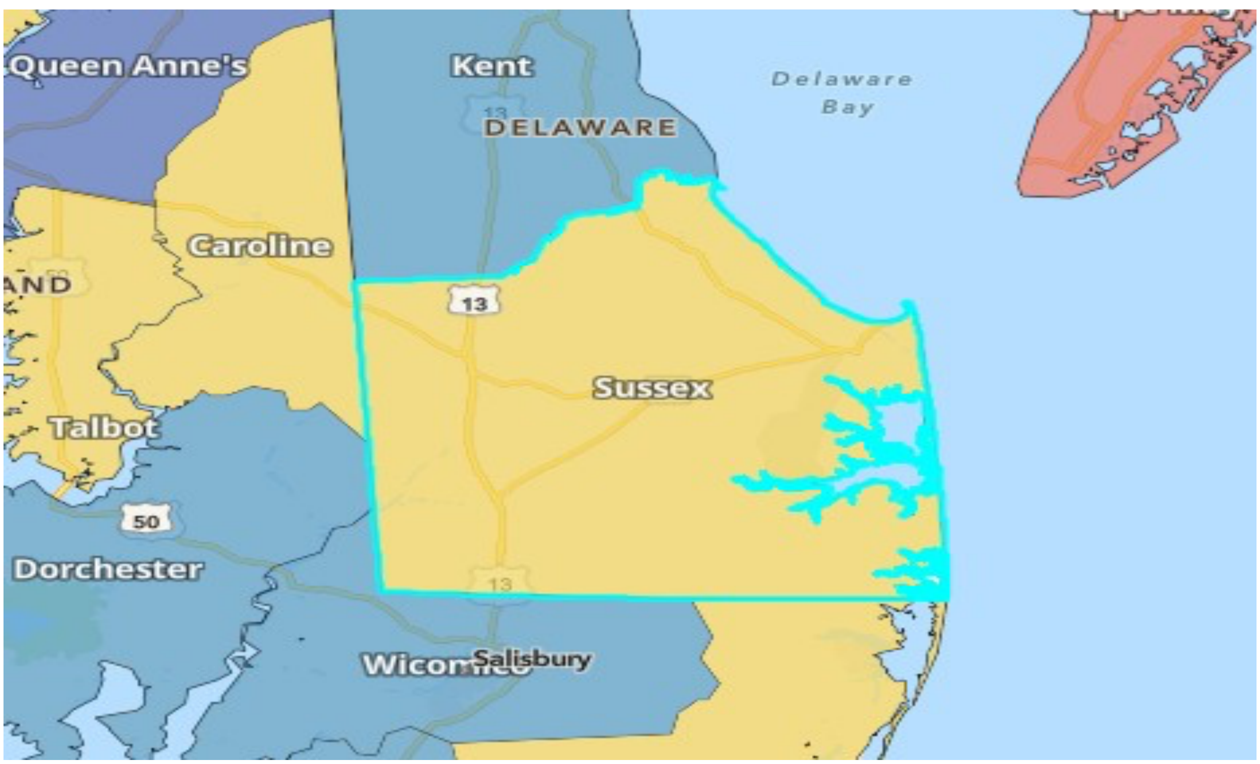

Figure 4-3. Map of Risk Index

Relatively Moderate 18.25

CALCULATING EXPECTED ANNUAL LOSS

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio

In Sussex County, DE, expected loss each year due to natural hazards is Relatively Moderate when compared to the rest of the U.S.

Type	Rating	Score
Coastal Flooding	Relatively High	32.56
Drought	Relatively Moderate	12.02
Earthquake	Relatively Low	4.86
Hail	Very Low	8.17
Heat Wave	Relatively Moderate	17.97
Hurricane	Relatively Moderate	12.09
Ice Storm	Relatively Moderate	22.05
Landslide	Relatively Low	10.19
Lightning	Relatively Moderate	28.86
Riverine Flooding	Relatively Low	10.86
Strong Wind	Relatively Low	21.58
Tornado	Relatively Moderate	18.64
Wildfire	Relatively Low	11.00
Winter Weather	Relatively High	39.07

Table 4-3. Expected Annual Loss Rating and Score

Type	Total	Building Value	Population Evidence	Population	Agriculture Value
Coastal Flooding	$8,909,423	$8,742,143	$167,280	0.02	n/a
Drought	$423,765	n/a	n/a	n/a	$423,765
Earthquake	$181,276	$174,993	$6,283	0.00	n/a
Hail	$36,501	$8,813	$217	0.00	$27,471
Heat Wave	$407,107	$0	$406,918	0.05	$189
Hurricane	$922,988	$457,663	$334,466	0.04	$130,859
Ice Storm	$117,736	$94,054	$23,682	0.00	n/a
Landslide	$9,193	$5,288	$3,904	0.00	n/a
Lightning	$214,028	$108,115	$105,912	0.01	n/a
Riverine Flooding	$641,850	$160,346	$31,707	0.00	$449,797
Strong Wind	$180,221	$51,892	$126,590	0.02	$1,740
Tornado	$914,111	$465,532	$441,533	0.06	$7,045
Wildfire	$210,741	$209,872	$452	0.00	$417
Winter Weather	$384,019	$117,217	$266,585	0.04	$218

Table 4-4. Expected Annual Loss

Type	Total	Building Value	Population Evidence	Population	Agriculture Value
Coastal Flooding	$519,904	$14,585	$505,319,011	66,489	
Drought	$900,951	n/a	n/a	n/a	$900,951,322
Earthquake	$1,527,390	$29,088	$1,498,302	197,145	n/a
Hail	$1,528,403	$29,088	$1,498,302	197,145	$1,012,583

Type	Total	Building Value	Population Evidence	Population	Agriculture Value
Heat Wave	$1,524,716	$28,950	$1,494,753	196,678	$1,012,262
Hurricane	$1,526,737	$29,056	$1,496,669	196,970	$1,011,876
Ice Storm	$1,504,777	$28,438	$1,476,339	194,255	n/a
Landslide	$78,718,262,	$1,710,138	$77,008,124	10,132.	n/a
Lightning	$1,527,390	$29,088	$1,498,302	197,945	n/a
Riverine Flooding	$146,612	$6,132	$140,439,504	18,478	$40,733
Strong Wind	$1,528,403	$29,088	$1,498,302	197,945	$1,012,583
Tornado	$1,528,403	$29,088	$1,498,302	197,945	$1,012,583
Wildfire	$34,736,576	$758,794	$33,951,874	4,467	$25,907
Winter Weather	$1,524,720	$28,951,420	$1,494,756	196,678	$1,012,264

Table 4-5. Exposure Values

Type	Frequency	Events	Period
Coastal Flooding	4.4 events per year	n/a	Various
Drought	4 events per year	98	2000-2017 (18 years)
Earthquake	0.029% chance per year	n/a	2017 dataset
Hail	0.8 events per year	27	1986-2017 (32 years)
Heat Wave	0.7 events per year	28	2005-2017 (12 years)
Hurricane	0.2 events per year	32	East 1851-2017 (167 years) / West 1949-2017 (69 years)
Ice Storm	0.4 events per year	28	1946-2014 (67 years)
Landslide	0 events per year	0	2010-2019 (10 years)

Type	Frequency	Events	Period
Lightning	44.6 events per year	982	1991-2012 (22 years)
Riverine Flooding	2.8 events per year	68	1996-2019 (24 years)
Strong Wind	2.1 events per year	69	1986-2017 (32 years)
Tornado	0.3 events per year	12	1986-2019 (34 years)
Wildfire	0.033% chance per year	n/a	2016 dataset
Winter Weather	2.7 events per year	109	2005-2017 (12 years)

Table 4-6. Frequency Values

Type	Overall Rating	Building Value	Population	Agriculture Value
Coastal Flooding	Very Low	$1.35 per $10K	7.44 per 100M	n/a
Drought	Very Low	n/a	n/a	$1.14 per $10K
Earthquake	Very Low	$1.68 per $100	1.40 per 10K	n/a
Hail	Very Low	$3.89 per $10M	1.73 per 10B	$2.98 per $100K
Heat Wave	Very Low	$4.55 per $10T	3.33 per 10M	$2.26 per $10M
Hurricane	Very Low	$8.98 per $100K	1.30 per 1M	$7.68 per $10K
Ice Storm	Very Low	$7.83 per $1M	3.87 per 100M	n/a
Landslide	Very Low	$3.09 per $10K	5.07 per 1M	n/a
Lightning	Very Low	$8.17 per $100M	1.54 per 1B	n/a
Riverine Flooding	Very Low	$9.23 per $1M	7.97 per 100M	$3.90 per $1K
Strong Wind	Very Low	$8.56 per $10M	3.83 per 100M	$7.36 per $10M
Tornado	Very Low	$5.00 per $100K	9.21 per 10M	$2.17 per $100K
Wildfire	Very Low	$4.00 per $10	2.00 per 100K	$1.36 per $100

Type	Overall Rating	Building Value	Population	Agriculture Value
Winter Weather	Very Low	$1.25 per $1M	5.32 per 100M	$6.34 per $100M

Table 4-7. Historic Loss Ratio

Figure 4-4. Expected Annual Loss

Relatively Moderate 19.71

Expected Annual Loss			
Composite Expected Annual Loss		$13,552,958.99	
Building Value	$10,595,928.81	Population	0.25 fatalities
Population Equivalence	$1,915,529.49	Agriculture Value	$1,041,500.69

Table 4-8. Expected Annual Loss

CALCULATING SOCIAL VULNERABILITY

Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Social groups in Sussex County, DE have a Relatively Moderate susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.

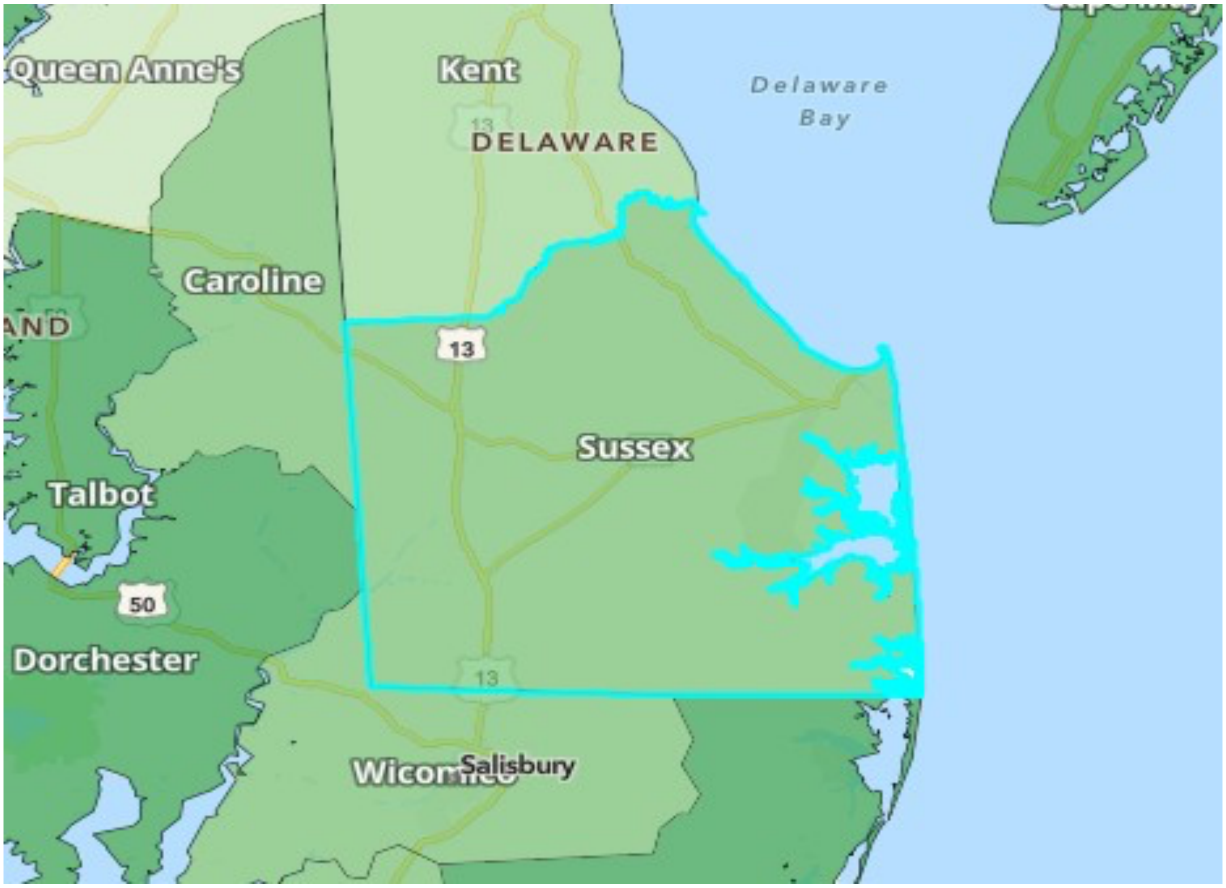

Figure 4-5. Social Vulnerability Index

Relatively Moderate 44.15

CALCULATING COMMUNITY RESILIENCE

Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

Communities in Sussex County, DE have a Relatively Moderate ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S.

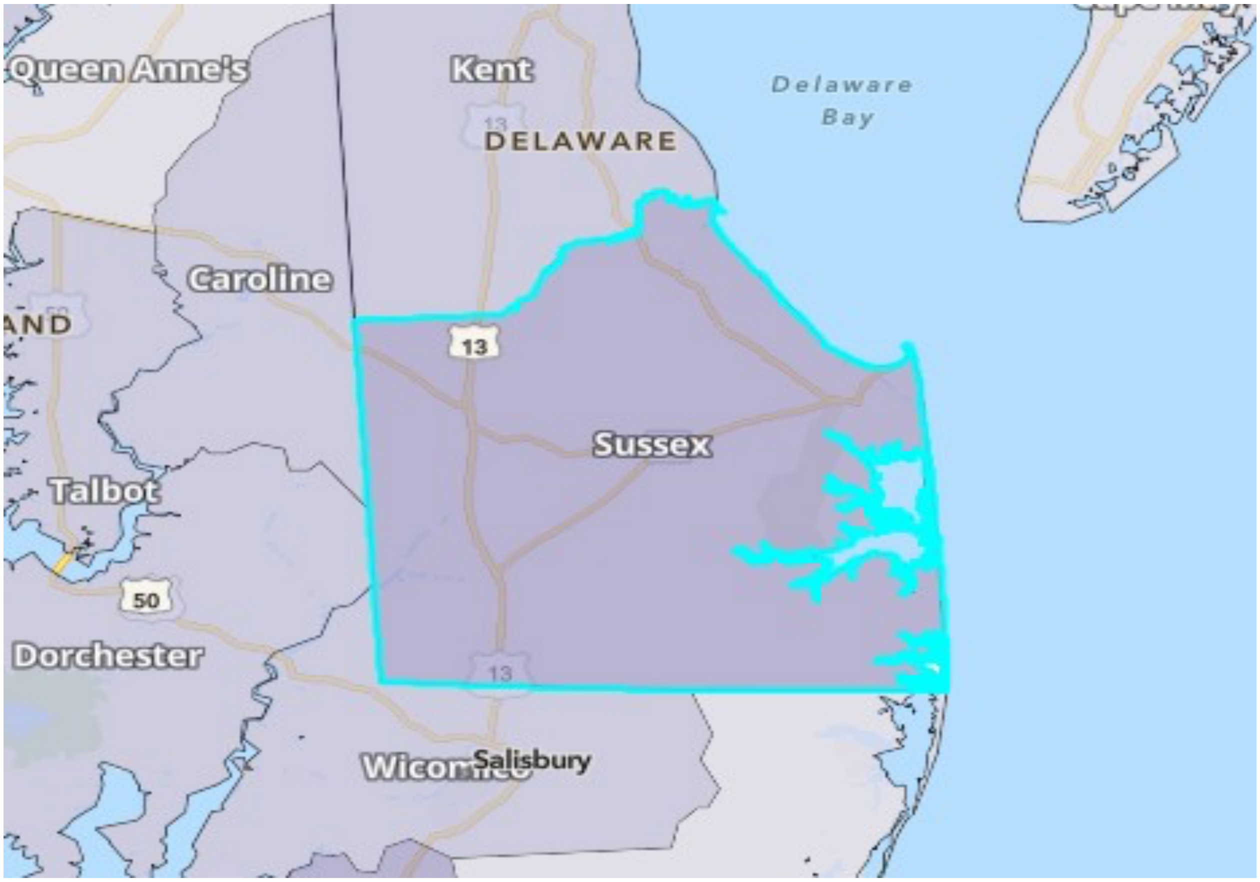

Figure 4-6. Community Resilience

Relatively Moderate: 55.10

POPULATION, DEMOGRAPHICS, AND TRENDS

The resident population of the State of Delaware as of the 2020 census is 992,035. This was an increase of 26,438 from the 2015 census (U.S. Census Bureau and Delaware Population Consortium). The number of households is 386,375 which increased by 30,118 from 356,204 as reported in 2015 (U.S. Census Bureau and Delaware Population Consortium).

The current population of Sussex County is 238,496 which was an increase of 24,016 from 2015 with the number of households increasing to 147,545. Table 4-1 shows the population trend for each jurisdiction within Sussex County.

Population and Trends					
Jurisdiction	**2010**	**2015**	**2020**	**Total Increase**	**2030**
Bethany Beach	1,059	1,146	1,271	125	1,422
Bethel	173	187	205	18	229
Blades	1,244	1,340	1,484	144	1,658
Bridgeville	2,015	2,176	2,416	240	2,702
Dagsboro	792	855	946	91	1,057
Delmar	1,590	1,695	1,858	163	2,065
Dewey Beach	341	369	408	39	456
Ellendale town	370	400	443	43	495
Fenwick Island	380	410	454	44	508
Frankford	848	910	1,007	97	1,125
Georgetown	6,452	6,959	7,721	762	8,635
Greenwood	976	1,052	1,163	111	1,298
Henlopen Acres	123	132	147	15	164
Laurel	3,733	4,017	4,446	429	4,966
Lewes	2,858	3,077	3,389	312	3,778
Milford	5,815	6,406	7,257	851	8,164
Millsboro	3,876	4,155	4,629	474	5,183
Millville	530	575	639	64	716
Milton	2,570	2,775	3,075	300	3,438
Oceanview	1,852	2,010	2,237	227	2,506
Rehoboth Beach	1,324	1,426	1,578	152	1,763

Seaford	6,918	7,427	8,174	747	9,103
Selbyville	2,172	2,341	2,593	252	2,897
Slaughter Beach	207	222	246	24	274
South Bethany	451	487	541	54	606
Sussex County	197,892	214,480	238,496	24,016	272,266

Table 4-9. Population and Trends[31]

GENERAL BUILDING INVENTORY

Sussex County is the largest of Delaware's three counties, with 979 square miles and over 79,000 households. The region has an estimated 117,721 buildings with a total building replacement value (excluding contents) of $32,249,328.

Approximately 95% of the County's structures and 85% of the building value are associated with residential housing. Wood frame construction makes up 81% of the building inventory, with the other 19% constructed of steel, concrete, precast, reinforced masonry, unreinforced masonry, or manufactured housing. In HAZUS-MH analysis, the general building stock is grouped and evenly distributed at the census block or tract level.

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Occupancy	Exposure	% of Total Building Inventory
Residential	$27,520,983	85.34%
Commercial	$3,042,603	9.43%
Industrial	$871,675	2.70%
Agricultural	$156,447	0.49%
Religious	$324,358	1.01%
Government	$144,928	0.45%
Education	$188,634	0.58%

[31] U.S. Census Bureau and Delaware Population Consortium

Occupancy	Exposure	% of Total Building Inventory
Total	$32,249,628	100.00%

Table 4-10. Building Exposure[32]

CRITICAL FACILITIES

The priority for this Plan was to focus on the accuracy of the essential facility's lifeline data. The lifeline data updated for this Plan included potable water system facilities and wastewater treatment plants. The Delaware River Basin Commission (DRBC) shared the HAZUS-MH data that was updated based on their partnerships with specific communities, which they compiled in 2007 for the *Multi-Jurisdictional Flood Mitigation Plan for Municipalities in the Non-tidal, New Jersey Section of the Delaware River Basin*. This update did not include the entire County, only those municipalities within the designated watershed who chose to participate. In addition, Sussex County GIS Department provided data for essential facilities updates. All the relevant data was then compiled and reloaded into HAZUS-MH for use in the analysis and loss estimations.

CLASS CODE DEFINITIONS

Facility class code definitions for critical facilities are listed below in ***Table 4-11.***

Facility Class	Type of Facility	Occupancy Class	Description
EFEO	ESF: Emergency Response	Emergency Operation Center	-
EFFS	ESF: Emergency Response	Fire Station	
EFPS	ESF: Emergency Response	Police Station	-
EFHS	ESF: Medical Care	Small Hospital	Hospital with less than 50 beds
EFHM	ESF: Medical Care	Medium Hospital	Hospital with beds between 50-150
EFHL	ESF: Medical Care	Large Hospital	Hospital with greater than 150 beds
EFMC	ESF: Medical Care	Medical Clinic	Clinics, Labs, Blood Banks
MDFLT	ESF: Medical Care	Default for Medical	
EFS1	ESF: School	School	Primary and High School, K-12

32 HAZUS-MH Analysis completed June 2016.

Facility Class	Type of Facility	Occupancy Class	Description
EFS2	ESF: School	College/University	Community and State Colleges, State and Private Universities
PDFLT	Utility	Default for Potable Water	-
WDFLT	Utility	Default for Wastewater	-

Table 4-11. Facility Class Code Definitions[33]

ESSENTIAL FACILITIES

The list of essential facilities for each jurisdictional fire stations is noted in the following table.

Facility Name	Jurisdiction	Facility Class
Sussex County EOC	Sussex County	EFEO
Rehoboth Beach EOC	Rehoboth Beach	EFEO
BETHANY BEACH VOLUNTEER FIRE COMPANY	BETHANY BEACH	EFFS
BLADES VOLUNTEER FIRE COMPANY	BLADES	EFFS
BRIDGEVILLE VOLUNTEER FIRE COMPANY	BRIDGEVILLE	EFFS
Medic 107	BRIDGEVILLE	EFFS
MILLVILLE VOLUNTEER FIRE COMPANY - SU	DAGSBORO	EFFS
DAGSBORO VOLUNTEER FIRE DEPARTMENT	DAGSBORO	EFFS
Medic 103	DAGSBORO	EFFS
DELMAR VOLUNTEER FIRE DEPARTMENT	DELMAR	EFFS
ELLENDALE VOLUNTEER FIRE COMPANY INCO	ELLENDALE	EFFS
BETHANY BEACH VOLUNTEER FIRE COMPANY	FENWICK ISLAND	EFFS

[33] HAZUS-MH Analysis completed June 2022.

Facility Name	Jurisdiction	Facility Class
ROXANA VOLUNTEER FIRE COMPANY STATION	FRANKFORD	EFFS
FRANKFORD VOLUNTEER FIRE COMPANY	FRANKFORD	EFFS
Medic 105	FRANKFORD	EFFS
GEORGETOWN AMERICAN LEGION EMS	GEORGETOWN	EFFS
GEORGETOWN FIRE COMPANY	GEORGETOWN	EFFS
Medic 108	GEORGETOWN	EFFS
GREENWOOD VOLUNTEER FIRE COMPANY	GREENWOOD	EFFS
LAUREL VOLUNTEER FIRE DEPT. STATION 2	LAUREL	EFFS
LAUREL FIRE DEPARTMENT I	LAUREL	EFFS
Medic 102	LAUREL	EFFS
LEWES VOLUNTEER FIRE DEPARTMENT	LEWES	EFFS
LEWES FIRE DEPARTMENT	LEWES	EFFS
ELLENDALE VOL. FIRE CO. STATION 2	LINCOLN	EFFS
Medic 101	LINCOLN	EFFS
MEMORIAL VOLUNTEER FIRE COMPANY	MILFORD	EFFS
MILLSBORO FIRE COMPANY	MILLSBORO	EFFS
MID SUSSEX RESCUE SQUAD	MILLSBORO	EFFS
INDIAN RIVER VOLUNTEER FIRE COMPANY I	MILLSBORO	EFFS
INDIAN RIVER VOLUNTEER FIRE COMPANY S	MILLSBORO	EFFS
GUMBORO VOLUNTEER FIRE COMPANY	MILLSBORO	EFFS
Medic 106	MILLSBORO	EFFS
MILLVILLE VOLUNTEER FIRE COMPANY	MILLVILLE	EFFS

Facility Name	Jurisdiction	Facility Class
MILTON FIRE DEPARTMENT INCORPORATED	MILTON	EFFS
REHOBOTH BEACH VOLUNTEER FIRE COMPANY	REHOBOTH BEACH	EFFS
REHOBOTH BEACH VOLUNTEER FIRE COMPANY	REHOBOTH BEACH	EFFS
Medic 100/104	REHOBOTH BEACH	EFFS
SEAFORD VOLUNTEER FIRE DEPARTMENT INC	SEAFORD	EFFS
ROXANNA FIRE DEPARTMENT - AMBULANCE S	SELBYVILLE	EFFS
SELBYVILLE VOLUNTEER FIRE COMPANY	SELBYVILLE	EFFS

Table 4-12. EOC and Fire Station Facilities[34]

The list of essential facilities for each jurisdictional law enforcement stations is noted in the following table.

Facility Name	Jurisdiction	Facility Class
Bethany Beach Police Department	Bethany Beach	EFPS
Blades Police Department	Blades	EFPS
Bridgeville Police Department	Bridgeville	EFPS
Dagsboro Police Department	Dagsboro	EFPS
Lewes Police Department	Lewes	EFPS
Delmar Police Department	Delmar	EFPS
Dewey Beach Police Department	Dewey Beach	EFPS
DSP Aviation Unit South	Georgetown	EFPS
DSP Troop 4	Georgetown	EFPS
DSP Troop 5	Bridgeville	EFPS

34 HAZUS-MH, DRBC, and local data sources

Facility Name	Jurisdiction	Facility Class
DSP Troop 7	Lewes	EFPS
Ellendale Police Department	Ellendale	EFPS
Fenwick Island Police Department	Fenwick Island	EFPS
Georgetown Police Department	Georgetown	EFPS
Greenwood Police Department	Greenwood	EFPS
Laurel Police Department	Laurel	EFPS
Millsboro Police Department	Millsboro	EFPS
Milton Police Department	Milton	EFPS
Ocean View Police Department	Ocean View	EFPS
Rehoboth Beach Police Department	Rehoboth Beach	EFPS
Seaford Police Department	Seaford	EFPS
Selbyville Police Department	Selbyville	EFPS
South Bethany Police Department	South Bethany	EFPS

Table 4-13. Law Enforcement Facilities[35]

The list of essential medical care facilities is noted in the following table.

Facility Name	Jurisdiction	Facility Class
Bayhealth- Milford Memorial Hospital	Milford	EFHL
Beebe Medical Center	Lewes	EFMC
MID SUSSEX	Georgetown	EFMC
Tidal Health Nanticoke	Seaford	EFMC

Table 4-14. Medical Facilities[36]

[35] HAZUS-MH, DRBC, and local data sources

[36] HAZUS-MH, DRBC, and local data sources

The list of educational facilities is noted in the following table.

Facility Name	Jurisdiction	Facility Class
BLADES ELEMENTARY SCHOOL	BLADES	EFS1
PHILLIS WHEATLEY ELEMENTARY SCHOOL	BRIDGEVILLE	EFS1
WOODBRIDGE MIDDLE SCHOOL	BRIDGEVILLE	EFS1
INDIAN RIVER HIGH SCHOOL	DAGSBORO	EFS1
LIGHTHOUSE CHRISTIAN SCHOOL	DAGSBORO	EFS1
DELAWARE LEARNING INSTITUTE OF COSMET	DAGSBORO	EFS1
DELMAR HIGH SCHOOL	DELMAR	EFS1
DELMAR MIDDLE SCHOOL	DELMAR	EFS1
LIL' RED HEN KINDERGARTEN	DELMAR	EFS1
PACEM IN TERRIS ACADEMY	FRANKFORD	EFS1
CARVER (G.W.) EDUCATIONAL CENTER	FRANKFORD	EFS1
CLAYTON (JOHN M.) ELEMENTARY SCHOOL	FRANKFORD	EFS1
SUSSEX TECHNICAL HIGH SCHOOL	GEORGETOWN	EFS1
UNIVERSITY OF DELAWARE - CARVER RESEA...	GEORGETOWN	EFS1
ENNIS (HOWARD T.) SCHOOL	GEORGETOWN	EFS1
WILMINGTON UNIVERSITY - GEORGETOWN	GEORGETOWN	EFS1
NORTH GEORGETOWN ELEMENTARY SCHOOL	GEORGETOWN	EFS1
THE JEFFERSON SCHOOL	GEORGETOWN	EFS1
GEORGETOWN ELEMENTARY SCHOOL	GEORGETOWN	EFS1
GEORGETOWN MIDDLE SCHOOL	GEORGETOWN	EFS1
SUSSEX ACADEMY	GEORGETOWN	EFS1

Facility Name	Jurisdiction	Facility Class
DELMARVA CHRISTIAN HIGH SCHOOL	GEORGETOWN	EFS1
JESUS IS LORD CHRISTIAN ACADEMY	GEORGETOWN	EFS1
SUSSEX CENTRAL HIGH SCHOOL	GEORGETOWN	EFS1
WOODBRIDGE EARLY CHILDHOOD EDUCATION	GREENWOOD	EFS1
WOODBRIDGE HIGH SCHOOL	GREENWOOD	EFS1
GREENWOOD MENNONITE SCHOOL	GREENWOOD	EFS1
EPWORTH CHRISTIAN SCHOOL	LAUREL	EFS1
WESTERN SUSSEX ACADEMY	LAUREL	EFS1
LAUREL INTERMEDIATE MIDDLE SCHOOL	LAUREL	EFS1
DUNBAR (PAUL LAURENCE) ELEMENTARY SCHOOL	LAUREL	EFS1
LAUREL SENIOR HIGH SCHOOL	LAUREL	EFS1
LAUREL NEW SCHOOL HOLD	LAUREL	EFS1
NORTH LAUREL ELEMENTARY SCHOOL	LAUREL	EFS1
SHIELDS (RICHARD A.) ELEMENTARY SCHOOL	LEWES	EFS1
SUSSEX CONSORTIUM	LEWES	EFS1
CAPE HENLOPEN HIGH SCHOOL	LEWES	EFS1
BETHEL CHRISTIAN SCHOOL	LEWES	EFS1
MARGARET H ROLLINS SCHOOL OF NURSING	LEWES	EFS1
BEACON MIDDLE SCHOOL	LEWES	EFS1
MORRIS (EVELYN I.) EARLY CHILDHOOD	LINCOLN	EFS1
KIDS FIRST ACADEMY	LINCOLN	EFS1
GENEVA ACADEMY	LINCOLN	EFS1

Facility Name	Jurisdiction	Facility Class
MILFORD CHRISTIAN SCHOOL	MILFORD	EFS1
ROSS (LULU M.) ELEMENTARY SCHOOL	MILFORD	EFS1
MISPILLION ELEMENTARY	MILFORD	EFS1
MILLSBORO MIDDLE SCHOOL	MILLSBORO	EFS1
EAST MILLSBORO ELEMENTARY SCHOOL	MILLSBORO	EFS1
LONG NECK ELEMENTARY SCHOOL	MILLSBORO	EFS1
MILTON ELEMENTARY SCHOOL	MILTON	EFS1
H. O. BRITTINGHAM ELEMENTARY SCHOOL	MILTON	EFS1
EAGLE'S NEST CHRISTIAN ACADEMY	MILTON	EFS1
MARINER MIDDLE SCHOOL	MILTON	EFS1
UNIVERSITY OF DELAWARE - HUGH R. SHAR...	NEWARK	EFS1
LORD BALTIMORE ELEMENTARY SCHOOL	OCEAN VIEW	EFS1
WILMINGTON UNIVERSITY - REHOBOTH CAMPUS	REHOBOTH BEACH	EFS1
REHOBOTH ELEMENTARY SCHOOL	REHOBOTH BEACH	EFS1
SEAFORD CHRISTIAN ACADEMY	SEAFORD	EFS1
SEAFORD CENTRAL ELEMENTARY SCHOOL	SEAFORD	EFS1
SUSSEX ORTHOPEDIC PROGRAM	SEAFORD	EFS1
SEAFORD SENIOR HIGH SCHOOL	SEAFORD	EFS1
SEAFORD MIDDLE SCHOOL	SEAFORD	EFS1
FREDERICK DOUGLASS ELEMENTARY SCHOOL	SEAFORD	EFS1
SOUTHERN DELAWARE SCHOOL OF THE ARTS	SELBYVILLE	EFS1
SELBYVILLE MIDDLE SCHOOL	SELBYVILLE	EFS1

Facility Name	Jurisdiction	Facility Class
SHOWELL (PHILLIP C.) ELEMENTARY SCHOOL	SELBYVILLE	EFS1

Table 4-15. Educational Facilities[37]

The list of potable water and wastewater facilities is noted in the following table.

Facility Name	Jurisdiction	Facility Class
South Coastal Wastewater Treatment Plant #40	Frankford	PDFLT
Inland Bay's Treatment Facility #84	Millsboro	PDFLT
Piney Neck Treatment Facility	Dagsboro	PDFLT
South Coastal Wastewater Treatment Plant #40	Frankford	PDFLT
Sussex County Industrial Airpark Water Plant #25	Georgetown	PDFLT
Wolfeneck Treatment Facility	Rehoboth Reach	PDFLT
DB-4	Dewey Beach	WDFLT
DB-5	Dewey Beach	WDFLT
DF-8	Dagsboro	WDFLT
AIR-26	Georgetown	WDFLT
SC-43	Bethany Beach	WDFLT
BL-45	Blades	WDFLT
SC-67	Frankford	WDFLT
LN-82	Millsboro	WDFLT
EL-90	Ellendale	WDFLT
SC-99	Ocean View	WDFLT

[37] HAZUS-MH, DRBC, and local data sources

Facility Name	Jurisdiction	Facility Class
SC-100	Ocean View	WDFLT
OO-189	Millsboro	WDFLT
WR-196	Lewes	WDFLT
LN-197	Millsboro	WDFLT
WR-210	Lewes	WDFLT
CN-256	Henlopen Acres	WDFLT

Table 4-16. Water Facilities[38]

Figure 4-7 on the following page shows the locations of the essential facilities, potable water facilities, and wastewater system facilities throughout Sussex County that were used in this analysis.

[38] HAZUS-MH, DRBC, and local data sources

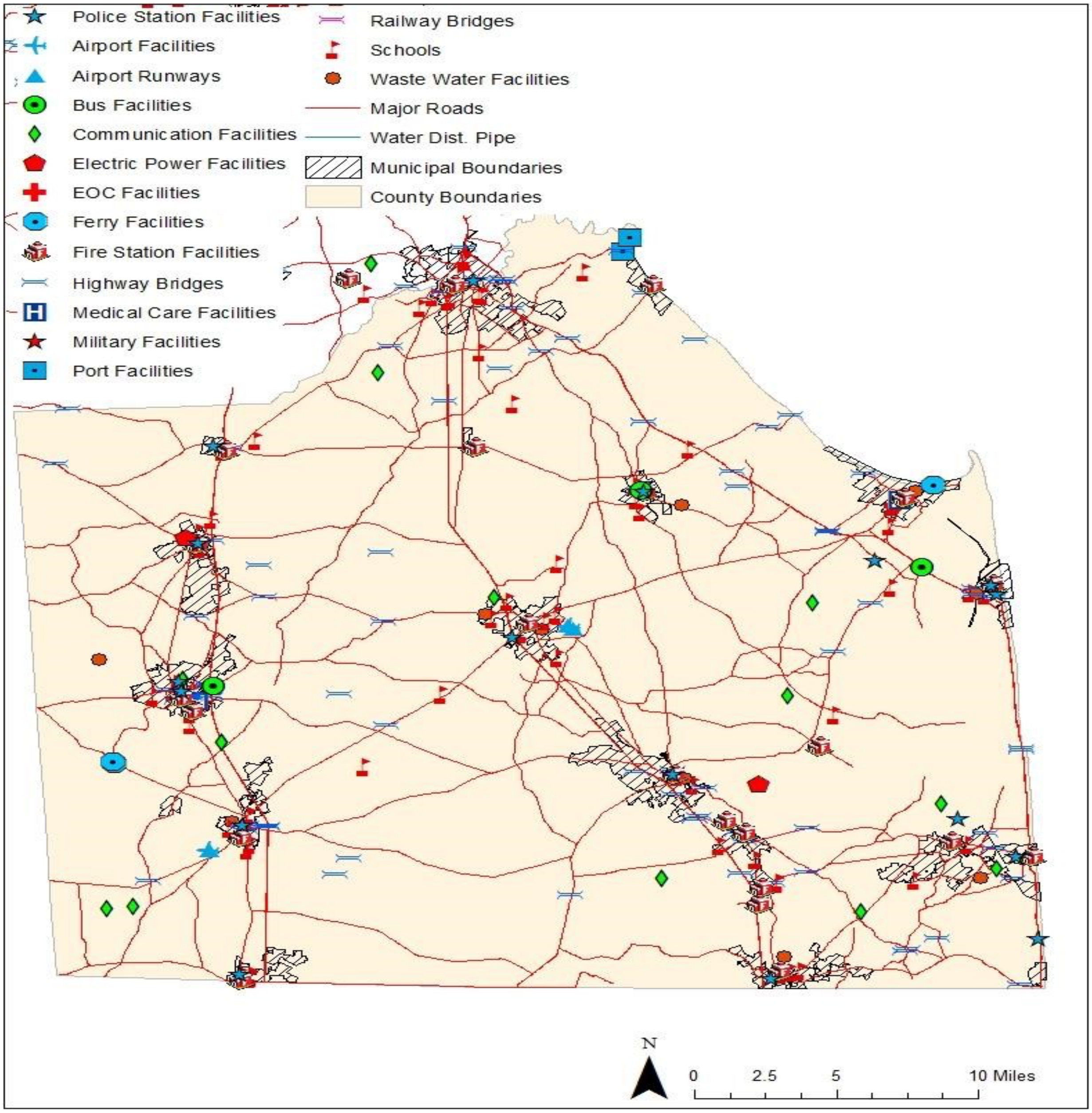

Figure 4-7. Essential Facilities in Sussex County[39]

In Sussex County, the replacement value of the transportation systems is estimated to be approximately $2,989,938,000 and the utility lifeline systems to be about $1,304,465,000, for a total of over $4,294,403,000. This inventory includes approximately 6362 kilometers of roads, 229 bridges, and 14,614 kilometers of pipes.

39 HAZUS-MH, DRBC, and local data sources.

SUMMARY OF RISK AND VULNERABILITY ASSESSMENT

For the purposes of this risk and vulnerability assessment, the label “critical facility” may refer to any of the following: airports, colleges, dams, day care centers, dispatch centers, electric switching stations, Emergency Operations Centers (EOCs), fire departments, food storage facilities, gas compressor stations, gas LNG plants, gate stations for utility companies, generating stations, government facilities, hospitals, hotels/motels, major bridges, medical facilities, military bases, minor bridges, newspaper offices, nursing homes, paramedic/EMS stations, police departments, ports, prisons, public shelters, radio/television towers, railroad facilities, schools, sewage treatment plants, substations and TV/radio stations.

FLOOD

Using FEMA DFIRM, where available, along with the modeling approach described earlier, losses were estimated using return period events ranging from 10-year to 500-year events. With this approach, annualized losses were calculated by accounting for the losses from different return period events and their respective annual probabilities of occurrence. (i.e., the annual probability of observing a 100-year flood is 1 percent).

Describing vulnerability in terms of annualized losses provides three primary benefits:

- Potential losses from all future disasters are accounted for using this approach
- Results across hazards are readily comparable and hence easier to rank
- A risk ranking approach facilitates the evaluation of mitigation alternatives.

COASTAL FLOODING

Modeling conducted by the US Army Corps of Engineers in Philadelphia, PA, provides an approximation of the extent of storm surge flooding by tropical storm category. The Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model is a robust, empirically-verified storm surge model that creates maps of potential storm surge areas. Coastal flooding profiles were created for Category 1 through Category 3 storms to illustrate the expected storm surge associated with each magnitude event. For example, in Sussex County, the risk of a Category 2 storm surge is about 1% any given year. The storm surge area was mapped to show the intersection of surge with major cities and roads and can also be compared to population density/distribution. ***Figure 4-8*** on the following page shows the storm surge areas for Category 1 through Category 3 storm events in Sussex County.

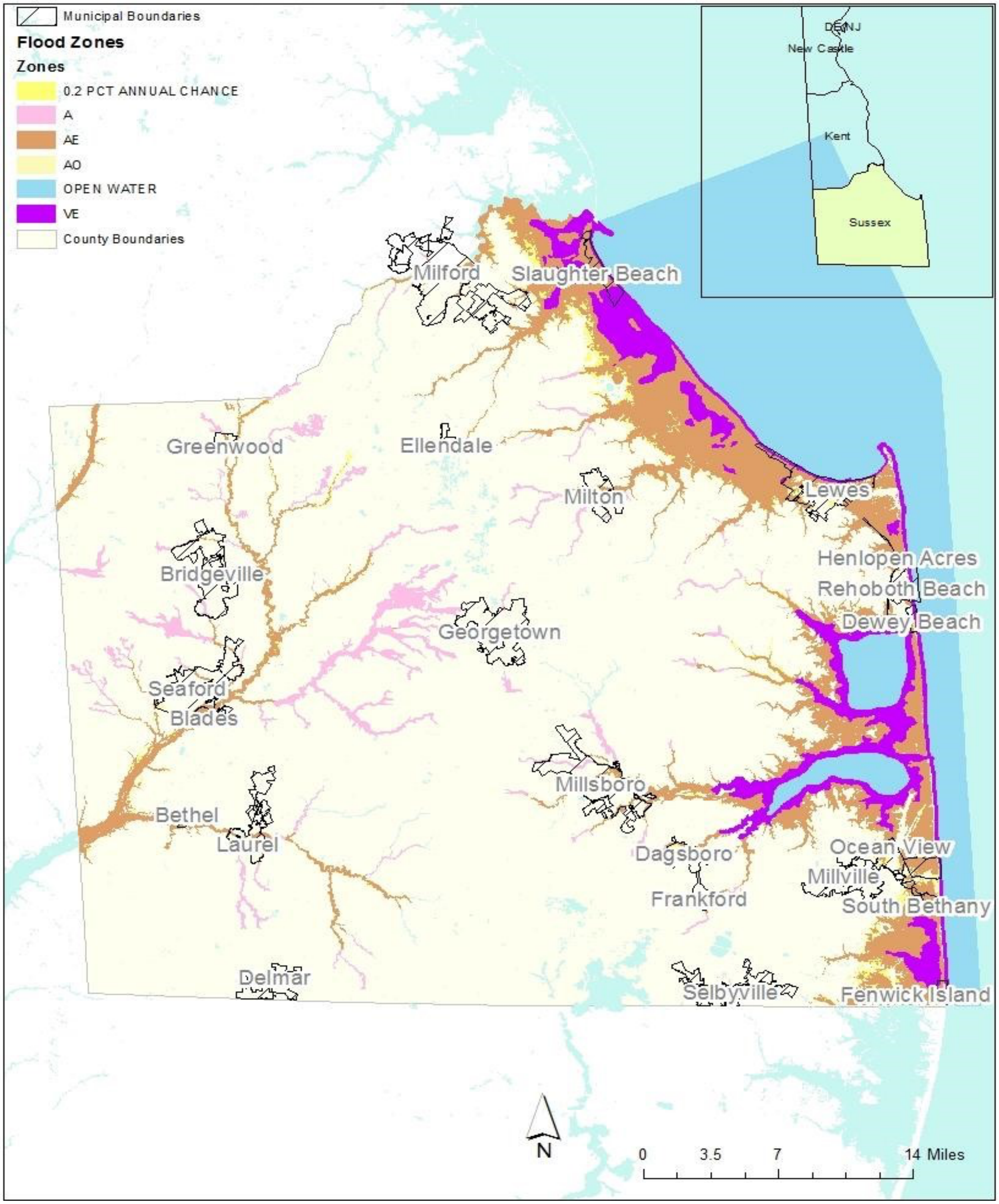

Figure 4-8. Hurricane Storm Surge Extent (USACE)

RIVERINE FLOODING

In addition to coastal flooding, the Sussex County is vulnerable to riverine flooding, primarily due to the accumulation of excessive rainfall in the watersheds upstream along the Mispillion River, Cedar Creek, Slaughter Creek, Primehook Creek, the Broadkill River, Old Mill Creek, Love Creek, Herring Creek, Guinea Creek, the Indian River, Pepper Creek, Vines Creek, Miller Creek, Dirickson Creek, the Nanticoke River, Broad Creek, Bridgeville Branch, Gravelly Branch, Marshyhope Creek, and other smaller tributaries. A map of the 100- and 500-year floodplains can be found in ***Figure 4-9.***

When taken together, the extent of potential coastal flooding and the size of riverine flooding equal the total flood hazard zone. HAZUS-MH calculated the depth of the flood of various periodicities and compared that to the intersecting building stock exposure to predict the flood loss for each return period and an annualized estimate. ***Figure 4-10*** displays the result of the hydrology and hydraulic modeling in HAZUS-MH used to estimate the depth of the 100-year flood in Sussex County. ***Table 4-17*** shows total annualized expected losses from coastal and riverine flooding events by jurisdiction within Sussex County. The total potential annualized losses for Sussex County equal $129,520,000.

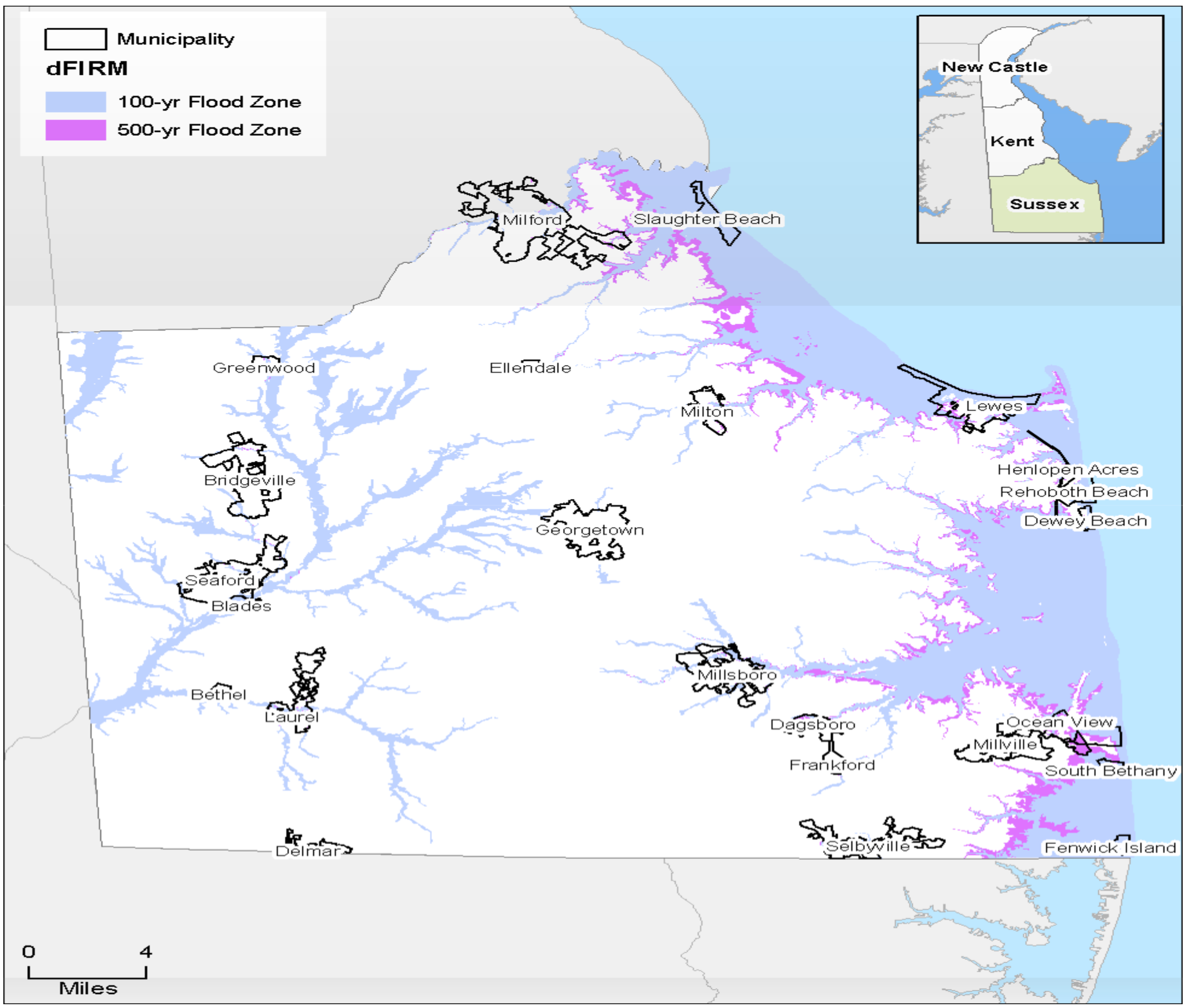

Figure 4-9. 100-year and 500-year Floodplains

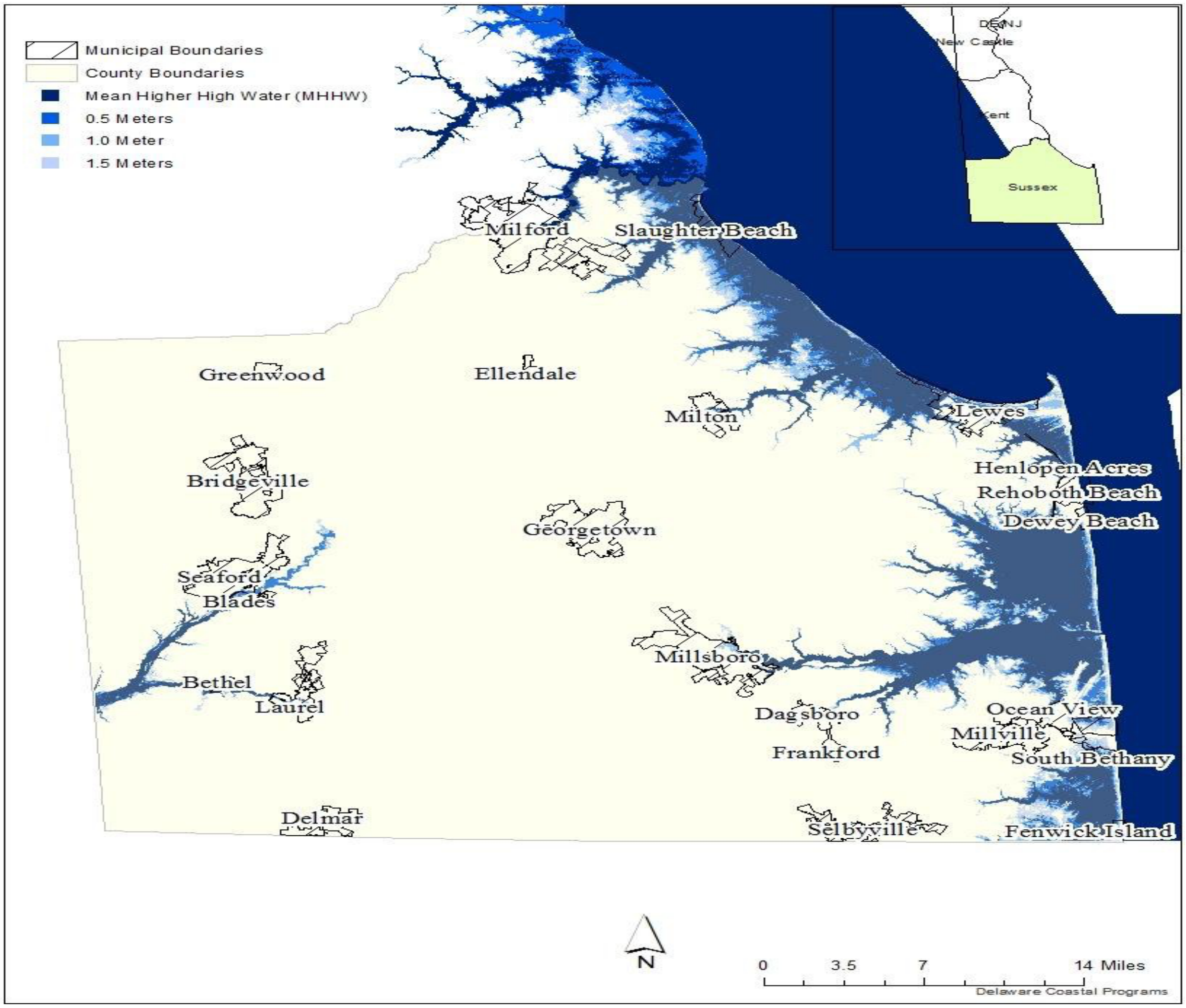

Figure 4-10. Modeled 100-year Flood Depth

Jurisdiction	Estimated Losses
Bethany Beach	$8,221,887
Bethel	$76,408
Blades	$115,000
Bridgeville	Negligible
Dagsboro	Negligible
Delmar	Negligible

Jurisdiction	Estimated Losses
Dewey Beach	$1,430,177
Ellendale	Negligible
Fenwick Island	$2,258,541
Frankford	$63,925
Georgetown	Negligible
Greenwood	$7,101
Henlopen Acres	$409,600
Laurel	$2,182,198
Lewes	$700,624
MCD Bridgeville-Greenwood	$1,091,200
MCD Georgetown	$255,801
MCD Laurel-Delmar	$991,374
MCD Lewes	$19,357,870
MCD Milford South	$1,912,048
MCD Millsboro	$36,640,370
MCD Milton	$445,316
MCD Seaford	$1,403,417
MCD Selbyville-Frankford	$43,167,201
Milford	$630,092
Millsboro	$411,348
Millville	$124,808
Milton	$338,142

Jurisdiction	Estimated Losses
Ocean View	$1,008,480
Rehoboth Beach	$499,965
Seaford	$560,861
Selbyville	$148,809
Slaughter Beach	$333,152
South Bethany	$4,017,172
TOTAL	**$129,520,000**

Table 4-17. Potential Estimated Losses

Another means of gauging the vulnerability within Sussex County to flooding was the vulnerability of state-owned critical facilities to the 100- and 500-year flood return periods. Within Sussex County, 1,637 necessary facilities were assessed concerning flood risk ***(Table 4-18)***. In summary, in a 100-year flood event, as many as 1,561 of these facilities could sustain slight damage, and 72 could sustain moderate damage. In a 500-year event, as many as 1,240 facilities could be slightly damaged, and 397 could be moderately damaged. No facilities would escape with negligible damage (less than $5,000) in either event.

Jurisdiction	Total Number of Critical Facilities	100-year Flood			500-year Flood		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
Bethany Beach	14	0	12	2	0	14	0
Bethel	1	0	1	0	0	1	0
Blades	7	0	7	0	0	7	0
Bridgeville	25	0	25	0	11	14	0
Dagsboro	11	0	11	0	0	11	0

Jurisdiction	Total Number of Critical Facilities	100-year Flood			500-year Flood		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
Delmar	7	0	7	0	0	7	0
Dewey Beach	11	0	11	0	11	0	0
Ellendale	6	0	6	0	0	6	0
Fenwick Island	5	0	5	0	0	5	0
Frankford	8	0	8	0	0	8	0
Georgetown	40	0	40	0	0	40	0
Greenwood	8	0	8	0	0	8	0
Laurel	31	10	21	0	10	21	0
Lewes	40	0	39	1	0	40	0
MCD Bridgeville-Greenwood	76	12	64	0	31	45	0
MCD Georgetown	83	0	83	0	6	77	0
MCD Harrington	1	0	1	0	0	1	0
MCD Laurel Delmar	172	17	155	0	48	124	0
MCD Lewes	175	8	166	1	30	145	0
MCD Milford North	1	0	1	0	0	1	0
MCD Milford South	121	0	121	0	19	102	0

Jurisdiction	Total Number of Critical Facilities	100-year Flood			500-year Flood		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
MCD Millsboro	137	2	135	0	64	73	0
MCD Milton	62	0	62	0	10	52	0
MCD Seaford	163	19	144	0	72	91	0
MCD Selbyville-Frankford	258	4	254	0	45	213	0
Milford	33	0	33	0	0	33	0
Millsboro	14	0	14	0	0	14	0
Millville	5	0	5	0	0	5	0
Milton	20	0	20	0	6	14	0
Ocean View	6	0	6	0	0	6	0
Rehoboth Beach	33	0	33	0	1	32	0
Seaford	50	0	50	0	33	17	0
Selbyville	2	0	2	0	0	2	0
Slaughter Beach	2	0	2	0	0	2	0
South Bethany	7	0	7	0	0	7	0
TOTAL	**1,637**	**72**	**1,561**	**4**	**397**	**1,240**	**0**

Table 4-18. Potential Damage to Critical Facilities from Flood Events

REPETITIVE LOSS PROPERTIES

A repetitive loss property is an NFIP-insured property that has had at least four (4) paid flood losses of more than $1,000 or has had two (2) paid flood losses within ten years that, in aggregate, equal or exceeded the value of the property, or has had three (3) or more paid losses that, in aggregate, equal or exceed the value of the property. Addressing repetitive loss properties through implementing specific mitigation projects represents one of the most effective ways to reduce future flood losses. As a result, the mitigation strategies listed in the Sussex County Flood Mitigation Plan were explicitly designed to address identified repetitive loss properties and are cited by reference here.[40] Due to the lack of inability to obtain updated information, data from the previous plan can be found in the table below. No severe repetitive loss properties were identified.

Jurisdiction	Number of Rep Losses	Number of Policies	% Rep Loss
Sussex County	231	12,427	1.9%
Town of Bethany Beach	68	2,016	3.4%
Town of Dewey Beach	67	1,116	6.0%
Town of Fenwick Island	23	687	3.3%
City of Rehoboth Beach	11	1,121	1.0%
Town of South Bethany	110	896	12.3%
City of Milford	6	74	8.1%

Table 4-19. Repetitive Loss Properties

[40] **Sussex County Flood Mitigation Plan maintained by DNREC, last updated in 1999**

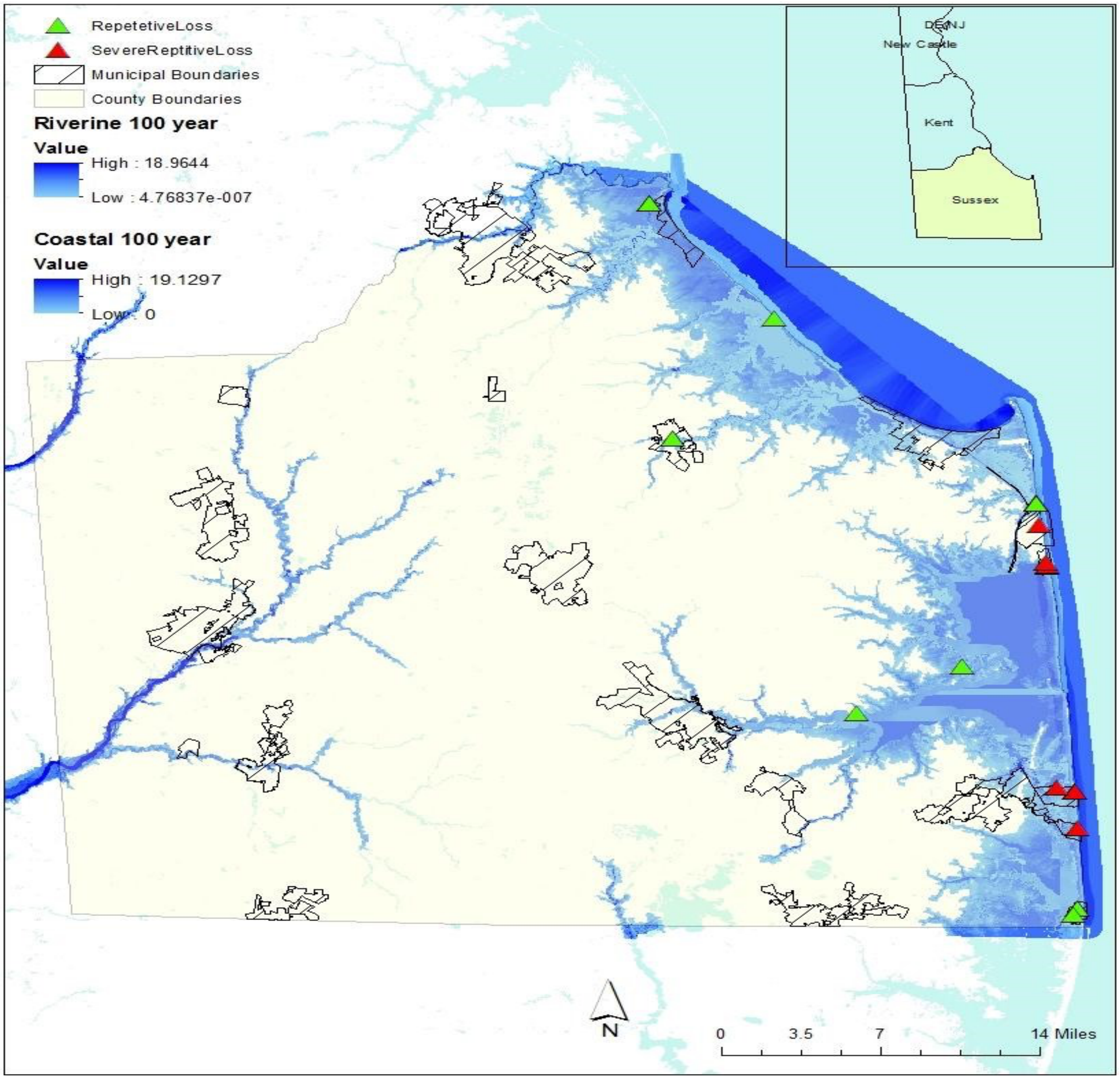

Figure 4-11. Repetitive Loss Properties

TROPICAL STORM WINDS

Historical evidence shows that the State of Delaware is vulnerable to hurricane and tropical storm-force winds. HAZUS-MH's modeling scenarios provided wind speed data for a range of return periods as well as an inventory and damage functions, which were used in estimating losses. The HAZUS-MH method involves Monte Carlo simulations to estimate the probable track of a tropical storm with a particular recurrence interval, and then estimates the wind field of that probably tropical storm to predict losses.

Figure 4-12 shows the potential tropical storm winds that could affect the area for a 100year wind event. The total potential annualized losses equal $1,926,244.

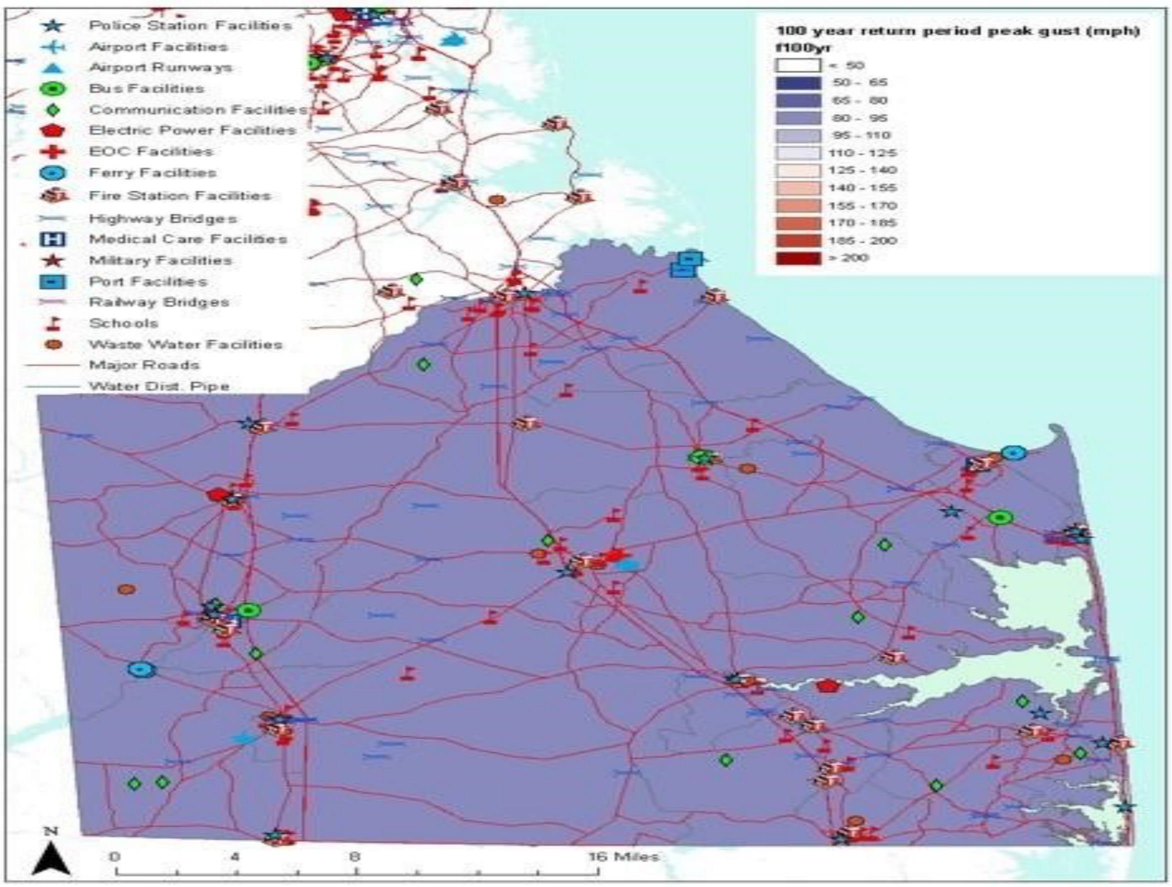

Figure 4-12. Potential Hurricane Winds for 100-year Wind Events

The HAZUS-MH earthquake module also provides loss estimates for some transportation and utility lifeline losses. As previously mentioned, essential facilities, potable water facilities, and wastewater facilities were updated before analysis based on DRBC and local updates.

Table 4-20 shows the potential damage to critical facilities from hurricane-force wind events. ***Table 4-21*** shows total annualized expected losses from hurricane wind events by jurisdiction within Sussex County

Jurisdiction	Total Number of Critical Facilities	100-year Wind			500-year Wind			
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Extensive Damage	Slight Damage	Negligible Damage
Bethany Beach	14	10	4	0	8	4	2	0
Bethel	1	1	0	0	0	0	1	0
Blades	7	4	2	1	0	2	5	0
Bridgeville	25	8	14	3	0	6	19	0
Dagsboro	11	6	5	0	2	5	4	0
Delmar	7	6	1	0	0	0	7	0
Dewey Beach	11	11	0	0	11	0	0	0
Ellendale	6	5	1	0	0	0	6	0
Fenwick Island	5	5	0	0	5	0	0	0
Frankford	8	5	3	0	1	3	4	0
Georgetown	40	34	4	2	11	4	25	0
Greenwood	8	4	2	2	0	3	5	0
Laurel	31	17	4	10	0	8	19	4
Lewes	40	30	10	0	15	8	17	0
MCD Bridgeville-Greenwood	76	30	19	27	0	40	36	0
MCD Georgetown	83	50	11	22	15	28	39	1
MCD Harrington	1	1	0	0	0	0	1	0

Jurisdiction	Total Number of Critical Facilities	100-year Wind			500-year Wind			
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Extensive Damage	Slight Damage	Negligible Damage
MCD Laurel-Delmar	172	67	46	59	2	97	70	3
MCD Lewes	175	136	36	3	127	31	14	3
MCD Milford North	1	0	0	1	0	1	0	0
MCD Milford South	121	50	24	47	11	63	41	6
MCD Millsboro	137	91	43	3	81	40	14	2
MCD Milton	62	44	14	4	43	15	3	1
MCD Seaford	163	85	36	42	0	63	96	4
MCD Selbyville-Frankford	258	180	78	0	156	70	32	0
Milford	33	22	6	5	4	8	21	0
Millsboro	14	11	3	0	5	2	7	0
Millville	5	5	0	0	5	0	0	0
Milton	20	11	7	2	3	6	9	2
Ocean View	6	2	4	0	2	4	0	0
Rehoboth Beach	33	31	2	0	27	2	4	0
Seaford	50	25	14	11	0	20	29	1
Selbyville	2	2	0	0	0	0	2	0

Jurisdiction	Total Number of Critical Facilities	100-year Wind			500-year Wind			
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Extensive Damage	Slight Damage	Negligible Damage
Slaughter Beach	2	2	0	0	1	0	1	0
South Bethany	7	4	3	0	4	3	0	0
TOTAL	1635	95	396	244	539	536	533	27

Table 4-20. Potential Damage from Tropical Storm Wind Events

Jurisdiction	Estimated Losses
Bethany Beach	$11,377
Bethel	Negligible
Blades	Negligible
Bridgeville	Negligible
Dagsboro	Negligible
Delmar	Negligible
Dewey Beach	Negligible
Ellendale	Negligible
Fenwick Island	Negligible
Frankford	Negligible
Georgetown	$5,236
Greenwood	Negligible

Jurisdiction	Estimated Losses
Henlopen Acres	Negligible
Laurel	Negligible
Lewes	$7,481
MCD Bridgeville-Greenwood	$25,390
MCD Georgetown	$48,865
MCD Laurel-Delmar	$95,369
MCD Lewes	$367,759
MCD Milford South	$48,034
MCD Millsboro	$616,112
MCD Milton	$111,662
MCD Seaford	$61,270
MCD Selbyville-Frankford	$451,242
Milford	Negligible
Millsboro	$8,191
Millville	$10,358
Milton	Negligible
Ocean View	$10,134
Rehoboth Beach	$5,387
Seaford	$9,739
Selbyville	$8,370
Slaughter Beach	Negligible
South Bethany	$5,155

Jurisdiction	Estimated Losses
TOTAL	$1,926,244

Table 4-21. Potential Losses from Tropical Storm Winds

SEVERE THUNDERSTORM WIND

According to historical records, Sussex County is affected by severe thunderstorms several times a year. The strong winds and lightning generated from severe thunderstorms threaten the residents, the built environment, and particularly the trees within the County. However, because severe thunderstorms are not spatially constrained, one must consider the entire County at risk. The extent of damage from extreme thunderstorm wind may be either localized or widespread, but it is rarely consistent across space. Therefore, it is impossible to predict if some regions of the County may be more vulnerable than others and even to estimate the number of buildings that may suffer loss from a severe thunderstorm wind.

The approach to determining the County's vulnerability to severe thunderstorm wind is to examine not just extreme thunderstorm events in the County boundary but to look at all the events of the neighboring counties within 25 miles of the border of the County. For example, a severe thunderstorm that impacts Dorchester County, MD (to the west of Sussex County) could have just as quickly impacted Sussex County instead. The location of the severe thunderstorm at this scale of analysis is simply a matter of luck rather than any of the County's unique geographical factors. Because the neighboring jurisdictions have differing sizes and densities, the results must be scaled appropriately. For example, Sussex County had 5.5 severe thunderstorm events per year, compared to Kent County's 4.69 events per year. But Sussex County is more extensive than Kent County; one would expect the larger County to have more thunderstorm events. Sussex County is 159% the size of Kent County. Therefore, Kent would have been impacted by 7.46 events per year if the County had been the same size as Sussex.

Table 4-22 shows the number of events in Sussex County and those counties within 25 miles of Sussex County. ***Table 4-23*** shows expected losses from severe thunderstorm wind events by jurisdiction within Sussex County. The total estimated annualized losses for the County are equal to $168,211.

County	Total Events	Property Damage	Deaths	Injuries
Sussex County, DE	94	0	0	0
Kent County, DE	73	0	0	0
Caroline County, MD	45	0	0	0
Dorchester County, MD	30	$158,000	0	0
Wicomico County, MD	24	$63,000	0	0
Worcester County, MD	19	$249,000	0	0
Average	48	$94,000	0	0

Table 4-22. Losses from Severe Thunderstorm Wind Events (NOAA)

Jurisdiction	Estimated Losses
Bethany Beach	Negligible
Bethel	Negligible
Blades	Negligible
Bridgeville	Negligible
Dagsboro	Negligible
Delmar	Negligible
Dewey Beach	Negligible
Ellendale	Negligible
Fenwick Island	Negligible
Frankford	Negligible
Georgetown	Negligible
Greenwood	Negligible
Henlopen Acres	Negligible
Laurel	Negligible
Lewes	Negligible
MCD Bridgeville-Greenwood	$17,559
MCD Georgetown	$11,452
MCD Laurel-Delmar	$30,869
MCD Lewes	$14,471
MCD Milford South	$20,936
MCD Millsboro	$16,369
MCD Milton	$10,649

Jurisdiction	Estimated Losses
MCD Seaford	$15,314
MCD Selbyville-Frankford	$21,801
Milford	Negligible
Millsboro	Negligible
Millville	Negligible
Milton	Negligible
Ocean View	Negligible
Rehoboth Beach	Negligible
Seaford	Negligible
Selbyville	Negligible
Slaughter Beach	Negligible
South Bethany	Negligible
TOTAL	$168,211

Table 4-23. Potential Losses from Severe Thunderstorms by MCD and Municipality

TORNADO

Historical evidence shows that Sussex County is vulnerable to tornado activity. This hazard may result from severe thunderstorm activity or during a tropical storm or hurricane. Because it cannot be predicted where a tornado may touchdown, all buildings and facilities are exposed to this hazard and could potentially be impacted. It is also impossible to estimate the number of residential, commercial, and other buildings or facilities that may experience losses. ***Figure 4-13*** shows the location and magnitude of tornados since 2016.

The approach to determining vulnerability to tornadoes is like that of severe thunderstorm wind. Historical tornado loss data from the National Oceanic and Atmospheric Administration (NOAA) was gathered for Sussex County and the neighboring counties within 25 miles of the boundary of the County. All historical losses were scaled to account for inflation, and average historic tornado losses were calculated ***(Table 4-24*).** As with severe thunderstorms, the neighboring jurisdictions are of differing sizes and densities, and the results must be normalized appropriately using the method described previously.

County	Total Events	EF	Property Damage	Deaths	Injuries
Sussex County, DE	5	EF1	0	0	1
Kent County, DE	3	EF1	0	0	0
Caroline County, MD	2	EF0	0	0	0
Dorchester County, MD	2	EF0	$45,000	0	0
Wicomico County, MD	7	EF2	$1,030.00	0	0
Worcester County, MD	6	EF2	$185,000	0	0
Average	4.8		$252,000	0	.002

Table 4-24. Losses from Tornado Events (NOAA)

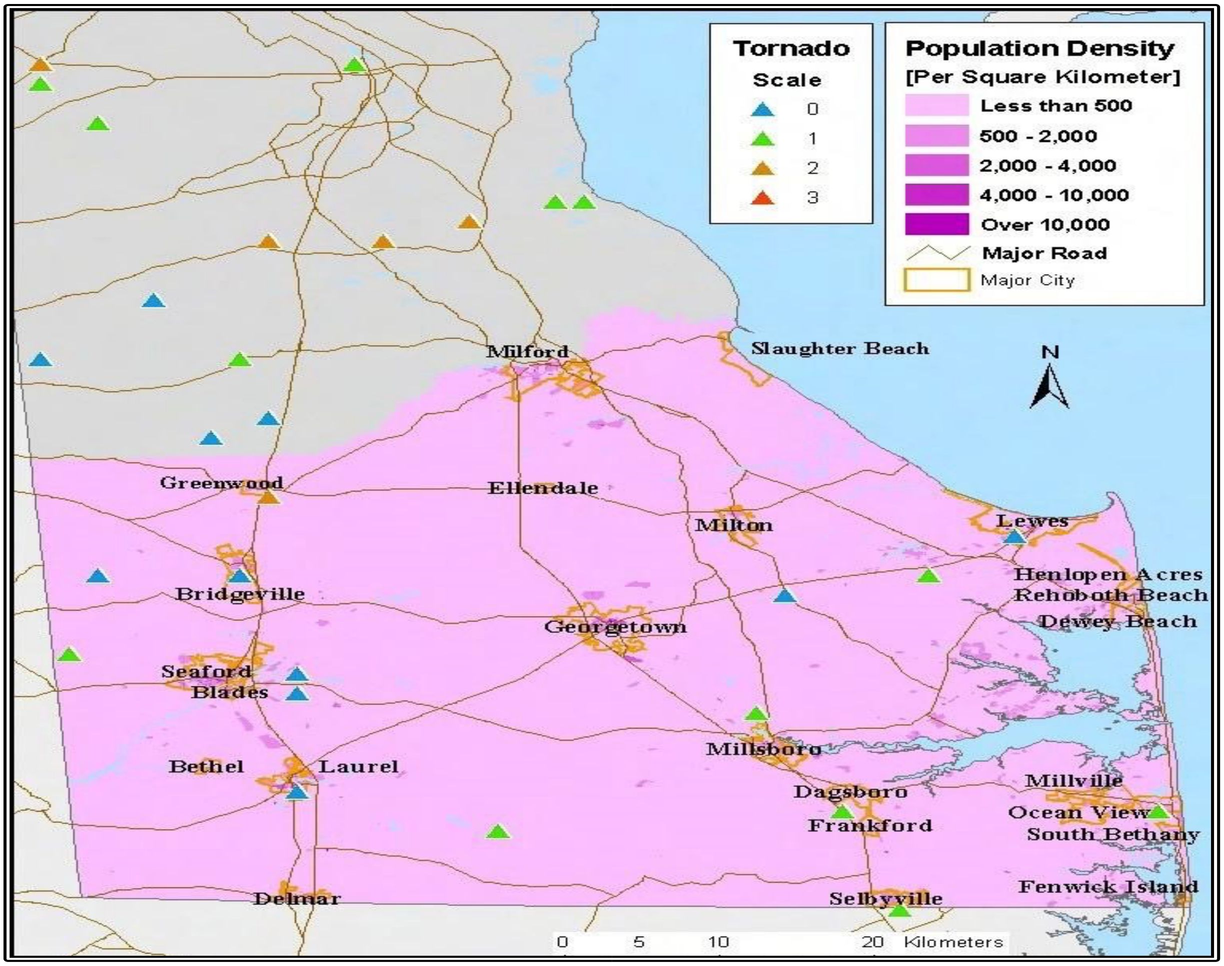

Figure 4-13. Location and Magnitude of Past Tornado Events (NOAA)

DROUGHT

Although the State of Delaware is vulnerable to drought, estimated potential losses are somewhat difficult to calculate because drought causes minor damage to the built environment, mainly affecting crops and farmland. Therefore, it is assumed that all buildings and facilities are exposed to drought but would experience negligible damage in a drought event.

The approach used to determine vulnerability within Sussex County consisted of several factors. First, statistical data for the past 100 years from the University of Nebraska, developed based on Palmer Drought and Crop Severity Indices, was analyzed. Drought event frequency/impact was then determined for Sussex County. Also used was USDA agriculture data from 1997. Drought impact on the non-irrigated agriculture products profile was then determined.

Table 4-25 shows annualized expected losses from drought events by jurisdiction within Sussex County. The total estimated annualized losses for the County equal $14,659,834.

Jurisdiction	Estimated Losses
Bethany Beach	$17,626
Bethel	$6,671
Blades	$7,230
Bridgeville	$67,345
Dagsboro	$20,999
Delmar	$13,992
Dewey Beach	$6,732
Ellendale	Negligible
Fenwick Island	$7,536
Frankford	$10,766
Georgetown	$69,388
Greenwood	$11,048
Henlopen Acres	Negligible
Laurel	$40,473
Lewes	$65,458

Jurisdiction	Estimated Losses
MCD Bridgeville-Greenwood	$1,530,281
MCD Georgetown	$998,028
MCD Laurel-Delmar	$2,690,299
MCD Lewes	$1,261,154
MCD Milford South	$1,824,606
MCD Millsboro	$1,426,546
MCD Milton	$928,101
MCD Seaford	$1,334,655
MCD Selbyville-Frankford	$1,900,032
Milford	$142,649
Millsboro	$61,221
Millville	$35,871
Milton	$24,765
Ocean View	$37,724
Rehoboth Beach	$24,588
Seaford	$75,703
Selbyville	$50,804
Slaughter Beach	$20,816
South Bethany	$7,933
TOTAL	**$14,659,834**

Table 4-25. Annualized Expected Losses from Drought

Sussex County is currently not in a drought. However, ***Figure 4-14*** is the U.S. Drought Monitor which is updated weekly.[41]

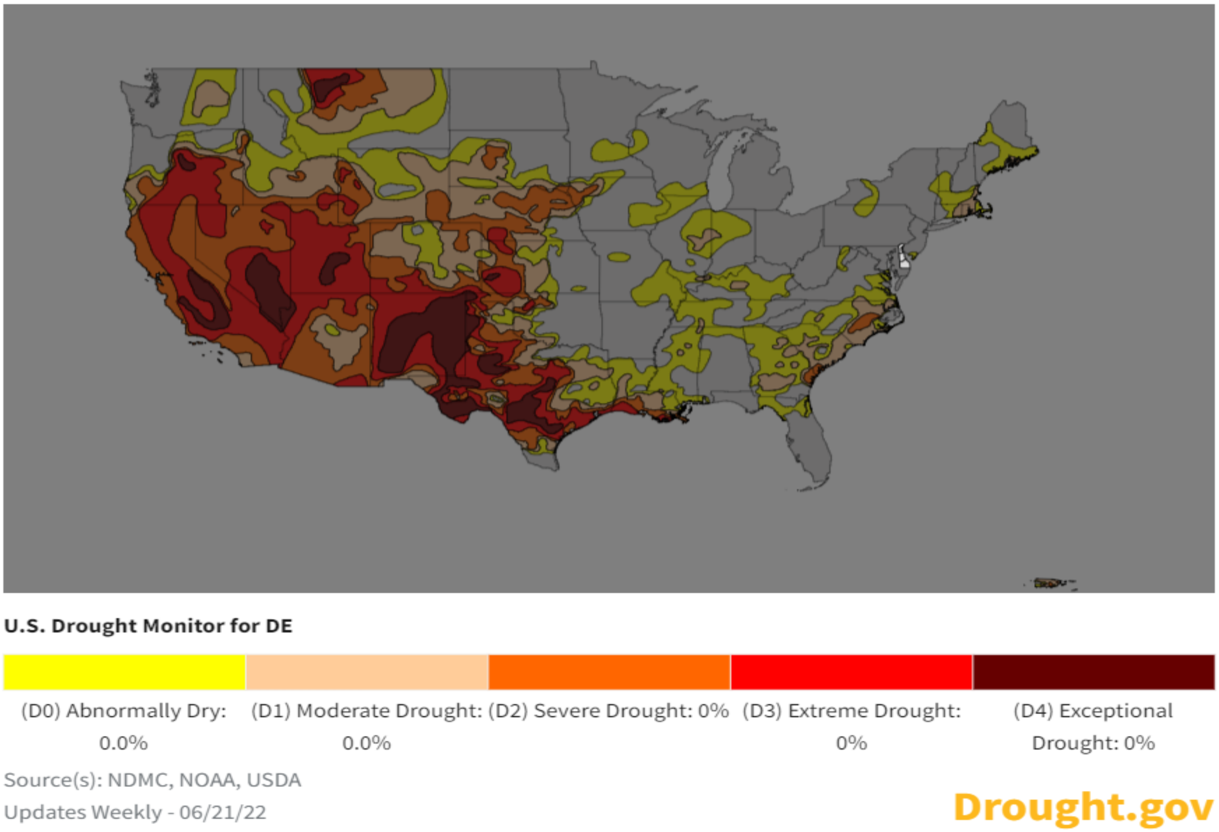

Figure 4-14. U.S. Drought Monitor

[41] **https://www.drought.gov/states/delaware/county/sussex**

HAIL

The State of Delaware is minimally vulnerable to hailstorms. Hail does occur in the Mid-Atlantic but is usually not large or widespread enough to cause significant damage to the built environment. It does, however, have the potential to harm crops in the agricultural areas of Sussex County.

The approach to determining vulnerability to hail is like that used for severe thunderstorm wind. Historical hail loss data from the National Oceanic and Atmospheric Administration (NOAA) was gathered for Sussex County and the neighboring counties within 25 miles of the boundary of the County. All historical losses were scaled to account for inflation, and average historical losses were calculated ***(Table 4-26).***

County	Total Events	Magnitude	Total Loss	Deaths	Injuries
Sussex County, DE	8	7.75	0	0	0
Kent County, DE	7	6.51	0	0	0
Caroline County, MD	0	0	0	0	0
Dorchester County, MD	0	0	0	0	0
Wicomico County, MD	0	0	0	0	0
Worcester County, MD	0	0	0	0	0
Average	2.5	1.08	0	0	0

Table 4-26. Losses from Hail Events (NOAA)

Figure 4-15 shows recorded hail activity by hailstone size in relation to population distribution.

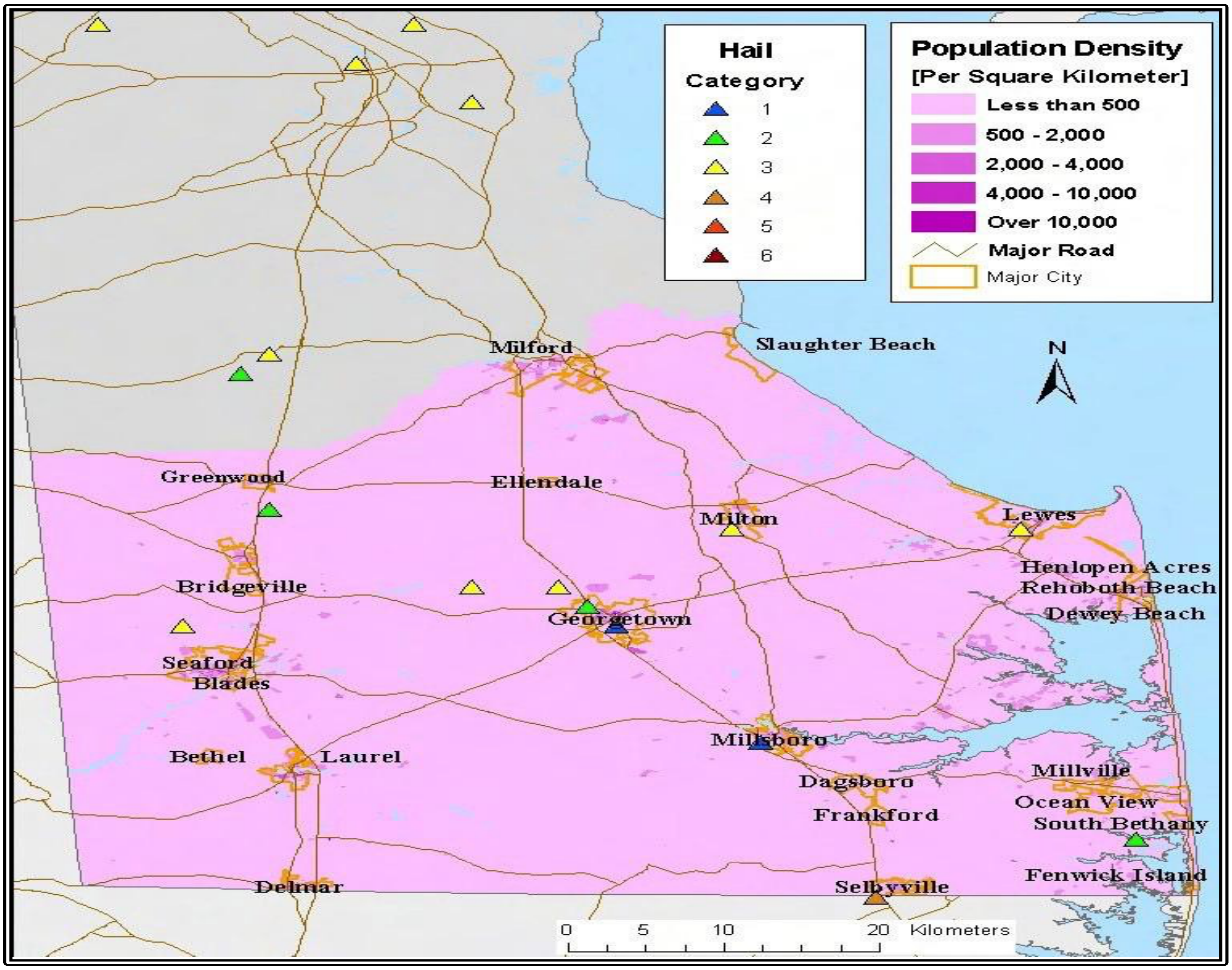

Figure 4-15. Recorded Hail Activity

WINTER STORMS

Historical evidence shows that Sussex County is quite vulnerable to winter storms, with several occurring yearly. Because winter storms generally impact large areas, all buildings and facilities are exposed to this hazard and could be impacted. Unfortunately, it is also impossible to estimate the number of residential, commercial, and other structures or facilities that may experience losses.

The approach to determining vulnerability to winter storms is like that of severe thunderstorm wind. Historical winter storm loss data from the National Oceanic and Atmospheric Administration (NOAA) was gathered for Sussex County and the neighboring counties within 25 miles of the boundary of the County. All historical losses were scaled to account for inflation, and average historical losses were calculated ***(Table 4-27)***. ***Table 4-28*** shows annualized expected losses from winter storm events by jurisdiction within Sussex County. The total estimated annualized losses for the County equal $340,625.16.

County	Total Events	Property Damage	Deaths	Injuries
Sussex County, DE	12	0	0	0
Kent County, DE	9	0	0	0
Caroline County, MD	8	0	0	0
Dorchester County, MD	8	$35,000	0	0
Wicomico County, MD	8	$30,000	0	0
Worcester County, MD	6	0	0	0
Average	8.5	$11,333	0	0

Table 4-27. Occurrences and Losses from Winter Storm Events (NOAA)

Jurisdiction	Estimated Losses
Bethany Beach	Negligible
Bethel	Negligible
Blades	Negligible
Bridgeville	Negligible
Dagsboro	Negligible

Jurisdiction	Estimated Losses
Delmar	Negligible
Dewey Beach	Negligible
Ellendale	Negligible
Fenwick Island	Negligible
Frankford	Negligible
Georgetown	Negligible
Greenwood	Negligible
Henlopen Acres	Negligible
Laurel	Negligible
Lewes	Negligible
MCD Bridgeville-Greenwood	$35,556
MCD Georgetown	$23,189
MCD Laurel-Delmar	$62,510
MCD Lewes	$29,303
MCD Milford South	$42,395
MCD Millsboro	$33,146
MCD Milton	$21,565
MCD Seaford	$31,011
MCD Selbyville-Frankford	$44,148
Milford	Negligible
Millsboro	Negligible
Millville	Negligible

Jurisdiction	Estimated Losses
Milton	Negligible
Ocean View	Negligible
Rehoboth Beach	Negligible
Seaford	Negligible
Selbyville	Negligible
Slaughter Beach	Negligible
South Bethany	Negligible
TOTAL	**$340,625**

Table 4-28. Expected Losses from Winter Storms

EARTHQUAKE

Figure 4-16 shows the potential ground motion for a 100-year and 500-year earthquake. While Sussex County has felt earthquakes every so often, none have been significant enough to cause any damage for well over 100 years. The coastal plain of the Mid-Atlantic is notorious for beinga seismically quiet zone. However, if a serious earthquake were to occur, the losses would likely be significant. This explains the amount of potential annualized losses for the County of $190,778 ***(Table 4-29).***

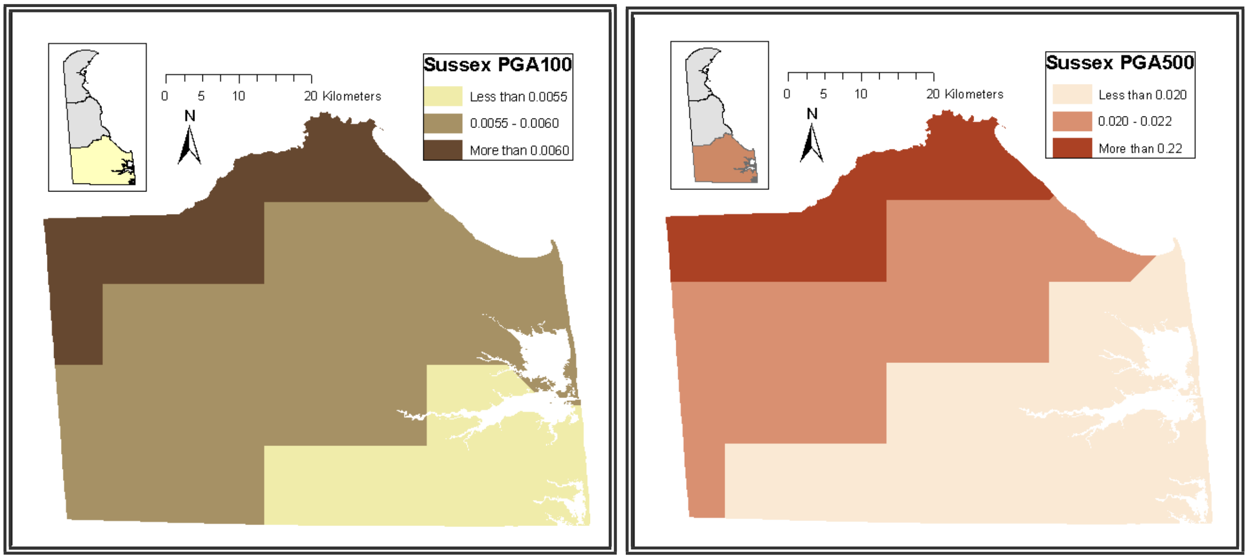

Figure 4-16. Peak Ground Acceleration (Ground Motion) for 100- and 500-Year Events100-Year Ground Motion 500-Year Ground Motion

Jurisdiction	Estimated Losses
Bethany Beach	Negligible
Bethel	Negligible
Blades	Negligible
Bridgeville	Negligible
Dagsboro	Negligible
Delmar	Negligible
Dewey Beach	Negligible
Ellendale	Negligible
Fenwick Island	Negligible

Jurisdiction	Estimated Losses
Frankford	Negligible
Georgetown	Negligible
Greenwood	Negligible
Henlopen Acres	Negligible
Laurel	Negligible
Lewes	Negligible
MCD Bridgeville-Greenwood	$11,232
MCD Georgetown	$12,767
MCD Laurel-Delmar	$14,884
MCD Lewes	$40,144
MCD Milford South	$16,310
MCD Millsboro	$16,409
MCD Milton	$9,429
MCD Seaford	$21,886
MCD Selbyville-Frankford	$24,987
Milford	Negligible
Millsboro	Negligible
Millville	Negligible
Milton	Negligible
Ocean View	Negligible
Rehoboth Beach	Negligible
Seaford	$5,284

Jurisdiction	Estimated Losses
Selbyville	Negligible
Slaughter Beach	Negligible
South Bethany	Negligible
TOTAL	**$190,778**

Table 4-29. Annualized Expected Losses from Earthquakes

Critical Facilities Risk for Earthquake/Geological

All critical facilities are vulnerable to earthquakes. A critical facility would encounter many of the same impacts as any other building within the County, depending on the level of building code used to construct the structure. These impacts include structural failure and loss of facility functionality. In other words, a damaged police station may not be able to serve the community. ***Table 4-30*** *shows* potential damage to critical facilities from earthquakeevents by jurisdiction within Sussex County.

Jurisdiction	Total Number of Critical Facilities	100-year Earthquake			500-year Earthquake		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
Bethany Beach	14	0	0	14	0	0	14
Bethel	1	0	0	1	0	0	1
Blades	7	0	0	7	0	0	7
Bridgeville	25	0	0	25	0	0	25
Dagsboro	11	0	0	11	0	0	11
Delmar	7	0	0	7	0	0	7
Dewey Beach	11	0	0	11	0	0	11
Ellendale	6	0	0	6	0	0	6

Jurisdiction	Total Number of Critical Facilities	100-year Earthquake			500-year Earthquake		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
Fenwick Island	5	0	0	5	0	0	5
Frankford	8	0	0	8	0	0	8
Georgetown	40	0	0	40	0	0	40
Greenwood	8	0	0	8	0	0	8
Laurel	31	0	0	31	0	0	31
Lewes	40	0	0	40	0	0	40
MCD Bridgeville-Greenwood	76	0	0	76	0	0	76
MCD Georgetown	83	0	0	83	0	0	83
MCD Harrington	1	0	0	1	0	0	1
MCD Laurel-Delmar	172	0	0	172	0	0	172
MCD Lewes	175	0	0	175	0	0	175
MCD Milford North	1	0	0	1	0	0	1
MCD Milford South	121	0	0	121	0	0	121
MCD Millsboro	137	0	0	137	0	0	137
MCD Milton	62	0	0	62	0	0	62
MCD Seaford	163	0	0	163	0	0	163

Jurisdiction	Total Number of Critical Facilities	100-year Earthquake			500-year Earthquake		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
MCD Selbyville-Frankford	258	0	0	258	0	0	258
Milford	33	0	0	33	0	0	33
Millsboro	14	0	0	14	0	0	14
Millville	5	0	0	5	0	0	5
Milton	20	0	0	20	0	0	20
Ocean View	6	0	0	6	0	0	6
Rehoboth Beach	33	0	0	33	0	0	33
Seaford	50	0	0	50	0	0	50
Selbyville	2	0	0	2	0	0	2
Slaughter Beach	2	0	0	2	0	0	2
South Bethany	7	0	0	7	0	0	7
TOTAL	1,280		0		0		1,280

Table 4-30. Potential Damage from Earthquakes

DAM/LEVEE FAILURE

The approach for determining vulnerability to dam and/or levee failure consists of several factors. Data from the USACE National Inventory of Dams (NID)[42] in addition to the HAZUS- MH demographic inventory was used, with an assumption that dam breaks most likely will occur at the time of maximum capacity.[43] The affected population was then calculated.

Table 4-31 shows estimated exposure of people to dam failure. ***Figure 4-17*** on the following page shows the location of dams within Sussex County, along with their hazard ranking (high, significant, or low), in relation to population density.

Dam Name	River or Stream	Owner	Hazard Potential
Abbotts Pond Dam	Johnson Branch	DelDOT; DNREC DFW	High
Betts Pond Main Dam	Shoals Branch	DelDOT	High
Betts Pond Route 113 Dam	Shoals Branch	DelDOT	High
Burton Pond Dam	Chapel Branch	DelDOT	High
Chipman Pond Dam	Elliot Pond Branch	DelDOT; DNREC DFW	High
Collins Pond Dam	Gravelly Branch	DelDOT	Significant
Concord Pond Dam	Deep Creek	DelDOT; DNREC DFW	High
Cubbage Pond Dam	Cedar Creek	DelDOT	High
Davis/Racoon Pond Dam	Raccoon Prong	DelDOT; DNREC DFW	Significant
Fleetwood Pond Dam	Tyndall Branch	DelDOT	High
Griffith Lake Dam	DE00043	Sussex	Mispillion River
Hearns Pond Dam	DE00060	Sussex	Clear Brook
Horseys Pond Dam	DE00022	Sussex	Little Creek
Ingram Pond Dam	DE00020	Sussex	Shoals Branch

[42] With the National Dam Inspection Act of 1972, the U.S. Congress authorized the U.S. Army Corps of Engineers (USACE) to inventory dams located in the United States. The Water Resources Development Act of 1986 authorized USACE to maintain and periodically publish an updated National Inventory of Dams (NID).

[43] Downstream quarter-circle buffer proportional to the maximum capacity of dams are assumed to represent the maximum impact area.

Dam Name	River or Stream	Owner	Hazard Potential
Marshall Millpond Dam	DE00093	Sussex	Herring Branch
Millsboro Pond Dam	DE00018	Sussex	Mirey Branch
Records Pond Dam	DE00057	Sussex	Broad Creek
Red Mill Pond Dam	DE00016	Sussex	Martin Branch
Reynolds Pond	DE00054	Sussex	Sowbridge Branch
Shoals Branch Dam	DE00106	Sussex	Shoals Branch
Swiggetts Pond Dam	DE00056	Sussex	Cedar Creek
Trap Pond Dam	DE00017	Sussex	Hitch Pond Branch
Trussams Pond Dam	DE00019	Sussex	James Branch
Wagamons Pond Dam	DE00061	Sussex	Broadkill River
Williams Pond Dam	DE00064	Sussex	Clear Brook

Table 4-31. Dams and Risk Potential[44]

[44] https://dnrec.alpha.delaware.gov/watershed-stewardship/waterways/dam-safety/

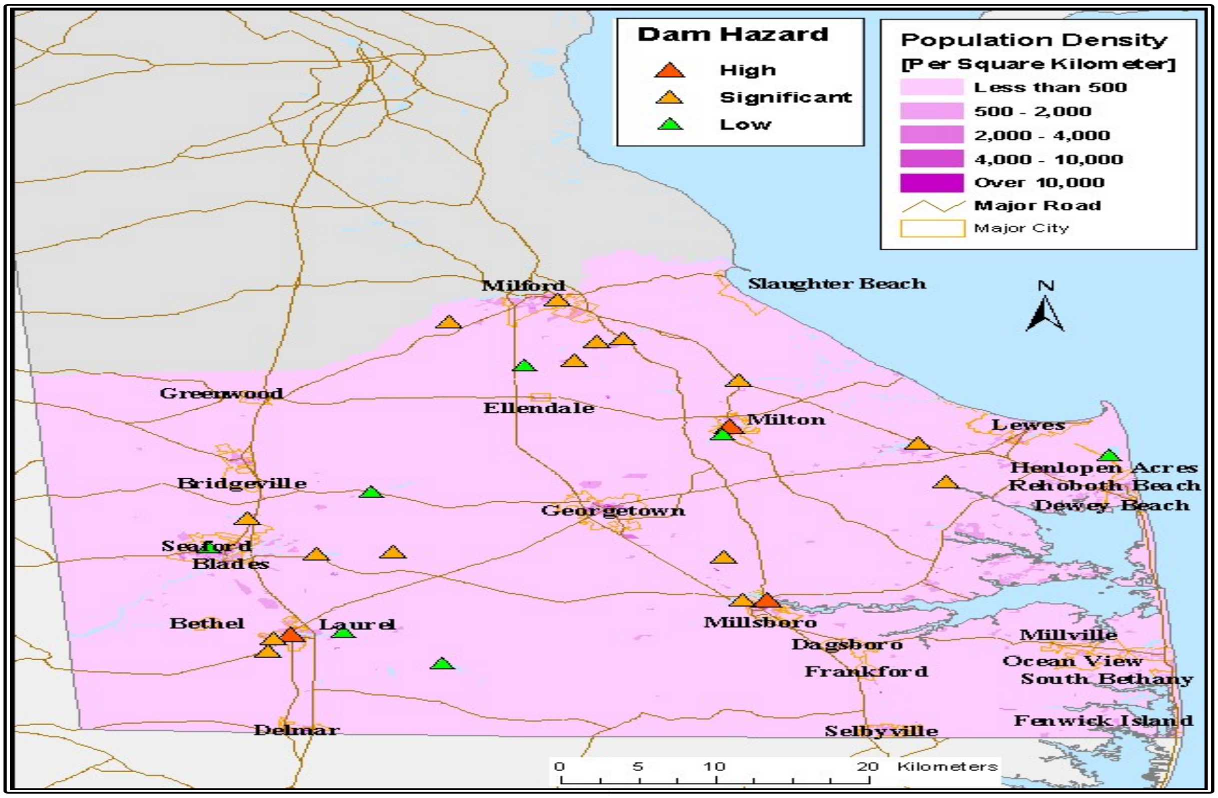

Figure 4-17 Location of Dams

ENERGY PIPELINES

Energy pipelines cross most of the State of Delaware, including some of Sussex County. If any of these energy pipelines, oil, or gas, were to rupture, such an event could endanger property and lives in the immediate area within less than half a mile radius. ***Figure 4-16*** shows the location of 45 miles of energy pipelines within the County's boundaries with population density and municipalities.

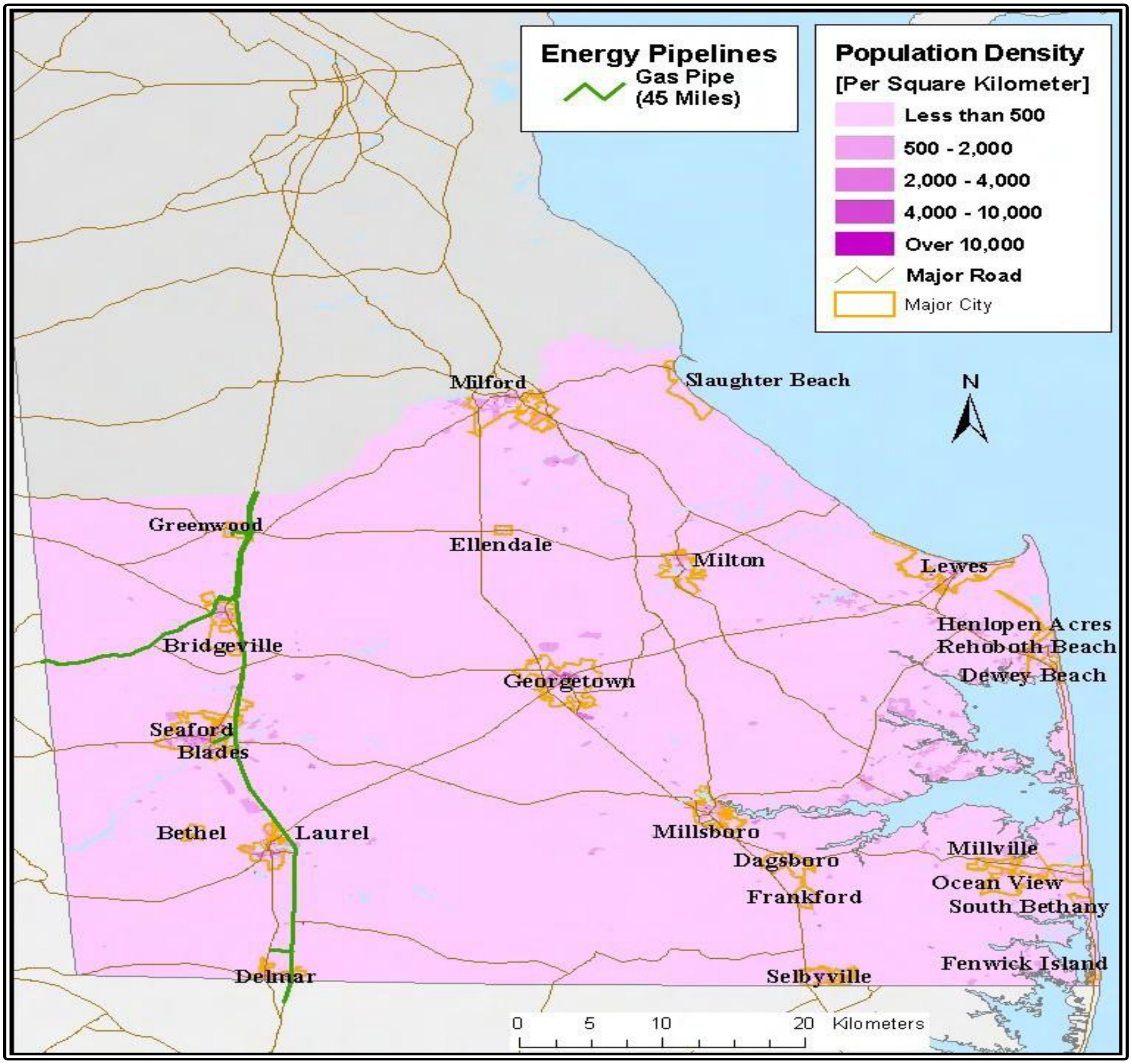

Figure 4-18. Energy Pipelines

HAZARDOUS MATERIALS (HAZMAT)

Assessing vulnerability to a hazardous material (HazMat) release on a Countywide scale can consist of several factors, such as the type(s) of hazardous materials present, the potential for mass casualties, potential consequences for the surrounding area, accessibility, public awareness, and the likelihood of being a terrorist target. The assessment conducted for Sussex County focuses on the first three of these factors, and a comprehensive study was undertaken to document information for 13 identified hazardous material sites from State of Delaware exposure data.[45]

High consequence events were then selected, (high material toxicity and population density), and ALOHA[46] was used for calculating the impact area.

Affected population (based on Census 2020) and exposure value (HAZUS-MH) was then reported per selected events. ***Table 4-32*** offers the results of this analysis for all 13 HazMat facilities.

Facility Name	City	Chemical Name	Potential Residential Population at Risk	Clean-up Area (square kms)
Orient Corp. of America	Seaford	Aniline	192	3.118
Orient Corp. of America	Seaford	Nitrobenzene	65	0.856
Du Pont Seaford Plant	Seaford	Antimony Compounds	19	0.447
Johnson Polymer	Seaford	Ammonia	8	0.096
Du Pont Seaford Plant	Seaford	Zinc Compounds	0	0.048
Du Pont Seaford Plant	Seaford	Hydrochloric Acid	0	0.028
Du Pont Seaford Plant	Seaford	Mercury Compounds	0	0.000
Du Pont Seaford Plant	Seaford	Sulfuric Acid	0	0.000
Du Pont Seaford Plant	Seaford	Chromium Compounds	0	0.000
Du Pont Seaford Plant	Seaford	Biphenyl	0	0.000
Du Pont Seaford Plant	Seaford	Chlorodifluoromethane	0	0.000

Table 4-32. Risk Potential

45 Suppose a facility houses more than one hazardous material. In that case, it is treated as a separate entry in this table because the potential population at risk and projected clean-up area could vary depending on the chemical.

46 ALOHA (Areal Locations of Hazardous Atmospheres) is a computer program that uses information provided by its operator and physical property data from its extensive chemical library to predict how a hazardous gas cloud might disperse in the atmosphere after an accidental chemical release.

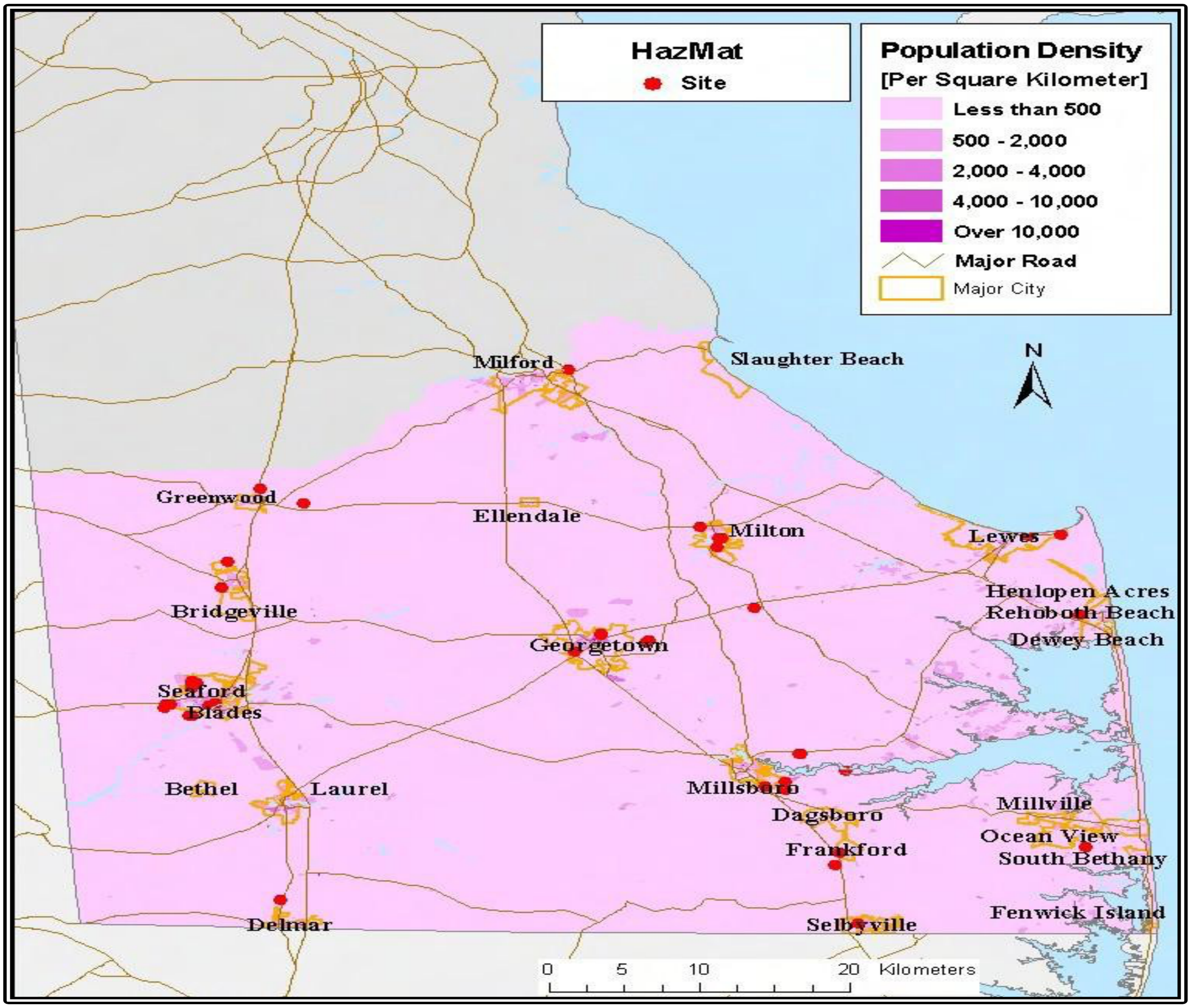

Figure 4-19. Location of Hazardous Materials Facilities in Relation to Population Density

WEAPONS OF MASS DESTRUCTION

Using FEMA Publication 426 Reference Manual to Mitigate Potential Terrorist Attacks in High Occupancy Buildings as a basis, a vulnerability assessment was conducted for Weapons of Mass Destruction (WMDs) to expand the scope of the hazard mitigation planning process in the State of Delaware to include vulnerability to acts of terrorism. The methodology employs a vulnerability ranking of 1 to 5 for specific transportation, water/hydrology, emergency and public safety, and utility elements. The sum of each component is multiplied against a value (from 1 to 5 scale) and multiplied against a factor representing the Department of Homeland Security Threat Level. For this Plan, the Threat Level is assumed to be Orange (High). This part of the assessment is the same for all three counties in Delaware. In the final analysis, the total risk for each County is multiplied by a unique weighted factor to arrive at County-specific scores. For Sussex County, a weighted factor of 1.00 was used. Abbreviated findings of this methodology are presented in ***Table 4-33***.

	Based on FEMA 426: Reference Manual to Mitigate Potential Terrorist Attacks in High Occupancy Buildings															
	Asset Visibility	Target Value to	Asset	Asset Mobility	Target Threat of	Collateral	Site	Pot. for	SUM		Asset Value of		Homeland		Risk	Susse x
Transportation																
Major bridges	5	4	5	5	0	2	1	0	22	X	4	X	6	=	528	528
Airports	4	4	3	5	0	1	2	0	19	X	4	X	6	=	456	456
Water / Hydrology																
Reservoirs	3	5	3	5	1	3	1	0	21	X	5	X	6	=	630	630
Dams	4	5	2	5	1	4	1	0	22	X	5	X	6	=	660	660
Emergency and Public Safety																
Hospitals	4	3	4	5	4	2	2	2	26	X	5	X	6	=	780	780
Military Facilities	2	4	1	5	4	3	3	2	24	X	5	X	6	=	720	720
Schools	4	4	4	5	1	1	2	1	22	X	3	X	6	=	396	396
Utilities																

Gas LNG plant	3	3	3	5	2	3	1	2	22	X	3	X	6	=	396	396
Electric substations	3	2	3	5	1	2	1	0	17	X	2	X	6	=	204	204

Table 4-33. Assessment of Vulnerability to Weapons of Mass Destruction

To provide perspective to these findings, the final scores for each element were compared to the maximum score defined in FEMA Publication 426 ***(Table 4-34).*** This comparison shows hospitals, military facilities, and day care centers to have the three highest rankings compared to all other elements. These three elements are the focal point of the chemical and radiological agent's sections.

Facility	Threat	Percent Comparison
Maximum Score in FEMA 426 Model	**14.400**	**100%**
Hospitals	7.800	54%
Military Facilities	7.200	50%
Day Care Centers	6.900	48%
Hazardous Material Sites	6.600	46%
Dams	6.600	46%
Reservoirs	6.300	44%
Major Bridges	5.280	37%
All Gas Pipelines	1.020	7%
U.S. Roads	0.960	7%
State Roads	0.960	7%

Table 4-34. Comparison of Sussex County and FEMA 426 Model

CHEMICAL AGENTS

In planning for the possible release of a chemical agent as an act of terrorism, Sussex County identified two (2) hospitals and 47 daycare facilities throughout the County as potential targets. ***Figure 4-XX and 4-XX*** graphically illustrate the locations of these facilities. To create a complete assessment of the damage that would be inflicted should such an attack occur, Sussex County also determined the surrounding population and building stock within both an 8-mile radius of the target (the "Immediate Response Zone") and a 20-mile radius (the "Protective Action Zone"). This approach accurately represents the overall exposure to the threat of a chemical agent. ***Tables 4-35*** *and* ***4-36*** offer the results of this analysis. The top three daycare facilities in terms of the affected population are included in Table Complete information for all 47 facilities is stored in a Microsoft Excel file separate from this Plan.

Name of Hospital	City	Immediate Response Zone (IRZ) 8 miles from each hospital		Protective Action Zone (PAZ) 20 miles from each hospital	
		Population	Buildings	Population	Buildings
Beebe Medical Center	Lewes	27,779	24,313	104,072	67,839
Nanticoke Memorial Hospital	Seaford	39,178	15,727	105,689	41,312

Table 4-35. Hospital Facilities and Surrounding Exposure

Name of Day Care Facility	City	Immediate Response Zone (IRZ) 8 miles from each hospital		Protective Action Zone (PAZ) 20 miles from each hospital	
		Population	Buildings	Population	Buildings
Little Hearts Learning Center, Inc.	Dagsboro	42,170	33,212	98,415	67,841
Noah's Ark II	Millsboro	47,946	35,688	105,026	70,483
Child Craft Company	Seaford	38,877	15,611	103,191	40,292

Table 4-36. Day Care Facilities and Surrounding Exposure

Radiological

In planning for the possible release of a radiological agent as an act of terrorism, Sussex County identified two (2) hospitals and three (3) military facilities throughout the County as potential targets. . To create a complete assessment of the damage that would be inflicted should such an attack occur, Sussex County also determined the surrounding population and building stock within both an 8-mile radius of the target the ("Immediate Response Zone") and a 20-mile radius of the (Protective Action Zone"). This approach accurately represents the overall threat of a radiological agent. ***Tables 4-37 and 4-38*** contain the results of this analysis.

Name of Hospital	City	Immediate Response Zone (IRZ) 8 miles from each hospital		Protective Action Zone (PAZ) 20 miles from each hospital	
		Population	Buildings	Population	Buildings
Beebe Medical Center	Lewes	27,779	24,313	104,072	67,839
Nanticoke Memorial Hospital	Seaford	39,178	15,727	105,689	41,312

Table 4-37. Hospital Facilities and Surrounding Exposure

Name of Military Facility	Immediate Response Zone (IRZ) 8 miles from each hospital		Protective Action Zone (PAZ) 20 miles from each hospital	
	Population	Buildings	Population	Buildings
U.S. Naval Reserve	29,758	26,019	287,550	142,133
Army Reserve Center	38,823	31,243	289,054	142,708
Delaware National Guard	32,588	30,818	241,475	125,650

Table 4-38. Military Facilities and Surrounding Exposure

BIOLOGICAL AGENTS

The relative risk of Sussex County to Delaware in the release of a biological agent is 6.28 percent is based on a risk formula of "VULNERABILITY x HAZARD x EXPOSURE." Vulnerability, in this case, is a measure of the speed at which infection will spread among the population. The population was studied based on general occupancy class: residential, commercial, industrial, education, government, agricultural and religious. The hazard component was considered a measure of introducing the disease among the population and was broken down by occupancy class, in this case, residential, commercial, industrial, education, government, and religious. The exposure was determined using HAZUS-MH data.

CONCLUSIONS ON HAZARD RISK

Table 4-39 summarizes this section's annualized expected losses presented for each natural hazard. Based on the methodologies described at the beginning of this section, the risk from natural hazards in Sussex County can be rated on a scale of Low, Moderate, or High for each identified natural hazard based on these annualized losses and an annualized loss ratio.[47] Because of the nature of human-caused hazards and the nature in which risk and vulnerability are presented for human-caused hazards, it is not possible to rank them fairly in direct comparison with natural hazards. However, in summary, all human-caused hazards addressed in this section, terrorism (chemical, radiological and biological agents), hazardous materials incidents (HazMat), and energy pipeline failures, warrant an overall rating of low risk for Sussex County.

To create a final overall risk ranking per hazard in Sussex County, the previous hazard analysis and the risk assessment are combined in ***Table 4-39***. Several analyzed hazards were deemed to be of little consequence to the County. Therefore, they are added to the risk ranking as low risk but unranked. Other hazards, such as extreme heat/cold, generate no direct monetary losses and are excluded from the risk assessment. However, their frequency of occurrence and their potential to cause injuries and death warrants them to be ranked at a medium level of risk. The final risk ranking demonstrates that flooding and drought are the two most critical threats to Sussex County's population and built environment.

[47] **The annualized loss ratio is multiplied by 50,000 (x 500 for a proxy 500-year loss and x 100 for a percentage number.) Low risk equals 0 to 5 percent; Medium risk equals 6 to 20 percent, and High risk isany percentage over 20.**

Jurisdiction	Flood	Tropical Storm Winds	Thunder storm's	Tornado	Drought	Hail	Winter Storms	Earthquake
Bethany Beach	$8,221,887	$11,377	N	N	$17,626	N	N	N
Bethel	$76,408	N	N	N	$6,671	N	N	N
Blades	$115,000	N	N	N	$7,230	N	N	N
Bridgeville	N	N	N	N	$67,345	N	N	N
Dagsboro	N	N	N	N	$20,999	N	N	N
Delmar	N	N	N	N	$13,992	N	N	N
Dewey Beach	$1,430,177	N	N	N	$6,732	N	N	N
Ellendale	N	N	N	N	0	N	N	N
Fenwick Island	$2,258,541	N	N	N	$7,536	N	N	N
Frankford	$63,925	N	N	N	$10,766	N	N	N
Georgetown	N	N	N	N	$69,388	N	N	N
Greenwood	$7,101	N	N	N	$11,048	N	N	N
Henlopen Acres	$409,600	N	N	N	0	N	N	N
Laurel	$2,182,198	N	N	N	$40,473	N	N	N
Lewes	$700,624	$7,481	N	N	$65,458	N	N	N
MCD Bridgeville Greenwood	$1,091,200	$25,390	$17,559	N	$1,530,281	N	$35,556	$11,232
MCD Georgetown	$255,801	$48,865	$11,452	N	$998,028	N	$23,189	$12,767
MCD Laurel Delmar	$991,374	$95,369	$30,869	N	$2,690,299	N	$62,510	$14,884
MCD Lewes	$19,357,870	$367,759	$14,471	N	$1,261,154	N	$29,303	$40,144
MCD Milford South	$1,912,048	$48,034	$20,936	N	$1,824,606	N	$42,395	$16,310
MCD Millsboro	$36,640,370	$616,112	$16,369	N	$1,426,546	N	$33,146	$16,409

MCD Milton	$445,316	$111,662	$10,649	N	$928,101	N	$21,565	$9,429
MCD Seaford	$1,403,417	$61,270	$15,314	N	$1,334,655	N	$31,011	$21,886
MCD Selbyville-Frankford	$43,167,201	$451,242	$21,801	N	$1,900,032	N	$44,148	$24,987
Milford	$630,092	N	N	N	$142,649	N	N	N
Millsboro	$411,348	$8,191	N	N	$61,221	N	N	N
Millville	$124,808	$10,358	N	N	$35,871	N	N	N
Milton	$338,142	N	N	N	$24,765	N	N	N
Ocean View	$1,008,480	$10,134	N	N	$37,724	N	N	N
Rehoboth Beach	$499,965	$5,387	N	N	$24,588	N	N	N
Seaford	$560,861	$9,739	N	N	$75,703	N	N	$5,284
Selbyville	$148,809	$8,370	N	N	$50,804	N	N	N
Slaughter Beach	$333,152	N	N	N	$20,816	N	N	N
South Bethany	$4,017,172	$5,155	N	N	$7,933	N	N	N
TOTAL	**$129,520,000**	**$1,926,244**	**$168,211**	**$11,000**	**$14,659,834**	**$7,560**	**$340,625**	**$190,778**

Table 4-39. Potential Annualized Losses per Jurisdiction

To create a final overall risk ranking per hazard in Sussex County, the previous hazard analysis and the risk assessment are combined in ***Table 4-40***. Several analyzed hazards were deemed to be of little consequence to the County. Therefore, they are added to the risk ranking as low risk but unranked. Other hazards, such as extreme heat/cold, generate no direct monetary losses and are excluded from the risk assessment. However, their frequency of occurrence and their potential to cause injuries and death warrants them to be ranked at a medium level of risk. The final risk ranking demonstrates that flooding and drought are the two most critical threats to Sussex County's population and built environment.

It should be noted that although some hazards may show Medium or Low risk, hazard occurrence is still possible. Also, any hazard occurrence could potentially cause a great impact and losses could be extremely high (i.e., an F5 tornado or a Category 5 hurricane).

Flood	Tropical Storm Winds	Thunderstorms	Tornado	Drought	Hail	Winter Storms	Earthquake
High	Low	Moderate	Low	High	Low	Moderate	Low

Table 4-40. Estimated Level of Risk by Hazard (High, Moderate, Low)

UNIQUE RISKS FOR LOCAL JURISDICTIONS

To address unique risks within individual jurisdictions of the multi-jurisdictional planning area, the *Unique Risk for Local Jurisdictions* section documents responses from local government officials by the Delaware Emergency Management Agency. Through this process, unique risks were identified for Bethany Beach and all coastal communities within the County.

- Town of Bethany Beach- Identified by Bethany Beach Police Department
    - Bethany Beach experiences tidal flooding on the Back Bays and flooding on all streets east of State Route 1 during severe storms and heavy rain, including all areas along the oceanfront on the Atlantic Ocean. This flooding is confined to a distinct geographic boundary, streets flood within the corporate limits of Bethany Beach in areas with poor drainage and low elevation. Approximately 650 homes are at risk within this area, as well as several motels on Boardwalk, a lifeguard building, and other public facilities. The residential properties hold an estimated value of $500,000 per structure. The 50 commercial structures are estimated to be valued at approximately $250,000 to $500,000 each. The lifeguard station and other public facilities have an estimated total value of $500,000. No lifelines or infrastructure are known to be at risk.
- Town of Ellendale-Identified by the Town of Ellendale Mayor's Office
    - Wildfires are caused by coal-fired train engines and loaded coal cars. Sparks from the wheels and tracks have generated fires at least twice in the past two years that are reported to have burnt for more than three days causing damage to forestry and grasslands. No lives, homes, businesses, infrastructure, or critical facilities are known to be at risk from this hazard.

All Coastal Communities

Identified by the Delaware Department of National Resources and Environmental Control

One unique hazard affecting all coastal communities in Sussex County is the issue of long-term coastal erosion and sea-level rise. This hazard is confined to the distinct geographic boundaries of the Delaware Bay shore, the Atlantic Ocean coast, and the inland bays.

5. CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of Sussex County and the participating municipal jurisdictions to implement hazard mitigation activities. It consists of four sections:

What is a Capability Assessment?

- Capability Assessment Update.
- Capability Assessment Findings; and Conclusions on Local Capability.

Requirement §201.6(b)(3): *The planning process must include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

ASSESSMENT

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects[48]. As in any planning process, it is essential to establish which goals, objectives, and actions are feasible based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. In addition, a capability assessment helps determine which mitigation actions are practical and likely to be implemented over time, given the community's fiscal, technical, administrative, and political framework.

A capability assessment has two primary components: an inventory of a local jurisdiction's relevant plans, programs, or policies already in place; and an analysis of its capacity to carry them out. Examining local capabilities will detect gaps, shortfalls, or weaknesses with ongoing government activities. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced, if possible, through future mitigation efforts.

The capability assessment completed for Sussex County is a critical part of the foundation for designing an effective hazard mitigation strategy. Coupled with the *Risk Assessment*, the *Capability Assessment* helps identify and target meaningful mitigation actions for incorporation in the *Mitigation Strategy* portion of the All-Hazard Mitigation Plan. In addition, it helps establish the goals and objectives for Sussex County to pursue under this Plan and ensures that those goals and objectives are realistically achievable under given local conditions.

ASSESSMENT UPDATE

The original Capability Assessment survey distributed in 2003 to local government officials asked specific questions about existing local plans, policies, programs, or ordinances that contributed to and hindered the community's ability to implement hazard mitigation actions. In addition, questions were asked concerning each jurisdiction's technical, fiscal, administrative, and political capabilities to implement mitigation actions.

[48] While the Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step to develop a mitigation strategy that meets the needs of each jurisdiction while considering their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c) (3)).

The survey results provided an extensive inventory of existing local plans, policies, programs, and ordinances and required local officials to self-assess their jurisdiction's specific capabilities. The 2016 plan information was reviewed and updated during interviews conducted with community officials as part of this update.

Initially, the information provided by the participating jurisdictions in response to the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology[1] was then applied to quantify and rank each jurisdiction's overall capability relative to one another. According to the scoring system, each plan, policy, ordinance, or program was assigned a point value based on its relevance to hazard mitigation. Additional points were added based on each jurisdiction's self-assessment of its fiscal, technical, administrative, and political capability. A total score and general capability rating (High, Moderate, or Limited) were then determined according to the total number of points received. The survey results also serve as a good source of introspection for those jurisdictions wishing to improve their capability, as identified gaps, weaknesses, or conflicts may be recast as opportunities for specific mitigation actions.

During this Plan update process, the Capability Assessment results from the 2016 plan were distributed and discussed with participating municipalities. The 2016 information was shared with municipal officials, and areas, where plans, ordinances, political, fiscal, administrative, and technical capability had changed were indicated. This information was shared at the Committee meeting and incorporated into the overall Capability Assessment.

ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of Sussex County's jurisdictions to implement hazard mitigation activities. All information is based upon the responses provided by local government officials during one-on-one interviews and meetings.

Table 5-1 on the following page summarizes the local plans and programs in place for Sussex County's participating local governments. An "X" indicates that the given Plan or program is currently in place and implemented by the local jurisdiction. A more detailed discussion follows, incorporating additional information based on the narrative comments provided by local officials.

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Sussex County	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Bethany Beach	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Bethel **DNP**																			
Blades			X			X			X					X	X	X	X		X

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Bridgeville	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X		X
Dagsboro **DNP**																			
Delmar	X		X			X	X		X	X	X			X	X	X	X		X
Dewey Beach			X		X	X	X				P	X		X	X	X	X	X	X
Ellendale			X						X					X	X				X
Fenwick Island	X		X	X	X	X			X		X	X		X	X	X	X	X	X
Frankford	X		X	X										X	X	X	X		X
Georgetown	X		X	X		I/C			X		W/W	X		X	X	X	X		X
Greenwood **DNP**																			
Henlopen Acres		X	X	X	X	X	X		X	X	X	X		X	X	X	X		X
Laurel	X	X	X	X	X	A/CP								X	X	X	X		X
Lewes	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Millsboro		X	X	X	@					D/D	X			X	X	X	X		X
Millville	X		X	X					X			X		X	X	X	X		X
Milton	X		X			X								X	X	X	X		X

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Ocean View	X		X		X	X	X		X	X	X		X	X	X	X	X		X
Rehoboth Beach	X	X	X	X	X	X	X		X		X		X	X	X	X	X	X	X
Seaford	X	X	X	X		X	X		X	X		X	X	X	X	X	X	X	X
Selbyville	X		X	X								X	X	X	X	X	X		X
Slaughter Beach			X			X	X		X			X		X	X	X	X		X
South Bethany	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X

Table 5-1. Local Plans and Policies in Place

Key to Table 5.1

- **HMP** – Hazard Mitigation Plan
- **DRP** – Disaster Recovery Plan
- **CLUP** – Comprehensive Land Use Plan
- **FMP** – Floodplain Management Plan / Flood Mitigation Plan
- **SMP** – Stormwater Management Plan
- **EOP** – Emergency Operations Plan
- **COOP** – Continuity of Operations Plan
- **REP** – Radiological Emergency Plan
- **SARA** – SARA Title III Emergency Response Plan
- **TRANS** – Transportation Plan
- **CIP** – Capital Improvements Plan (that regulates infrastructure in hazard areas)
- **REG-PL** – Regional Planning
- **HPP** – Historic Preservation Plan
- **ZO** – Zoning Ordinance
- **SO** – Subdivision Ordinance
- **FDPO** – Flood Damage Prevention Ordinance

- **NFIP** – National Flood Insurance Program
- **CRS** – Community Rating System
- **BC** – Building Codes
- **DNP** - Did Not Participate
- **P** - Pending
- **I/C -** In Jurisdictional City Code
- **W/W** - Wastewater
- **D/D** - DelDOT
- **@** - Stormwater surface matching planning grant for stormwater infrastructure management
- **S/C -** Sussex County 2012 IRC/IBC
- **A/CP -** Needs to adopt Sussex County EOP

EMERGENCY MANAGEMENT CAPABILITIES

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. Other phases include preparedness, response, and recovery. Each phase is interconnected with hazard mitigation. Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions.

HAZARD MITIGATION PLAN (HMP)

A Hazard Mitigation Plan represents a community's blueprint for how they intend to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a Hazard Mitigation Plan include a risk assessment, capability assessment, and mitigation strategy. Twenty two of the 25 jurisdictions in Sussex County are participating in developing this Multi-Jurisdictional All-Hazard Mitigation Plan, which was an increase of two jurisdictions since the 2016 Plan.

In addition, the survey shows that of the 22 jurisdictions participating, 14 jurisdictions have local hazard mitigation plans, which was an increase of seven jurisdictions since the 2016 Plan.

Fifteen jurisdictions, including Sussex County, report having completed a Floodplain Management Plan or Flood Mitigation Plan. In addition, 10 jurisdictions reported completing a Stormwater Management Plan which was an increase of three jurisdictions since the 2016 Plan.

DISASTER RECOVERY PLAN (DRP)

A Disaster Recovery Plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses.

Survey results indicate that nine jurisdictions have prepared a Disaster Recovery Plan, which was an increase of three since the 2016 Plan.

EMERGENCY OPERATIONS PLAN (EOP)

An emergency operations plan outlines responsibilities and how resources are deployed following an emergency or disaster. Survey results indicate that 15 jurisdictions have an emergency operations plan, which was in increase of four jurisdictions since the 2016 Plan.

Sussex County has an EOP was updated in 2004 and is available to the community via the Sussex County Emergency Operations Center Website.

The municipalities of Bethany, Bridgeville, Delmar, Fenwick Island, Lewes, Rehoboth Beach, Seaford, Selbyville, and South Bethany also have emergency operations plans to cover their jurisdictions. Several of the municipal officials indicated that their jurisdictions continue to rely on the County for emergency operations planning and management.

CONTINUITY OF OPERATIONS PLAN (COOP)

COOP Plans establish a chain of command, line of succession and plans for backup or alternate emergency facilities in case of an extreme emergency.

Survey results indicate that 12 jurisdictions have completed COOP Plans which was an increase of four jurisdictions since the 2016 Plan. Many times, communities include COOP planning into their Emergency Operations Plan. An additional three communities also have completed a municipal EOP and may also have completed a COOP plan as part of that effort

RADIOLOGICAL EMERGENCY PLAN (REP)

A Radiological Emergency Plan delineates roles and responsibilities for assigned personnel and the means to deploy resources in the event of a radiological accident. Survey results indicate that four jurisdictions have a Radiological Emergency Plan, which is an increase of one jurisdiction since the 2016 Plan. However, Sussex County indicated that their Radiological Emergency Plan is a component of their Emergency Operations Plan

SARA TITLE III EMERGENCY RESPONSE PLAN (SARA)

A SARA Title III Emergency Response Plan outlines the procedures to be followed in the event of a chemical emergency such as the accidental release of toxic substances. These plans are required by Federal law under Title III of the Superfund Amendments and Re-authorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). The Sussex County Local Emergency Planning Committee (LEPC) has developed an Emergency

Response Plan for hazardous materials incidents throughout the County in coordination with the Delaware State Emergency Response Commission. Sussex County LEPC maintains the goal to review and update the Per Hazardous Material Response Plan annually. The 2015 SERC Annual Report, the Sussex County Hazardous Material Response Plan is scheduled for review and update in 2016.

Only 16 jurisdictions report active SARA Title III Emergency Response Plans in place. Many of the municipalities participate in the LEPC through town and city representatives. In addition, the County LEPC has approximately 34 industry representatives engaged as members of the County LEPC.

GENERAL PLANNING CAPABILITIES

Hazard mitigation activities often involve agencies and individuals with planning, land use management, and risk management from other disciplines. Other stakeholders may include local planners, public works officials, and economic development specialists. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals even though they are not designed. Therefore, the Capability Assessment included a discussion with each jurisdiction regarding general planning capabilities.

REGIONAL PLANNING (REG-PL)

Regional planning refers to any planning effort that involves a community working in conjunction with neighboring jurisdictions. For example, the development of this All-Hazard Mitigation Plan is representative of a regional planning effort.

Survey results indicate that 13 jurisdictions participate in regional planning decisions.

Twelve jurisdictions also maintain a Capital Improvement Plan. In addition, Sussex County coordinates with municipalities on issues and projects related to the County's Comprehensive Plan and the State's *Livable Delaware* initiative. Many local jurisdictions also coordinate regional issues through the Sussex County Association of Towns (SCAT).

Sussex County's local jurisdictions are members of the Delaware League of Local Governments (DLLG). The DLLG is a statewide, nonprofit, nonpartisan association of city, town, and County governments established in 1963 to improve and assist local governments through legislative advocacy at the state and federal levels. The DLLG also serves as a clearinghouse for important governmental and business-oriented information.

COMPREHENSIVE LAND USE PLAN (CLUP)

A complete plan establishes the overall vision for what a community wants to be and is a guide to future governmental decision-making. Typically, a comprehensive plan comprises demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, integrating hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

Delaware requires its counties to adopt and regularly update comprehensive plans in conformity with the Quality-of-Life Act of 1988, Del. Code tit. 9 § 6960. The Act requires the plan to include the following elements: Economic Development, Housing, Conservation (including Agriculture), Historic Preservation, Recreation, Open Space, Accomplishments, Intergovernmental Coordination, Mobility, Water and Sewer, Community Facilities, and Future Land Use. An optional element is Community Design.

Local governments use such plans to establish land-use policies, identify growth areas, and consider various other community concerns, such as affordable housing availability, agriculture preservation, open space protection, historic preservation, economic development, and transportation mobility.

Delaware law mandates that all counties and municipalities have a comprehensive plan. In addition, under a change in Delaware law in 2011, counties and jurisdictions must review and update their plans for State certification every ten years while providing yearly updates on the implementation progress. The Sussex County Council adopted the County's 2018 comprehensive plan update.[49]

TRANSPORTATION PLAN (TRANS)

A transportation plan identifies the means to gauge transportation demands and the options to meet those needs while considering the area's social, economic, and environmental characteristics. The development of transportation networks can significantly impact the amount, type, and location of future growth. As a result, transportation planning can dramatically affect future hazard vulnerability.

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[49] https://sussexcountyde.gov/comprehensive-plan

Survey results indicate that most jurisdictions do not have their stand-alone transportation plan. Eight of the jurisdictions reported having a Transportation Plan, an increase of 3 jurisdiction since 2016 Plan. Transportation planning (including emergency evacuation) is commonly addressed as an element of the local comprehensive plans and in coordination with the Delaware Department of Transportation.

CAPITAL IMPROVEMENTS PLAN (CIP)

A capital improvements plan guides the scheduling of spending on public improvements. A capital improvement plan can be an essential mechanism to guide future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

Survey results indicate that fourteen jurisdictions have capital improvement plans that regulate the provision or extension of infrastructure in hazard areas.

HISTORIC PRESERVATION PLAN (HPP)

A historic preservation plan is intended to preserve historic structures or districts within a community. An often-overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards to include the identification of the most effective way to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

Survey results indicate that nine jurisdictions have historic preservation plans, which is no change from the 2016 Plan update.

ZONING ORDINANCES (ZO)

Zoning represents how local governments control land use. As part of a community's police powers, zoning protects the public health, safety, and welfare of those in each jurisdiction that maintains zoning authority. A zoning ordinance is a mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit development type and density, they can be a powerful tool when applied in identified hazard areas. Survey results indicate that all 22 participating jurisdictions listed in the All-Hazard Mitigation Plan have a zoning ordinance.

SUBDIVISION ORDINANCES (SO)

A subdivision ordinance is intended to regulate the development of housing, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure to future growth.[50]

BUILDING CODES, PERMITTING, AND INSPECTIONS

Building Codes regulate construction standards. In many communities, permits are issued, and inspections of work take place on new construction. Decisions regarding the adoption of building codes (that account for

[50] For additional information regarding the use of subdivision regulations in reducing flood hazard risk, see Subdivision Design in Flood Hazard Areas. 1997. Morris, Marya. Planning Advisory Service Report Number 473. American Planning Association: Washington, D.C.

hazard risk), the permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk a community faces. Surveys reaffirmed that all jurisdictions interviewed had adopted a local building code or administered by the County.

Sussex County currently has a MOU in place with the following local jurisdictions, and they are responsible for issuing of permits, certificate of occupancy, inspections, and enforcement. Sussex County is currently using 2012 IRC/IBC but in process of updating to 2020 codes to reflect the necessary changes.

Name	Name	Name
Town of Bethel	Town of Blades	Town of Bridgeville
Town of Dagsboro	Town of Dewey Beach	Town of Ellendale
Fenwick Island	Town of Frankford	Georgetown
Town of Greenwood	Henlopen Acres	Ocean View
Slaughter Beach	South Bethany	

Table 5-2. Building Codes and Permits Administered by County

In addition to using survey results, the adoption and enforcement of building codes by local jurisdictions were assessed using the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO)[51] Under the BCEGS program, ISO assesses the building codes in effect in a particular community and how the community enforces its building codes, *with specific emphasis on mitigating losses from natural hazards*. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which may offer rating credits for new buildings constructed in communities with strong BCEGS classifications. The concept is that communities with well-enforced, up-to-date codes should demonstrate better loss experience.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education, as well as several daily inspections. This type of information, combined with local building codes, determines a grade for that jurisdiction. The grades range from 1 to 10, with the ideal lower grade. A BCEGS grade of 1 represents an exemplary commitment to building code enforcement, and a grade of 10 indicates less than minimum recognized protection. BCEGS grades for each of Sussex County's local jurisdictions are listed in ***Table 5-4.***

FLOODPLAIN MANAGEMENT CAPABILITY

Flooding represents the most significant natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards, such as education, outreach, and the training of local officials, the *National Flood Insurance Program* (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to

[51] Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated

flood hazards. Local governments voluntarily participate in the NFIP, but FEMA and DEMA promote the program as an essential step for implementing and sustaining an effective hazard mitigation program and as a critical indicator for measuring local capability.

For a County or municipality to join the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings be protected from damage by the 100-year flood and that new floodplain development will not aggregate existing flood problems or increase damage to other properties.

Another critical service provided by the NFIP is the mapping of identified flood hazard areas. Once prepared, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an essential source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their communities.

Only one community, Ellendale, is reported as a Non-Special Flood Hazard Area. ***Table 5-4*** summarizes NFIP participation for each of Sussex County's local jurisdictions.

An additional indicator of floodplain management capability is the number of participants in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities beyond the minimum requirements of the NFIP, adding extra local measures to protect from flooding. All 18 creditable CRS mitigation activities are assigned a range of point values. Communities can apply for an improved CRS class after accumulating points and reaching identified thresholds. Class ratings, which run from 10 to 1, are tied to flood insurance premium reductions, as shown in ***Table 5-3.*** As class ratings improve (decrease), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

CRS Class	Premium Reduction
1	45%
2	40%
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%

CRS Class	Premium Reduction
10	0

Table 5-3. CRS Premium Discounts, By Class[52]

Community participation in the CRS is voluntary. Any community in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been dramatically simplified over the past several years based on community comments to make the CRS more user-friendly as possible, and extensive technical assistance is also available for communities who request it.

Table 5-4 lists the current CRS communities in Sussex County. A total of seven municipalities belong to the Community Rating System. Of these there are three jurisdictions with a class 8, and four are class 9 communities.

FLOODPLAIN MANAGEMENT PLAN (FMP)

Survey results indicate that 15 jurisdictions interviewed have floodplain management or flood mitigation plan. Through the CTP program, DNREC updated portions of New Castle, Kent, and Sussex County floodplain maps. The Kent and Sussex map updates are effective in June 2018. [53] As a result of these floodplain map updates, all communities in Delaware which participate in the National Flood Insurance Program will be required up adopt updated floodplain regulatory language to comply with NFIP requirements.

To assist communities in meeting these requirements, DNREC has developed “model” floodplain ordinances that communities may find easier to adopt, rather than amending existing floodplain regulations. Four model ordinances have been designed to assist coastal and non-coastal communities and communities wishing to adopt higher floodplain standards, which DNREC highly recommends reducing flood damage and lower flood insurance premiums.

STORMWATER MANAGEMENT PLAN (SMP)

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures intended to reduce the impact of more frequently occurring minor urban flooding.

Survey results indicate that nine of the jurisdictions interviewed have a stormwater management plan which was three more than reported in 2016. Many communities identified this as one of their hazard mitigation needs going forward. Several have projects under development utilizing state grants and technical resources to manage stormwater runoff.

COUNTY AND JURISDICTIONAL SELF-ASSESSMENT

In addition to the above inventory of existing plans, programs, and policies, the Capability Assessment required each local jurisdiction to evaluate the 2016 self-assessment of its capability to implement hazard mitigation activities. As part of this process, County and municipal officials were

[52] FEMA- http://www.fema.gov/media-library-data/1458756801023http://www.fema.gov/media-library-data/1458756801023-311019d76271533f6b21ce505df7bd3c/20_crs_508_apr2016.pdf311019d76271533f6b21ce505df7bd3c/20_crs_508_apr2016.pdf

[53] https://dnrec.alpha.delaware.gov/watershed-stewardship/waterways/floodplains/mapping/

encouraged to consider the barriers to implementing mitigation strategies and the mechanisms that could further such strategies. In response to the survey questionnaire, local officials classified the capabilities listed the following abilities as either “limited,” “moderate,” or “high”:

- Technical Capability
- Fiscal Capability
- Administrative Capability

Table 5.4 summarizes the results of the self-assessment process for technical, fiscal, and administrative capabilities. An “L” indicates limited capability; an “M” indicated moderate capability; and an “H” indicates high capability. Further descriptions and discussions on each are provided below, in addition to some of general findings on political capability.

Jurisdiction	Comprehensive Land Use Plan Update	BCEGS Grade	Date of NFIP	CRS Date	CRS Class	Technical Capability (L, M, H)	Fiscal Capability (L, M, H)	Administrative Capability (L, M, H)
Sussex County	2018	8	10/1976	N/A	N/A	M	M	M
Bethany Beach	2017	N/A	04/1973	05/2009	8	M	M	M
Bethel			10/1981					
Blades	Update Under Revision	N/A	01/1981	N/A	N/A	L	L	M
Bridgeville	2019	8	01/1977	N/A	N/A	M	L	M
Dagsboro			6/1981					
Delmar	2020	N/A	N/A	N/A	N/A	L	L	L
Dewey Beach	2021	8	06/1982	10/1994	9	H	H	M
Ellendale	2022	8	N/A	N/A	N/A	L	L	L

Jurisdiction	Comprehensive Land Use Plan Update	BCEGS Grade	Date of NFIP	CRS Date	CRS Class	Technical Capability (L, M, H)	Fiscal Capability (L, M, H)	Administrative Capability (L, M, H)
Fenwick Island	2017 Update (2021 in progress)	8	03/1973	10/1994	9	M	M	M
Frankford	Adopted 2021	8	09/1981	N/A	N/A	M	L	M
Georgetown	Adopted 2021	8	05/2003	N/A	N/A	L	M	L
Greenwood			2/1978					
Henlopen Acres	Updated 2016	8	08/1978	N/A	N/A	M	M	M
Laurel	2018	6	01/1981	N/A	N/A	L	L	M
Lewes	2017	9	03/1977	UNK	8	H	M	M
Millsboro	2021	7	09/1978	N/A	N/A	H	H	H
Millville	Updated 2019	8	09/1981	N/A	N/A	L	L	L
Milton	2018	8	08/1978	N/A	N/A	L	M	M
Ocean View	Revised 2020	8	09/1980	N/A	N/A	H	M	H
Rehoboth Beach	2014 (Update Pending)	6	3/1973	UNK	8	H	M	H
Seaford	Updated 2020	6	02/1979	10/1996	9	M	M	H

Jurisdiction	Comprehensive Land Use Plan Update	BCEGS Grade	Date of NFIP	CRS Date	CRS Class	Technical Capability (L, M, H)	Fiscal Capability (L, M, H)	Administrative Capability (L, M, H)
Selbyville	Updated 2020	8	07/1991	N/A	N/A	M	M	M
Slaughter Beach	2016	8	07/1980	N/A	N/A	L	L	L
South Bethany	2016 (Update Pending)	Declined	10/1976	10/207	8/9	M	L	H

Table 5-4. Capability Assessment

TECHNICAL CAPABILITY

Technical capability can be defined as possessing the skills and tools needed to improve decision-making, including developing and implementing sound mitigation actions. For gauging the technical capability of Sussex County's local jurisdictions for mitigation planning purposes, the Capability Assessment interview focused on the local availability and application of Geographic Information Systems (GIS).

Due to financial limitations, most cities and towns don't employ GIS staff or have direct access to GIS systems. Sussex County maintains a GIS system. Many local officials also indicated that they rely on Sussex County and state agencies to provide necessary technical capabilities and resources.

The analysis of the responses to the Capability Assessment indicated that there is generally a *limited to the moderate* technical capability of Sussex County's jurisdictions to implement mitigation strategies. Eight of the 25 jurisdictions indicated they had limited technical ability, fifteen indicated they had average technical capacity, and two showed they had the high technical capability. Approximately six communities have shifted from low to moderate. This is a substantial shift in the technological capabilities of Sussex County communities to medium technical capability.

Recommendations: Technical capabilities among the communities in the County have significantly increased. The strategy of developing resource and capability sharing has been successful over the past five years. Several jurisdictions also have increased staffing to provide more technical capabilities within the community. However, there are still communities with limited technical capabilities throughout the County. Therefore, there remains a need for ongoing support for a systematic sharing of technical resources to support risk reduction strategy development. Sharing resources and capabilities with the County should continue to increase the technical capability to analyze natural hazards and develop meaningful actions to reduce their impact. This includes additional training to enhance the ability to use information technologies to facilitate the formulation, development, implementation, and monitoring of mitigation efforts.

FISCAL CAPABILITY

The ability to act is often closely associated with the money available to implement policies and projects. This may take the form of grants received or state and locally based revenue. The costs related to policy and project implementation vary widely. In some cases, policies are tied primarily to staffing costs associated with creating and monitoring a given program. In other cases, money is linked to an actual project, like the development of stormwater management strategies and the acquisition of flood-prone homes, which can require a substantial commitment from local, state, and federal funding sources.

It is imperative that jurisdictions research non-federal sources of revenue and funding for risk management strategies. This will reduce the dependence on the availability of federal and state funding to implement mitigation actions. Additional assistance may be available from economic development and private sector partnerships considering funding community resiliency to support overall growth and sustainability.

The analysis of the Capability Assessment responses indicated that a significant number of communities had moved from limited to the moderate fiscal capability of Sussex County's jurisdictions to implement mitigation strategies. This is partly due to substantial growth and development in the County.

Eleven jurisdictions indicated they had limited fiscal capability. Thirteen municipalities, and Sussex County, now identify as having moderate fiscal capabilities to support mitigation efforts. Only one, Dewey Beach, based on 2010 data, remains at a high budgetary capability.

Recommendations: The results of the local Capability Assessment should be used as a general guide to help craft achievable mitigation actions. When considering the effect of fiscal capability on implementing mitigation policies and projects, jurisdictions should consider whether the activities require monetary commitment or staff resources. Consideration should be given to open government and non-governmental grant funding sources. It may also be possible to combine resources such as Community Development Block Grants, rural development grants, and County or other resources to meet risk reduction priorities. In addition, it may be possible to create a regional effort by working with other municipalities to offset the implementation costs. Consideration should also be made whether the jurisdiction is willing to commit local revenue to assure community resiliency and sustainability.

To implement mitigation projects and policies, monetary commitment or staff resources will be required as a cost-share. This may be a non-federal match requirement, or the costs associated with staff time devoted to project administration, policy development, program implementation, and monitoring. Identifying eligible Pre-Disaster Mitigation projects and other federal funding sources identified in the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan enables communities to compete nationally for available funding. Therefore, the County and municipal governments should consider, whenever possible, combining financial and staff resources to address hazards, most of which tend to impact regions rather than individual jurisdictions.

Finally, if local governments have access to an ongoing source of revenue rather than a strict reliance on grant funds, a more comprehensive and sustained mitigation effort can be achieved. Examples include the development of a stormwater utility fee, a special district for floodplain management, or developing a budgetary line item that specifically addresses hazard mitigation.

ADMINISTRATIVE CAPABILITY

County and municipal staffing and existing organizational structures for local governments were evaluated to implement mitigation strategies and administrative capability. The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose.

The analysis of the responses to the Capability Assessment indicated that there is generally a *moderate to the high* administrative capability of Sussex County's jurisdictions to implement mitigation strategies. Three jurisdictions indicated they had limited organizational capability, while thirteen said they had moderate administrative capability. New in 2016 is that nine communities report high administrative capability. Local municipal jurisdictions in Sussex County indicated that they work cooperatively with the County on many activities, helping offset their organizational and staff limitations. This includes emergency-related activities coordinated by the Sussex County EOC and mutual aid agreements between police and fire departments, but not specifically mitigation activities. Many communities report an increase in staffing focused on municipal services and code enforcement. However, some local officials say minimal full-time staff to implement local government programs, and they rely heavily on volunteers, outside agencies, and professional consultants.

Recommendations: Demand for services continues to grow within the County. Many communities report that their year-round population has grown significantly over the past five years. In addition, many seasonal homeowners are now becoming permanent residents. This has created a demand for municipal services and an increase in staffing. The County and larger municipalities tend to possess a more substantial administrative capability than smaller communities. This is primarily due to fiscal limitations, as smaller jurisdictions have a limited tax base to support local government services. The development of local administrative capability could best be achieved through enhanced intergovernmental cooperation, outreach, training, and mentoring for smaller jurisdictions, as well as the sharing of resources, when appropriate.

POLITICAL CAPABILITY

Local governments needing to enhance local internal staff's emergency management expertise should consider sending a team to the free or low-cost training seminars available through DEMA's Training Program and FEMA's Emergency Management Institute. In addition, in preparing local mitigation strategies, local governments should look to integrate hazard mitigation activities into routine governmental functions whenever possible, particularly when limited to only a few full-time employees.

One of the most challenging capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Due to the nature of the difficulties, political capabilities were discussed in a more informal nature.

In many cases, hazard mitigation initiatives may not be a local priority or can be mistakenly seen by regional leaders as an impediment to other community goals. Therefore, the local political climate must be considered in designing mitigation strategies, as it could be the most challenging hurdle to overcome in their adoption or implementation.

The political capability was discussed in general terms. The discussions showed that Sussex County's jurisdictions generally have a *moderate* political capability to implement mitigation strategies. Due to several coastal events such as Hurricane Sandy, coastal and riverine flooding, and severe wind events, hazards and disasters have increased as a significant issue of concern in Sussex County. The local political climate is favorable for implementing mitigation actions consistent with sustainability and community growth.

An example of the political climate in favor of hazard mitigation can be found in the update of this plan. The planning team and Sussex EOC leadership met with the County Planning and Zoning Commission and the County Council to discuss the planning process and the value of hazard mitigation on community resiliency and growth.

Recommendations: Increasing local political capability to implement mitigation strategies is most often achieved through a coordinated approach to loss reduction that includes:

- Community outreach efforts designed to inform residents and businesses of the risk faced by natural hazards,
- Gaining community support through a wide range of local interest groups (particularly those that may be affected by proposed actions), and
- Informing and educating the elected and executive officials of the community in advance of the formal decision-making process.

Identifying key stakeholders early in designing and proposing mitigation strategies should generate community support and help eliminate or minimize potential impediments to acceptance before plans become drafted or officially presented.

Local elected and executive officials should become informed and educated on mitigation strategies before any formal considerations or decisions, which will facilitate a greater understanding of specific mitigation objectives and expected outcomes.

CONCLUSIONS AND RECOMMENDATIONS

The capability of local governments in Sussex County varies significantly from jurisdiction to jurisdiction.

Sussex County's local governments should continue working beyond this plan's development to maximize existing resources and local capabilities. The City of Lewes has gained considerable knowledge and expertise in applying hazard mitigation principles through local government programs and should serve as a mentor to its neighboring communities in Sussex County. As the above findings indicate, Sussex County has significantly more capability than its municipal jurisdictions and should serve as a clearinghouse for information while striving to enhance and maintain intergovernmental cooperation and coordination.

The plan provides the vehicle to begin this process. However, to succeed, it will require clearly articulating the benefits of participating in and sustaining the countywide mitigation planning process. One of the best ways to obtain local buy-in and long-term success is to identify and implement possible mitigation actions (as listed in this Plan's *Mitigation Strategy*) that will facilitate continued intergovernmental coordination not only across the County but with state and federal agencies as well.

The conclusions of the *Capability Assessment* and *Risk Assessment* serve as the foundation for a meaningful hazard mitigation strategy.

While identifying the goals, objectives, and mitigation actions, each jurisdiction must consider its level of hazard risk and its capability to minimize or eliminate that risk.

In jurisdictions where the overall hazard risk is considered HIGH and local capability is considered LIMITED, specific mitigation actions that account for these conditions should be assumed, including less costly measures such as minor ordinance revisions or public awareness activities. Further, if necessary, specific capabilities may need to be improved to address recurring threats better. Similarly, in cases where the hazard vulnerability is LIMITED and overall capability is HIGH, more emphasis can be placed on actions that may impact future exposure, such as guiding development away from known hazard areas.

No significant changes warranted a difference in the hazard risk or overall capability for the County (unincorporated areas) or municipalities.

6. MITIGATION STRATEGY

Requirement §201.6(c)(3): *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Requirement §201.6(c)(3)(ii): *[The mitigation strategy* ***shall*** *include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.]*

Requirement: §201.6(c)(3)(iii): *[The mitigation strategy section* ***shall*** *include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization* ***shall*** *include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there* ***must*** *be identifiable action items specific to the jurisdiction requesting Federal Emergency Management Agency (FEMA) approval or credit of the plan.*

MITIGATION GOALS, OBJECTIVES, AND ACTIONS

The Mitigation Strategy intends to provide Sussex County and participating jurisdictions with the tools necessary to continue to reduce the impact of natural and human-caused hazards. To achieve these aims, this section covers the following components:

- Mitigation Goals
- Identification and Analysis of Mitigation Measures
- Mitigation Actions

This section contains goals, objectives, and action items for the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan. For this Plan, the following definitions are proposed:

- **Goals** are general guidelines that explain what the County and participating jurisdictions want to achieve. Goals are expressed as broad policy statements representing desired long-term results.
- **Hazard Mitigation Policies** are defined as a course of action agreed to by members of the Planning Team.
- **Mitigation Actions** are the specific steps (projects, policies, and programs) that advance a given objective. They are highly focused, precise, and measurable.

The hazard identification and risk assessment in Sections 3 and 4 identified the hazards that affect Sussex County and the potential for damage to community assets that are vulnerable to the hazards. Section 5 identified the strengths and weaknesses of local capabilities. The goals and objectives described below were established by the Sussex County Hazard Mitigation Steering Committee and validated by the Sussex County Hazard Mitigation Working Group members in response to these assessment results. Many of the actions described below apply to the County and all participating jurisdictions.

The broad goals of the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan are as follows:

- **Goal 1:** Sussex County and participating jurisdictions will continue to adopt enhanced stormwater management practices.
- **Goal 2:** Sussex County and participating jurisdictions will continue to adopt and enforce codes and regulations designed to reduce the impact of natural hazards.
- **Goal 3:** Sussex County and participating jurisdictions will continue to retrofit and protect critical facilities and infrastructure from natural hazards.
- **Goal 4:** Sussex County and participating jurisdictions will continue to enhance education and outreach strategies to improve the dissemination of information to the public regarding hazards, including the steps that can be taken to reduce their impact.
- **Goal 5:** Sussex County and participating jurisdictions will continue to improve pre-event planning and preparedness activities.
- **Goal 6:** Sussex County and participating jurisdictions will continue identifying and implementing sound hazard mitigation projects.

IDENTIFICATION AND ANALYSIS OF MITIGATION MEASURES

In reformulating the Sussex County Mitigation Strategy, a wide range of activities was considered to help achieve the goals of participating jurisdictions. All actions chosen by County and jurisdictional government officials fell into one of the broad categories of mitigation techniques listed below:

1. **Prevention**: Preventative activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred, or capital improvements have not been substantial. Examples of preventative activities include:
   - Planning and zoning
   - Hazard mapping
   - Open space preservation
   - Floodplain regulations
   - Stormwater management
   - Drainage system maintenance
   - Capital improvements programming
   - Shoreline / riverine / fault zone setbacks
2. **Property Protection**: Property protection measures enable structures to better withstand hazard events, remove structures from hazardous locations, or provide insurance to cover potential losses. Examples include:
   - Acquisition

- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (i.e., wind proofing, flood proofing, seismic design standards, etc.)
- Insurance
- Safe room construction

3. **Natural Resource Protection**: Natural resource protection activities reduce the impact of hazards by preserving or restoring the function of natural systems. Examples of natural systems classified as high hazard areas include floodplains, wetlands, and barrier islands. Thus, natural resource protection can serve the dual purpose of protecting lives and property while enhancing environmental goals such as improved water quality or recreational opportunities. As a result, parks, recreation, or conservation agencies and organizations often implement these measures. Examples include:
    - Floodplain protection
    - Beach and dune preservation
    - Riparian buffers
    - Fire resistant landscaping
    - Erosion and sediment control
    - Wetland restoration
    - Habitat preservation
    - Slope stabilization
4. **Structural Projects**: Structural mitigation projects are intended to lessen the impact of hazards by modifying the environment or hardening structures. Structural projects are usually designed by engineers and managed or maintained by public works staff. Examples include:
    - Reservoirs
    - Levees, dikes, floodwalls, or seawalls
    - Detention and retention basins
    - Channel modification
    - Beach nourishment
    - Storm sewer construction
5. **Emergency Services**: Although not typically considered a mitigation technique, emergency services minimize the impact of a hazard on people and property. Actions taken immediately prior to, during, or in response to a hazard event include:
    - Warning systems
    - Search and rescue
    - Evacuation planning and management

    - Flood control techniques

6. **Public Information and Awareness**: Public Information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards and mitigation techniques they can use to protect themselves and their property. Examples of measures used to educate and inform the public include:
    - Outreach and education
    - Training
    - Speaker series, demonstration events
    - Real estate disclosure
    - Hazard expositions

Sussex County will continue to follow the guidelines set forth in the Hazard MitigationAdministrative Plan which detail these minimum project criteria:

- Have a beneficial impact upon the designated disaster area, whether located in the declared area,
- Be in conformance with 44 CFR Part 9, Floodplain Management and Protection of Wetlands, 44 CFR Part 10, Environmental Considerations, and Executive Orders,
- Solve a problem independently or constitute a functional portion of a solution where there is assurance that the project will be completed. Projects that merely identify or analyze hazards or problems are not eligible,
- Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster; Benefit Cost Analysis will be developed per FEMA standards, and
- Not be eligible under another federal program or grant.

NFIP, FLOODPLAIN MANAGEMENT, AND BUILDING CODES

Improved floodplain management, including land use planning, zoning, and enforcement at the local level, can reduce flood-related damages to existing buildings and new development and are consistent with this plan's stated Goals and Objectives of this plan. In addition, using the National Flood Insurance Program (NFIP) is critical to reducing future flood damage costs to the taxpayer.

Regardless of the location, all developments require a permit to include buildings, fill, and any other type of development. Under Delaware's *home rule* system, different offices in the various jurisdictions have authority over the necessary permits.

The NFIP requires that the facility meet the exact construction requirements as a new building when the cost of reconstruction, rehabilitation, addition, or other improvements to a building is equal to or exceeds 50% of the fair market value. Substantially damaged buildings must be brought up to new construction standards. A residence or building damaged so that the cost of repairs equals or exceeds 50% of the structure's fair market value must also be elevated above the Base Flood Elevation (BFE) in flood zones where BFEs are available.

For participation in the NFIP, each participating jurisdiction within Sussex County is expected to appoint a Floodplain Manager to enforce jurisdictional floodplain ordinances. These ordinances are intended to address methods and practices to minimize flood damage to new and substantial home improvement projects and address zoning and subdivision ordinances and state regulations as enforced through the Delaware Department of Environmental Protection.

Within floodplain management, the education process must play an important role. An effective education program should be implemented to show citizens the importance of building codes and ordinances and how cost-effective they could reduce future damages.

Established through the NFIP, the Community Rating System (CRS) is a program that counties and jurisdictions can elect to join. Once the jurisdiction has been entered, participants in that jurisdiction receive a discount on their flood insurance premiums.

As a result of being part of the CRS, the jurisdiction would have to pursue public outreach programs actively. One of the requirements of CRS is an annual outreach project, such as a Repetitive Loss Outreach Program. This program would focus on repetitive loss areas within the jurisdiction and consist of three main components.

OUTREACH

The first step in the Repetitive Loss Outreach Program is to advise the homeowners that they live in a repetitive loss area and could be subject to flooding. The second step is to give the homeowner appropriate property protection measure guidelines. The third is to make the homeowner aware of the basic facts about flood insurance.

The Delaware Unified Construction Code is the mandated construction code for all Delaware jurisdictions. Each County Building Code Office controls and coordinates all construction code and sub-code officials that enforce the state's Uniform Construction Code within their respective counties.

However, the State's Department of Environmental Protection is the lead state agency for administering the State's Floodplain Management Program. Therefore, each community participating in the NFIP must adopt and enforce jurisdictional floodplain management regulations that meet or exceed the minimum requirements of the NFIP as directed by the State's Floodplain Management Program. This requirement is in addition to the enforcement of the State Uniform Construction Code.

Each jurisdiction in Sussex County participating in the NFIP Program must have a well-trained jurisdictional floodplain manager and a construction code official. To ensure adequate enforcement of both codes, each jurisdiction in Sussex County should encourage additional training opportunities for all code enforcement personnel, including the jurisdictional floodplain manager.

Floodplain management and building codes assist the community with problems experienced by floods, hurricanes, tornadoes, thunderstorms/lightening/high winds, and other lower-priority hazards.

The NFIP is based on a voluntary agreement between a community and FEMA and identifies the requirements and documents how the County addresses these requirements. The table is based on a list of questions developed by DEMA. However, compliance with the NFIP extends beyond mere participation in the program. The three essential components of the NFIP include:

1. Floodplain identification and mapping risk (***Table 6-1***)
2. Responsible floodplain management (***Table 6-2***)
3. Flood insurance (***Table 6-3***)

Requirement	Action	Y/N	County Action
Does the County maintain a copyeffective FIRM (flood insurance ratemap) maps and FIS (flood insurancestudy) that is accessible to the public?	Place these documents in the local libraries.	Y	Maintained on file by the Sussex County Department of Planning and Zoning.
Has the County adopted the most current DFIRM or FIRM and FIS?	Date of Adoption	Y	XXXX
Does the County supportrequest for map updates?	If yes, state how.	N	Map changes, revisions, and amendments are reviewed bythe County CFM and submitted to FEMA for further study and determination.
Does the County share with FEMA any new technical or scientific data that could result inmap revisions within 6 months ofcreation or identification of new data?	If yes, specify how.	N	Sussex County has not conducted any studies thathave included new data formap revisions. Suggestionsand ideas for certain areas have been offered.
Does the County aid with local floodplaindeterminations?	If yes, specifyhow	Y	Sussex County Planning and Zoning Department assists property owners in identifying their location relative to the FIRMs.
Does the County maintain a record of approved Letters of Map Change?	If yes, specify the office that does it.	Y	The Sussex County Department of Planning and Zoning maintain these files on record.

Table 6-1. Floodplain Identification and Mapping

Requirement	Action	Y/N	County Action
a. Has the jurisdiction adopted acompliant floodplain management ordinance that at a minimum regulates the following:	If yes answer, (1) – (4) below.	Y	Yes
(1) Does the County issue permit for all proposed development in the SFHA?	If yes, specify the office.	Y	The Department of Planning andZoning Commission and Sussex County Council issue permits for proposed development and subdivision in the SFHA.
(2) Does the County obtain, review, and utilize any Base Flood Elevationand floodway data, and require BFEdata for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office that does it.	Y	The Sussex County Department of Planning and Zoning requires thisfor proposed subdivision application.
(3) Does the County identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the Base FloodElevation, including anchoring, using flood resistant materials, designing, or locating utilities and service facilities to prevent water damage?	If yes, specify the office that does it.	Y	Inspection and enforcementdone by the Sussex County Department of Planning and Zoning.
(4) Does the County document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office that does it.	Y	Files on record and maintained bythe Sussex County Department of Planning and

Requirement	Action	Y/N	County Action
			Zoning.
b. If a compliant floodplain ordinance was adopted, does the County enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how	Y	Sussex County Planning and Zoning coordinates with DNREC and FEMA for community assessments; identifies propertiesin violation; and works with property owners to achieve compliance

Table 6-2. Floodplain Management

Requirement	Action	Y/N	County Action
a. Does the County educate community members about the availability and value of flood insurance?	If yes, specify how.See Note 1.	N	Sussex County focuses primarily onproposed development and construction requirements within the floodplain. The flood insurance issues are directed to DNREC.
b. Does the County inform communityproperty owners about changes to theDFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	Y	The public is notified when themaps are updated and prior to Sussex County adoption of the maps.
c. Does the County provide generalassistance to community membersrelating to insurance issues?		Y	Sussex County offers preliminary assistance relating to flood insurance issues but directs on to DNREC for finalization.

Table 6-3. Flood Insurance

POTENTIAL MITIGATION ACTIONS IDENTIFIED

Sussex County and its jurisdictions have identified several hazard mitigations actions that would benefit the County. These actions were placed in the HMSC and HMWG meetings, including input from governmental organizations, local businesses, and private citizens. They were based partly on the range of potential mitigation actions for hazards faced by Sussex County and its constituent jurisdictions, described below.

PUBLIC AWARENESS

The insurance industry and emergency management research have demonstrated that awareness of hazards is not enough. People must know how to prepare for, respond to, and take preventive measures against threats from natural hazards. This research has also shown that a properly run local information program is more effective than national advertising or public campaigns.

Although concerted local, County, and statewide efforts to inform the public exist, lives and property continue to be threatened when segments of the population remain uninformed or ignore the available information. Public education assists the communities with problems experienced by floods, hurricanes, tornadoes, thunderstorms, lightning, high winds, and other lower-priority hazards. Educating the public about these life and property-saving techniques must remain a high priority item at the local, state, and federal level and is consistent with the goals of this plan.

Projects identified by the HMSC and HMWG are as follows:

- Develop an *All-Hazards* public education and outreach program for hazard mitigation and preparedness,
- Initiate a public awareness program on local TV/radio for hazard safety,
- Conduct evacuation exercises with and for local Office of Emergency Management (OEM) personnel and private citizens,
- Conduct yearly workshops related to FEMA hazard mitigation grant programs, including the Flood Mitigation Assistance (FMA) Grant Program, Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) Grant Program, Severe Repetitive Loss (SRL) grant program, and Repetitive Flood Claims (RFC) Grant Program, with a focus on those aspects available to private firms and property owners, and
- Through Delaware Emergency Management Agency (DEMA), outreach programs and hazard mitigation workshops educate the public.

FLOOD MITIGATION ACTIONS

Retrofitting structures prone to periodic flooding is an effective mitigation technique to reduce the flood loss of property and is consistent with stated goals. Methods include the elevation of systems, acquisition, mitigation reconstruction, dry flood-proofing, wet flood-proofing, drainage improvements, and installation of generators.

- **Elevation** involves raising a structure on a new foundation so that the lowest floor is above the Base Flood Elevation (BFE). Almost any structure, regardless of type or size, can be elevated.
- **Acquisition of structures** or *buyout* options is the most effective mitigation technique to reduce property loss due to flooding. The owners of repetitive flood loss structures sell their structure to the city on a cost-share basis for the structure's fair market value before the last flood event. The structure is removed/demolished, and a deed restriction is placed on the property for perpetuity, thus eliminating the structure from future flood damage. This approach is most effective when flood-prone structures within the same vicinity are grouped and acquired. The remaining property can be converted into recreational space with minor structure restrictions.

- **Mitigation Reconstruction** is a component of the Severe Repetitive Loss (SRL) grant program that allows the demolition and reconstruction of structures when traditional elevation cannot be implemented. This activity can be used for structures that were substantially damaged or destroyed. This pilot program is utilized mainly on the Gulf Coast but can be considered a potential approach to mitigation activities.
- **Dry flood-proofing** techniques include building floodwalls adjacent to existing walls, installing specialized doors to repel floodwaters, and installing special backflow valves for water and sewer lines. Wet flood-proofing includes low-cost mitigation measures such as raising air conditioners, heat pumps, and water heaters on platforms above the BFE.
- **Wet flood-proofing** includes measures applied to a structure that prevent or provide resistance to damage from flooding while allowing floodwaters to enter the structure or area. Generally, this includes appropriately anchoring the structure, using flood-resistant materials below the BFE, protecting mechanical and utility equipment, and using openings or breakaway walls. The application of wet flood-proofing as a flood protection technique under the NFIP has few enclosures below elevated residential and non-residential structures and accessory and agricultural structures.
- **Drainage** is a time-tested technique to mitigate flood damage that improves the drainage capacity around roads and low-lying areas. Maintenance of drainage canals and laterals is essential to maximize their efficiency and long-term effectiveness. To reduce the effects of flooding, widening, and deepening the earthen canals, cleaning existing ditches, replacing existing culverts, upgrading pumps, and installing check valves and inverts in certain culverts. Maintaining and improving drainage assists the jurisdictions with problems experienced by floods and severe storms.
- **Generators** are another cost-effective retrofitting technique. Many critical facilities may continue to provide necessary services to jurisdictions by delivering power with generators during and after severe storms. In addition, the installation of generators assists a jurisdiction with problems experienced by floods, high wind, powerful hurricanes, earthquakes, and dam failure.

WIND RETROFITTING MITIGATION ACTIONS

Structures can be retrofitted to withstand high winds by installing hurricane shutters, roof tie-downs, and other storm protection features. Protecting the structure's interior and providing stability against wind hazards associated with hurricanes maintain the exterior integrity. In addition, these measures can be relatively inexpensive and straightforward to put in place.

Another retrofitting technique is to bury electric power lines to avoid tree limbs falling on them or wind damage resulting in a break in service to the consumer. In addition, burying electric power lines assists the communities with problems experienced by floods, high winds, and severe storms.

EARLY WARNING SYSTEMS

With sufficient warning of a flood, a community and its residents can take protective measures such as moving personal property, cars, and people out of harm's way. When a flood threat recognition system is combined with an emergency response plan that addresses the jurisdictional flood problems, considerable flood damage can be prevented. This system must be coupled with warning the public, carrying out appropriate tasks, and coordinating the flood response plan with operators of critical facilities.

A comprehensive education and outreach program is critical to the success of early warning systems so that the public, operators of essential facilities, and emergency response personnel will know what actions to take when a warning is disseminated.

Early warning systems assist jurisdictions with problems experienced by floods, high winds, severe storms, dam failure, and other lower-priority hazards.

EARTHQUAKES

While not familiar to the region, significant seismic events pose a potentially significant threat to Sussex County and the surrounding area. The most practical preventative action to be considered concerns appropriate building code enforcement. While this is not necessarily

useful for existing structures except for renovations or reconstruction, some activities can be taken to mitigate further exposure to risk.

For example, one technique is a building retrofit involving reinforced concrete materials combined with cross ties to provide current structures with additional stabilization. Seismic stabilizer platforms for basic or critical mechanicals within buildings will significantly reduce adverse impacts.

DAM AND LEVEE FAILURE

Mitigation for dam and levee failure is often like that which can be done for flooding; however, dam and levee failure can cause catastrophic damage, for which most flood mitigation measures would be ineffective. Some solutions include:

- **Educational Outreach:** Develop and conduct educational outreach programs on the associated risks that proximity to dams and levees presents,
- **Building Codes:** Adopt building codes using a flood protection elevation, which is based on dam or levee failure water levels,
- **Warning Systems:** Install warning systems to prevent loss of life in the event of a dam or levee failure,
- **Land Use:** Avoid construction in areas located within a dam or levee high-velocity inundation zone, and
- **Inundation Studies:** Conduct detailed studies to identify areas, including potential water velocity and height.

WILDFIRE

The following mitigation measures can be applied to those areas of the county designated as wildfire risk zones.

- **Educational Outreach:** Develop and conduct educational outreach programs on wildfire prevention, including training on fire-safe buildings for contractors and homeowners,
- **Retrofitting:** Existing buildings can be retrofitted to reduce their vulnerability to wildfires. Potential measures include covering roof vents with wire mesh to prevent the entry of embers or flaming debris and replacing flammable roof materials such as wood or certain types of shingles. Fire-resistant roofing materials include various tiles, fiberglass shingles, and single-ply membranes,

- **Safety Zones:** Safety zones can be created around structures by reducing or eliminating brush, trees, and vegetation around a home or facility. FEMA recommends using a 30' safety zone, including keeping grass below 2" tall and clearing all fallen leaves and branches promptly, and
- **Fire Breaks:** Roads and trails can serve a dual function as firebreaks. Firebreaks are inflammable materials that create a fuel break and do not allow fires to spread.

COUNTY AND JURISDICTIONAL-SPECIFIC MITIGATION ACTIONS

Strategies for hazard mitigation within Sussex County and the jurisdictions were identified to reduce damage to those areas and conform to the Code of Federal Regulations requirements. The mitigation action tables found in the **jurisdiction-specific annexes** indicate the specific mitigation actions on a community-by-community basis, including the rankings assigned to the projects by the jurisdictions.

Each participating jurisdiction in Sussex County identified mitigation actions and programs based on the risk assessment **(Section 4)** and capabilities assessment **(Section 5)**. These are detailed in specific annex tables. In all cases, these actions support the plan's goals, i.e., pursue mitigation projects including repetitive and severe repetitive loss properties and other appropriate hazard mitigation projects, programs, and activities.

7. PLAN MAINTENANCE

Requirement §201.6(c)(4)(i): [The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle

Requirement §201.6(c)(4)(ii): [The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Requirement §201.6(c)(4)(iii): [The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.

MONITORING OF THE PLAN

The Director of the Emergency Operations Center will monitor the Plan for several related purposes:

- Maintain and update hazard and risk information,
- Ensure that mitigation projects and actions reflect the priorities of Sussex County and jurisdictional stakeholders,
- Comply with Federal Emergency Management Agency (FEMA) and the State of Delaware requirements for plan maintenance, and
- Maintain Sussex County's eligibility for federal disaster assistance and mitigation grants.

The Director will continuously monitor the Plan for the purposes noted above, according to the schedule described in Schedule for Monitoring the Plan and the update triggers indicated in the Method and Schedule for Updating the Plan section below. Specifically, monitoring activities will consist of:

- Soliciting and reviewing reports from participating jurisdictions regarding the implementation status of action items from the Plan. Status reports will indicate if projects have been:
- Scoped and documented for FEMA grant applications
- Submitted for FEMA funding programs
- Approved (or denied approval) for FEMA funding
- Documented for funding by other means (e.g., jurisdictional capital improvement plans)
- Funded (or not approved for funding) by other means
- Tracking the progress of improved or revised data sources for use in subsequent Plan updates on an annual (at a minimum) basis.
- We are preparing a report on the implementation status of action items from the Plan and the availability of improved or revised data. The information will include recommendations to the Hazard Mitigation Working Group regarding the need and advantages of undertaking updates to all or part of the Plan before the five-year required update (see Method and Schedule for Updating the Plan).

SCHEDULE

Informal Plan monitoring activities will be ongoing. In addition to the FEMA mandated five-year update cycle, the Director, or their designee (Coordinator) will perform monitoring activities for the Plan as described in Method for Monitoring the Plan every six months, or more often as circumstances require.

In addition to the scheduled reports, the Coordinator will convene meetings after damage-causing natural hazard events to review the effects of such events. Adjustments to the mitigation priorities identified in Section 6 may be made based on those effects or additional event-specific actions.

METHOD AND SCHEDULE FOR EVALUATION AND UPDATING THE PLAN

[**Note to Reviewers**: The missing dates in this Section will be provided once these events have occurred]

Comprehensive evaluation of and updates to this Plan will be undertaken on a five-year cycle. This Plan was adopted on [Insert Date], and thus must undergo a formal FEMA-compliant update process by [Insert Date + 5 years]. Approximately one year prior to the five-year anniversary of this Plan adoption or sooner, if circumstances require, the Director will initiatea comprehensive review of the Plan with particular attention to FEMA guidance.

The criteria to be used in this evaluation include (but are not limited to) the following:

- Assessing whether goals and objectives in the Plan address current and expected conditions
- Determining if there are any changes in risk factors and/or data that would be relevant to hazards in Sussex County
- Determining if capabilities have changed relative to the County and jurisdictions'ability to plan and implement hazard mitigation projects,
- Determining if significant changes have occurred in the availability of funding at federaland state levels to support hazard mitigation planning and implementation, and
- Results in implementing the Plan per monitoring reports.

The Director will prepare a report (1) describing the updated requirements; (2) summarizing the staff evaluation of the Plan, highlighting areas that require updating and explaining the reasons why the updates are needed, and (3) providing detailed recommendations about how the Plan should be updated, noting any technical work that may be required.

The report will sequentially be provided to the Sussex County Hazard Mitigation Working Group (HMWG) and Sussex County Council (Council) for consideration. The notice will also be posted on the County website for public review and comment.

The Sussex County HMWG and the Sussex County Council will review the report and recommendations and advise the Director on proceeding with the individual suggestions for the updates. The Director will initiate activities to carry out the directions and prepare draft updates to the Plan on a schedule that cooperates with the Sussex County HMWG and the Council.

When the draft updates are completed, the Sussex County HMWG will be convened to conduct a comprehensive evaluation and revision. The Sussex County HMWG and Director will produce a final draft of the updated Plan for consideration by the Council. The Council will review the updated Plan, indicate any desired changes, and approve and adopt the Plan insufficient time to meet FEMA requirements.

PLAN AMENDMENT PROCESS

Upon the initiation of the amendment process, Sussex County and its jurisdictions will forward information on the proposed change to all interested parties, including, but not limited to, all affected County and jurisdictional departments, residents, and businesses. In addition, information will also be forwarded to DEMA. This information will be disseminated to seek input on the proposed amendment for not less than a 45-day review and comment period. If no comments are received from the reviewing parties within the specified review period, such will be noted accordingly.

At the end of the 45-day review and comment period, the proposed amendment and all comments will be forwarded to the Hazard Mitigation Working Group for consideration. The HMWG reviewed the proposed amendment and the comments received from other parties and submitted a recommendation to the appropriate governing body within 60 days.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered:

- Errors or omissions made in the identification of issues or needs during the preparation of the Plan,
- New problems or requirements have been identified which were not adequately addressed in the Plan, and
- Changes in information, data, or assumptions from those on which the Plan was based.

Upon receiving the coordinator's recommendation and the HMWG, the governing body will hold a public hearing. The governing body will review the submission (including the above factors) and any oral or written comments received at the public hearing. Following that review, the governing body will take one of the following actions:

- Adopt the proposed amendment as presented,
- Adopt the proposed amendment with modifications,
- Refer the amendments request back to the designee for further consideration, or
- Defer the amendment request for further review and hearing

UPDATE IMPLEMENTATION

Each jurisdiction participating in this Plan is responsible for implementing specific mitigation actions prescribed in their locally adopted mitigation plan. In the Mitigation Action Plan, each proposed action is assigned to a particular local department or jurisdiction to increase accountability and the likelihood of implementation. This approach enables individual jurisdictions to update their unique mitigation strategy as needed without altering the broader focus of the countywide plan elements. The separate adoption of locally specific actions also ensures that each jurisdiction is not held responsible for the actions of every other jurisdiction involved in the planning process.

Each jurisdiction shall develop an updated implementation schedule as part of their local Mitigation Action Plan.

Sussex County and its jurisdictions will seek outside funding to implement mitigation projects. A funding source has been identified for proposed actions listed in the Mitigation Action Plan whenever possible.

It will be up to each participating jurisdiction to determine additional implementation procedures beyond their Mitigation Action Plan, including integrating the requirements of the All-Hazard Mitigation Plan into other planning documents, processes, or mechanisms, such as comprehensive or capital improvement plans, when appropriate.

OTHER LOCAL PLANNING MECHANISMS

It should be noted that Sussex County has limited land use planning and zoning authority, so the County has few opportunities to incorporate this Plan into other local mechanisms, such as zoning and subdivision ordinances or comprehensive land use plans. However, SCEOC will work with individual jurisdictions to include the Plan's recommendations in local comprehensive planning and capital improvement programs.

Participating jurisdictions in this Plan will work to incorporate the goals into the next update of relevant plans and regulations, including comprehensive plans, zoning codes, and capital improvement plans.

CONTINUED PUBLIC INVOLVEMENT

Efforts to obtain public input were an integral part of the Plan Update and will continue to be essential as this Plan changes over time. As is the case with any officially adopted plan or ordinance, significant changes to this Plan shall require a public hearing.

As necessary, other efforts to involve the public in the maintenance, evaluation, and revision process will be made. These efforts may include:

- Advertising meetings of the Hazard Mitigation Working Group in the local newspaper, public bulletin boards, and City and county office buildings,
- Utilizing local media to update the public of any maintenance and periodic review activities taking place,
- Utilizing City and County Web sites to advertise any maintenance and periodic review activities taking place, and
- Keeping copies of updated plans in Public Libraries

APPENDIX A: JURISDICTIONAL MITIGATION ASSESSMENT

SUSSEX COUNTY

General Profile

a. Sussex County is the largest County in Delaware encompassing 1,196 square miles.

b. Most of Delaware beaches are in the eastern portion of the state. Adjacent Counties are Kent County Delaware to the north, Cape May County New Jersey to the northeast, Worcester County Maryland to the south, Dorchester County Maryland to the southwest, Wicomico County Maryland to the southwest, and Caroline County Maryland to the northwest.

c. According to the 2022 Census, the County population is 248,733 residents.

d. There are three major north south highways within Sussex; US Route 13 in the west, US Route 113 in the middle, and State Route 1 along the coast.

e. Agriculture and commercial fishing drive Sussex County. The predominant economic driver in the state is agriculture with the largest poultry production within the United States. Most of the land is rural and there are but a few large population centers.

Unincorporated Land Areas such as Mallard Lakes, an unincorporated area of the county, have expressed a concern via public comment regarding the repair of the flooding of 4 units within the development boundaries.

There is evidence of flooding and substantial impact from events such as Hurricane Sandy. However, efforts to secure Hazard mitigation assistance previously have not been successful.It is recommended that the County work with the Homeowners Association in securing funding to conduct a study of the repetitive flooding concerns and what measures can betaken by the homeowner’s association to mitigate potential harm. This potential mitigation action is included within the Sussex County Mitigation Strategy section of the plan update.

Top Hazards

a. Flooding

b. Tidal flooding (Downtown)

c. Heavy winds and severe coastal storms

d. Winter storms

e. Extreme heat/cold

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Sussex County	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X

Building Codes:

a. 2012 IRC/IBC (Sussex County)

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		2018	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		10/6/1976	
CRS Communities	CRS Entry Date	N/A	CRS Class:	N/A

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	M	M	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
Assigned to jurisdictions	Pending updated data		
Severe Repetitive Loss Properties			
Assigned to jurisdictions	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Improve the County's Community Rating System rating. Review and update community plans and ordinances and incorporate updated information into the CRS update.	Yes	High	Short-term	Ongoing	Pending study	FMA, HMGP, PDM
Assist residents with compliance with building codes requiring residents to elevate manufactured housing located on the coast to above the base flood elevation (BFE).	Yes	High	Ongoing	Ongoing	Pending study	FMA, HMGP, PDM
Work with homeowners to identify ways to elevate flood-prone structures.	Yes	High	Ongoing	Ongoing	Pending study	FMA, HMGP, PDM

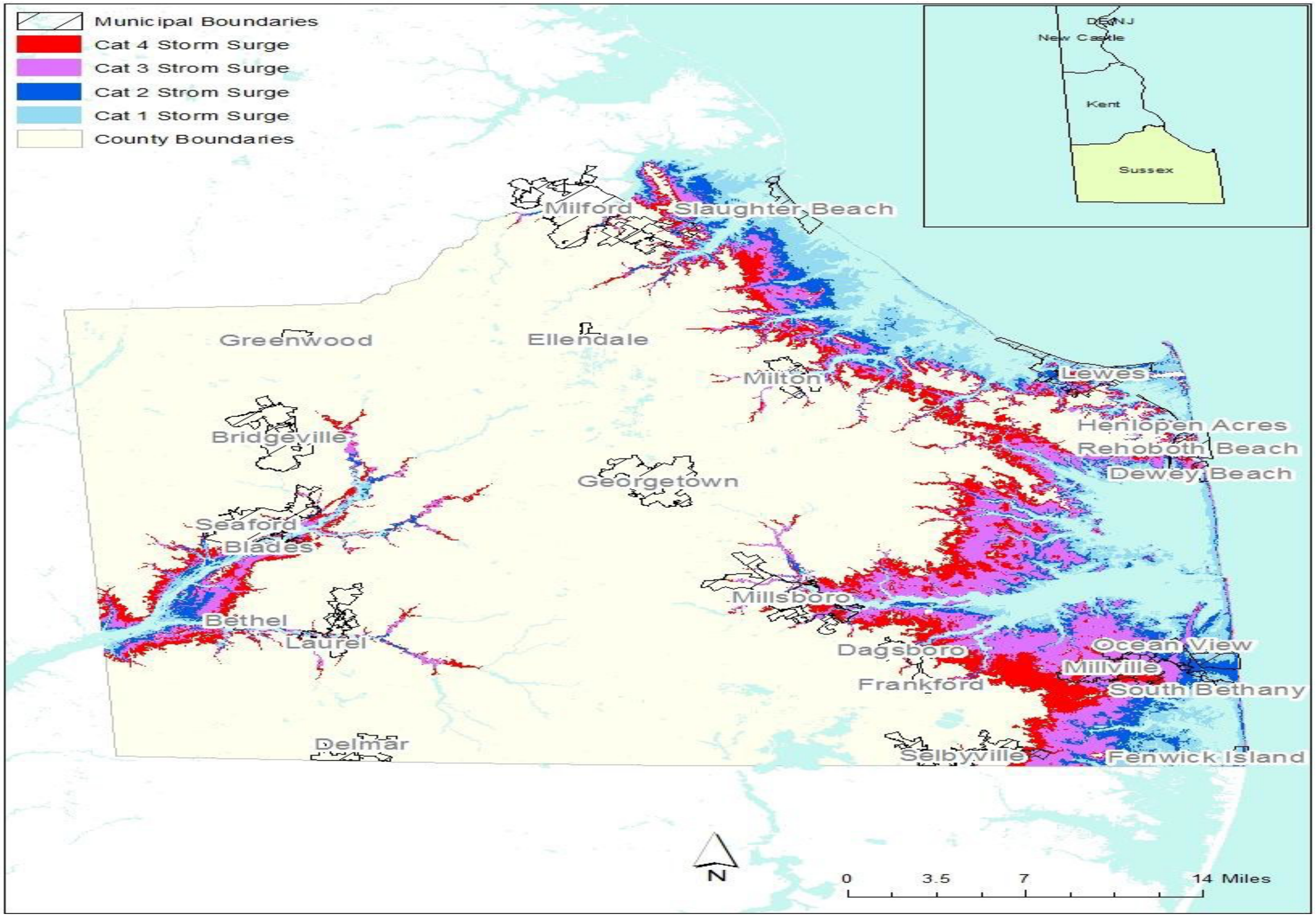
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Improve educational awareness through better notifications, training, and properly marked flood evacuation routes.	Yes	High	Short-term	Ongoing	Pending study	FMA, HMGP, PDM
Distribute disaster preparedness and hazard mitigation-related information using brochures and website link.	Yes	Moderate	Ongoing	Ongoing	$1200.00	FMA, HMGP, PDM, CDBG
Work with DelDOT to install storm drain of culvert on 1100 Block of South Bayshore Drive in Broadkill Beach.	Yes	High	Short-term	Not started	Pending study	FMA, HMGP, PDM
Work with DNREC and DelDOT to endorse Federally funded restoration projects to restore portions of the Sussex County coastline that are experiencing significant coastal erosion, both from rising sea levels and coastal storms.	No	Moderate	Ongoing	Ongoing	Pending study	FMA, HMGP, PDM, PS
Conduct a study to identify stormwater management systems that need to be retrofitted and channels that need to be improved to reduce flooding throughout the County.	No	Moderate	Short-term	Pending County property inventory	Pending study	FMA, HMGP, PDM

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Work with DelDOT to identify possible elevation alternatives for the rebuilding of SR 38 (Prime Hook Road).	No	Moderate	Short-term	Completed	$1.45 M	HMGP, CDBG, PS
Improve the County's Community Rating System rating. Review and update community plans and ordinances and incorporate updated information into the CRS update.	Yes	High	Short-term	Ongoing	Pending study	FMA, HMGP, PDM

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
3 Repetitive Loss Property Elevations Deemed not financially practical	Yes	High	Ongoing	Ongoing	$300,000	HMGP

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Support additional Flood Management Study and/or Potential Elevations in the Mallard Lakes area.	No	High	Short term	Pending grant funding	$2M	FMA, HMGP, PDM
Building inventory data (Assessment)	No	Medium	Ongoing		Pending study	Local

MALLARD Study completed but not eligible for grant funding.


Municipal Boundaries
Cat 4 Storm Surge
Cat 3 Strom Surge
Cat 2 Strom Surge
Cat 1 Storm Surge
County Boundaries
DE NJ
New Castle
Kent
Sussex
Milford
Slaughter Beach
Greenwood
Ellendale
Milton
Lewes
Bridgeville
Henlopen Acres
Rehoboth Beach
Dewey Beach
Georgetown
Seaford
Blades
Millsboro
Bethel
Laurel
Dagsboro
Ocean View
Millville
Frankford
South Bethany
Delmar
Selbyville
Fenwick Island
N
0 3.5 7 14 Miles

BETHANY BEACH

General Profile

a. Size: The Town of Bethany Beach is encompassing 1.2 square miles.

b 2020 Census: 1317 but will see over 20,000 during Memorial Day through Labor Day.

c Major Economy: Tourism, vacation industry, agriculture, and commercial fishing.

Top Hazards

a. Flooding

b. Tidal flooding (Downtown)

c. Heavy winds and severe coastal storms

d. Winter storms

e. Extreme heat/cold

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Bethany Beach	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X

Building Codes

- Not sure what building codes using
- Enforced locally

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	2017		
BCEGS Grades	BCEGS Grade	Declined		
NFIP Participation	NFIP Entry Date			
CRS Communities	CRS Entry Date	5/1/09	CRS Class:	8

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	M	M	M

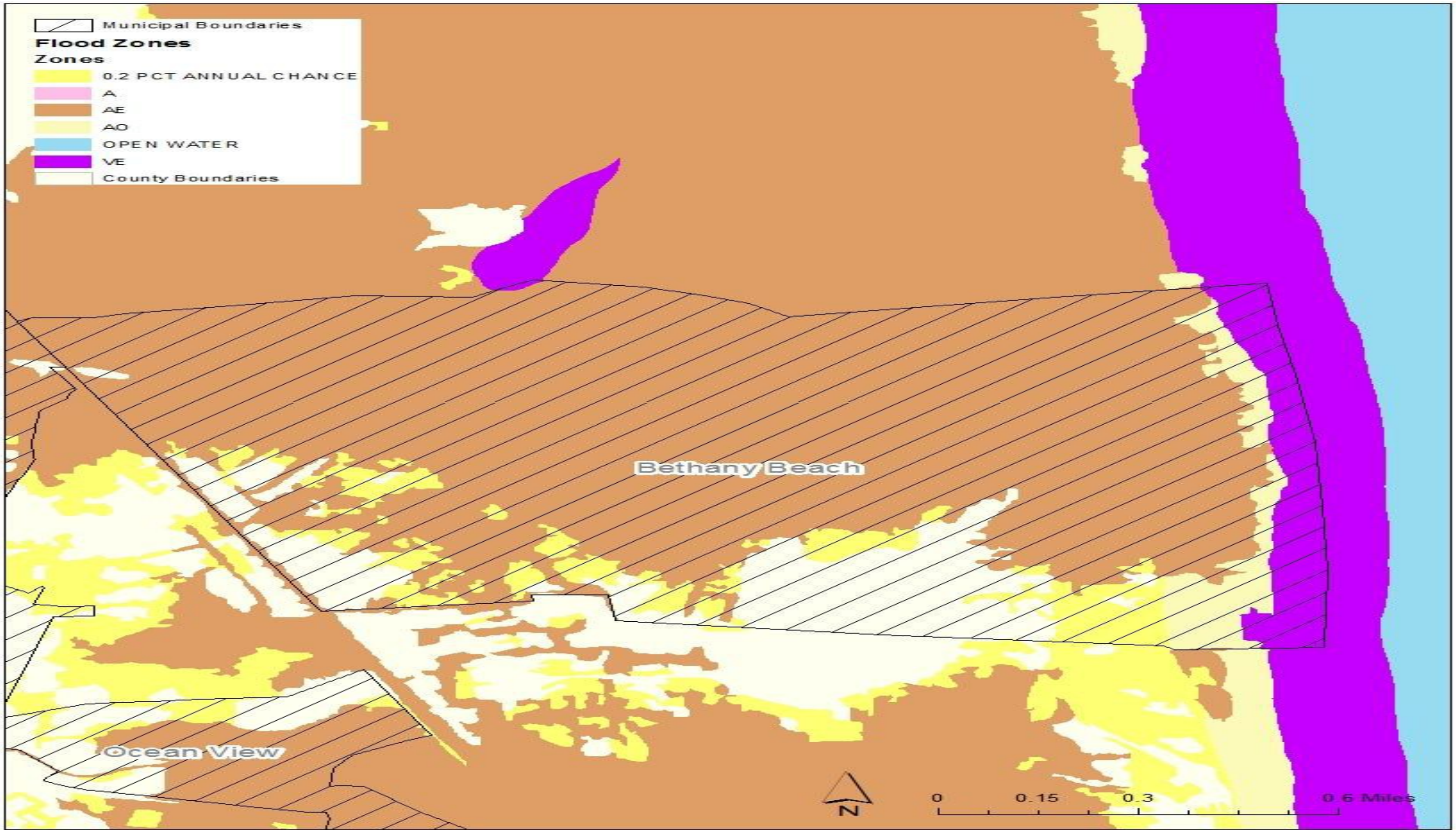
NFIP Registered Repetitive Loss Properties

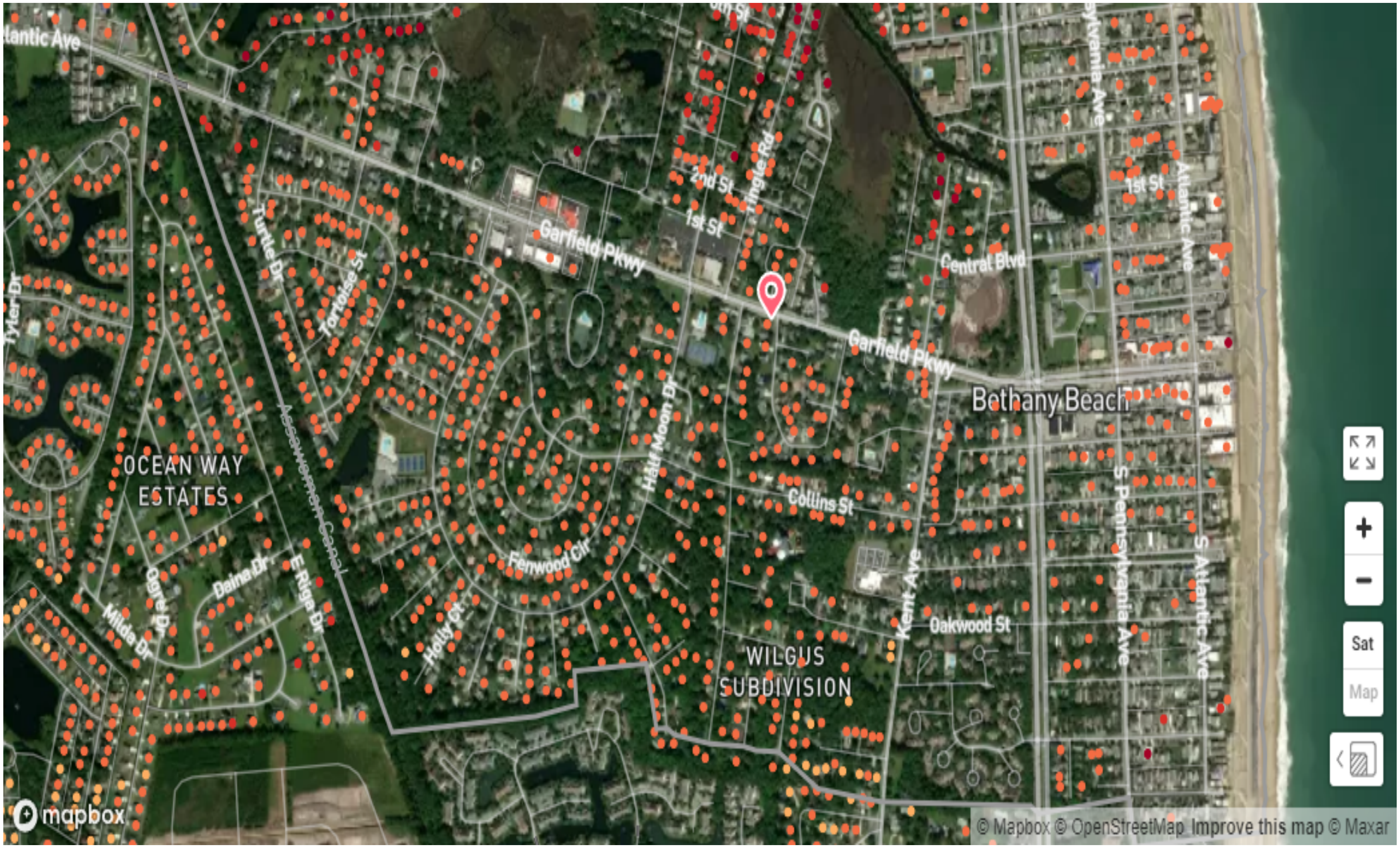
	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	NA		
Severe Repetitive Loss Properties			
	1	7	$394,376
	1	5	$110,440

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Improve existing drainage system throughout the town, particularly east of Route 1 and include a plan maintenance schedule.	Yes	High	Long term	Ongoing	$3.5M	HMGP, FMA, PDM, PS
Continue to educate residents and improve public awareness on being better prepared to face hazards.	Yes	High	Shortterm	Ongoing	$1000,000	HMGP, FMA, PDM, PS, CDBG

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Storm water runoff on Pennsylvania Ave from Garfield to 5th	No	High	Shortterm	Pending funding source	$250,000	HMGP
Storm water management at 8th Street and Evans Ave	No	High	Shortterm	Pending funding source	$250,000	MGP
Create 2 new outfalls leading from large ditch that runs from Route 26 behind Lake Bethany to the marsh and install	No	High	Shortterm	Pending funding	Pending study	HMGP, FMA, PDM,

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
flap gates.				source		PS
Conduct Phase 2 of Bethany West drainage improvements. Replace and upgrade existing storm-water system between Collins Street and Tudor Court along Halfmoon Drive including Tudor Court, Sandstone Court, and Pebble Court	No	High	Shortterm	Pending funding source	Pending study	HMGP, FMA, PDM, PS
Conduct Phase 3 of Bethany West drainage improvements. Replace and upgrade existing storm-water facilities at West Side Development, enlarge outfall, replace driveway culverts, replace old pipe systems, re-grade ditches.	No	High	Shortterm	Pending Funding source	Pending study	HMGP, FMA, PDM, PS
Consider installing steel dam for Loop and Assawoman Canal to protect against incoming tide waters.	Yes	Moderate	Shortterm	Delayed due to funding.	Pending study	HMGP, FMA, BRIC, PS
GIS Mapping of hazards and critical infrastructure. E.g., Stormwater Drainage systems and flows.	No	Moderate	Long Term	Pending Funding Source	Pending study	DNREC


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Bethany Beach
Ocean View
N
0
0.15
0.3
0.6 Miles


Garfield Pkwy
Central Blvd
Bethany Beach
OCEAN WAY
ESTATES
Collins St
Fenwood Cir
Kent Ave
Oakwood St
WILGUS
SUBDIVISION
Hall Moon Dr
Turtle Dr
Tortoise St
Assawoman Canal
Daina Dr
E Riga Dr
Holly Ct
Milda Dr
2nd St
1st St
S Pennsylvania Ave
S Atlantic Ave
Atlantic Ave
Sat
Map
mapbox
© Mapbox © OpenStreetMap Improve this map © Maxar

TOWN OF BLADES

General Profile

a Size: The Town of Blades encompasses 0.4 square miles.

b 2020 Census: 1,538

c Major Economy: Tourism and summer vacation

Top Hazards

a. Coastal Storms
b. Flooding
c. Winter storms
d. Extreme heat/cold

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Town of Blades			X			X			X					X	X	X	X		X

Building Codes

- 2012 IRC/IBC (Sussex County)

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	Update under revision
BCEGS Grades	BCEGS Grade	Declined

NFIP Participation	NFIP Entry Date		1/16/81	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	L	L	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						

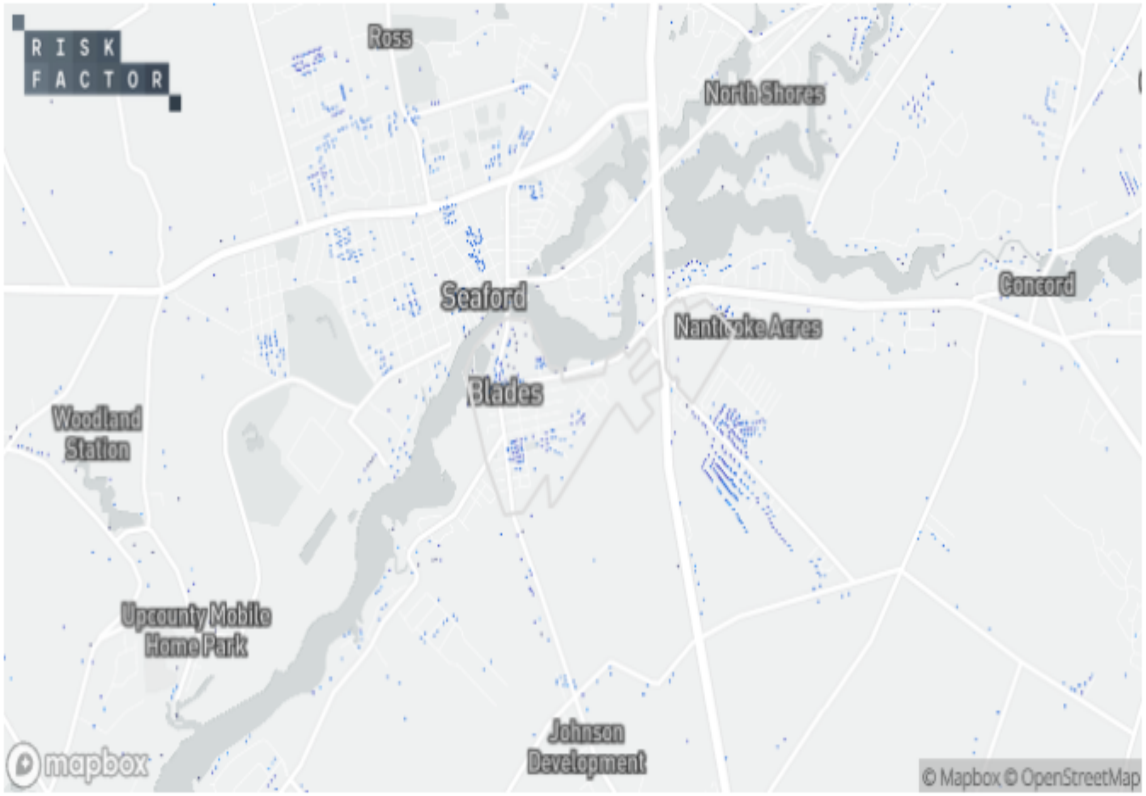
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Upgrade stormwater drainage systems with existing underground pipes and outfall areas to help prevent future flooding.	Yes	High	When funds become available	Delayed	Pending study	HMGP, FMA, BRIC, DNREC
Install new storm drains in strategic areas to allow removal of standing water during storms.	Yes	High	When funds become available	Delayed	$2M	HMGP, FMA, BRIC, DNREC

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Blades storm water Management Project: 5 Phase study completed	Yes	High	Short term	N/A	Completed	N/A

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions For Consideration						
Storm water management upgrade: Enlarged and improved culverts West 3rd Street (150 ft)	No	High	Short term	Pending funding source	$75,000	HMGP, FMA, BRIC, DNREC

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Storm water management upgrade: East 2nd St - East 3rd street - culvert expansion and upgrade (150ft)	No	High	Short term	Pending funding source	Pending study	HMGP, FMA, BRIC, DNREC
Storm water management upgrade: Enforcement of building and zoning codes in support of new construction (Fire House)	No	High	Short term	Completed	Pending study	Fire Company
Storm water management upgrade: Market Street Stormwater system upgrade	No	High	Short term	Pending funding source	Pending study	HMGP, FMA, BRIC, DNREC
Blades storm water Management Project: Phase I - upgrade to culvert along Holloway Street and West 2nd Street, West High Street	Yes	High	Short term	Pending funding source	Pending study	HMGP, FMA, BRIC, DNREC
Blades storm water Management Project: Phases 2 thru 5 are pending funding	No	High	Short term	Pending funding source	Pending study	HMGP, FMA, BRIC, DNREC
Comprehensive stormwater management study	No	High	Short Term	Pending	Pending study	HMGP, BRIC, DNREC


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Seaford
Blades
N
0
0.375
0.75
1.5 Miles



View additional community impacts with Risk Factor Pro™.

Blades Flood Risk

Residential **Moderate Risk**
82 out of 425 homes

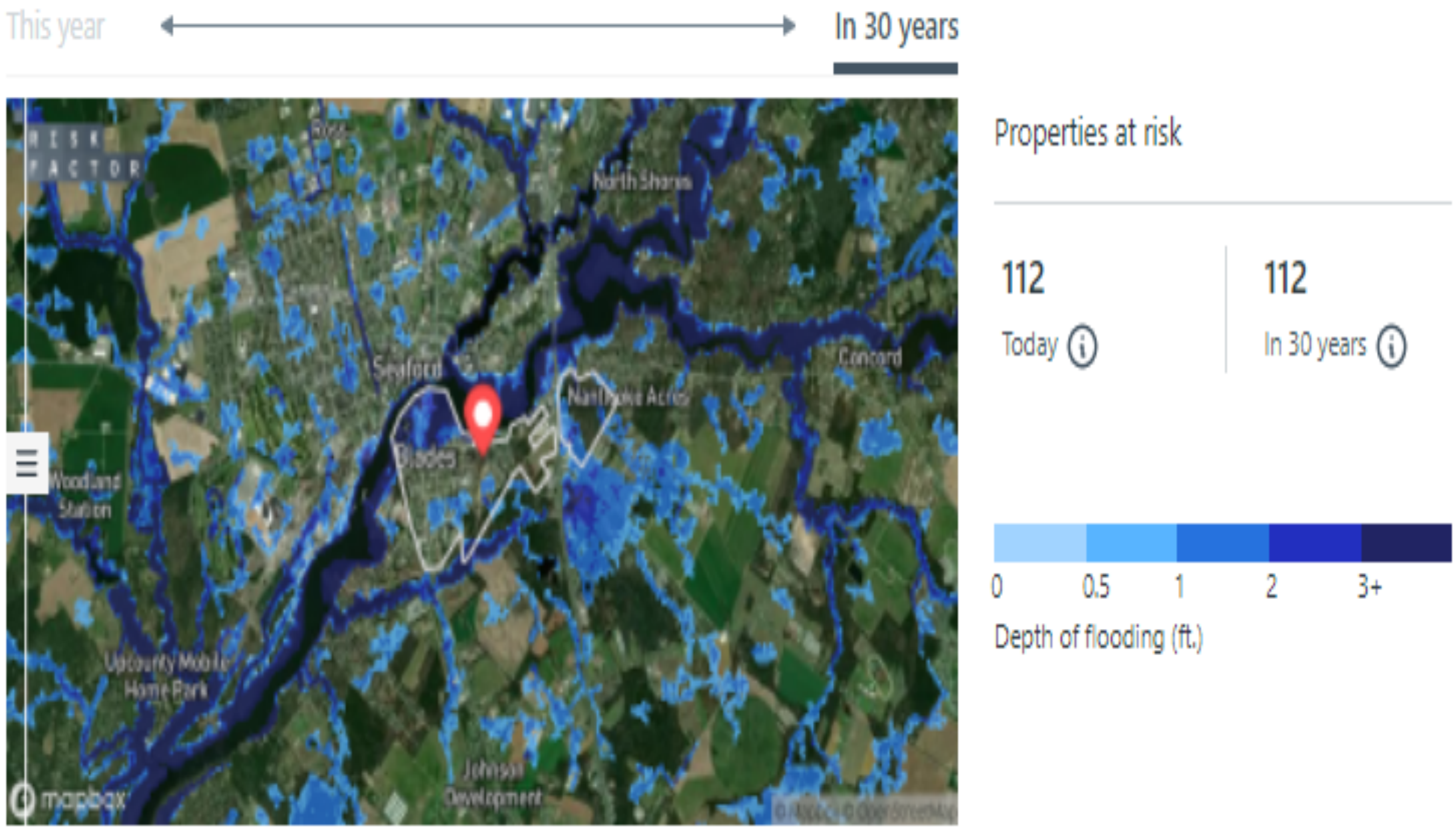
Road **Minor Risk**
3 out of 10 miles of roads

Commercial **Major Risk**
15 out of 32 commercial properties

Critical Infrastructure **Minimal Risk**
0 out of 2 infrastructure facilities

Social Facilities **Minor Risk**
1 out of 2 social facilities

Minimal Minor Moderate Major Severe Extreme


This year
In 30 years
Properties at risk
112
Today
112
In 30 years
0
0.5
1
2
3+
Depth of flooding (ft.)
RISK FACTOR
North Shores
Seaford
Concord
Blades
Woodland Station
Johnson Development
mapbox

TOWN OF BRIDGEVILLE

General Profile

a. Size: Roughly 1 square mile

b 2020 Census: 2504. Can swell to 16,000 during summer season and Apple Scrapple Festival

c Major Economy: Agricultural, Manufacturing, large retirement community (2000 homes when completed), and home-based businesses

Top Hazards

a. Extreme wind
b. Winter storms
c. Down power lines

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Bridgeville	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X		X

Building Codes:

a. 2012 IRC/IBC (Sussex County)

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	2018		
BCEGS Grades	BCEGS Grade	8		
NFIP Participation	NFIP Entry Date	1/7/77		
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	M	L	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Purchase mobile surveillance cameras for town use - protection of city own buildings/	No	High	Short term	Grant Awarded	$33,000	HSGP
Construction of new police department building next to current Town Hall	Yes	High	Short term	Completed 2019	Pending study	CDBG
Security fence at well-house and lift station (wastewater County took over) Heritage Shores	No	High	Short term	Completed	$50,000	HSGP

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions For Consideration						
Storm water management plan development with replacement timeline	No	High	Short term	Pending funding	$150,000	HMGP, FMA, PDM


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Bridgeville
N
0 0.325 0.65 1.3 Miles

TOWN OF DELMAR

General Profile

a. Sever wind related events

b. Size: The Town of Delmar is located on the Delaware and Maryland state border and encompasses 1 square mile. The Town of Delmar has two functioning governments that are managed by one Town Manager.

c. 2020 Census: Delaware: 1927 Maryland: 3732 for combined 5659

d. Major Economy: Unknown

Top Hazards

a. Sever wind related events

b. Winter storms

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Town of Delmar	X		X			X	X		X		X			X	X	X	X		X

Building Codes:

a. 2012 ICC

b. Town issues permits, inspections, and enforcement

Significant indicators for a local jurisdiction's ability to implement A MITIGATION strategy

Comprehensive Plan Update	Plan Status:	2020		
BCEGS Grades	BCEGS Grade	Not Evaluated		
NFIP Participation	NFIP Entry Date	NA		
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	L	L	L

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Conduct a vulnerability assessment of wastewater and stormwater management systems throughout the town.	Yes	High	3-5 years	Completed	$10,000	N/A
Develop an Emergency Operations Plan to include identifying additional local hazards.	Yes	High	12-24 months	Completed	$2,000	N/A

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Develop a disaster recovery plan	No	Medium	Short term	Pending Funding	$2,000	CDBG, HSGP
Community outreach program development to include web-based preparedness.		Medium	Short term	Ongoing	$2,500	HMGP, FMA, PDM, CDBG
GPS tracking for snow removal vehicles	No	Low	Short term	Pending Funding	$3.500	CDBG, HSGP, PS
Stormwater management efforts to mitigate overland flooding along roadways which mitigates inundation in residential	No	Low	Long term	Pending Funding	$1.3M	

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
E. Jewel, and E. Grove Streets from N. 6th						

Deeper floods from major events, like hurricanes, are less likely to occur, but affect more properties than more shallow flood events, like heavy rains. As Delmar feels the effects of a changing environment, however, events of all kinds will affect more properties within the community.

If a low-likelihood storm resulting in severe flooding (a 1-in-100 year flood event), occurred today, it could affect **144** properties in **Delmar**. This type of event has a 26% chance of occurring at least once over the life of a 30 year mortgage. 30 years from now, an event of this same likelihood would affect **157** properties due to a changing environment.

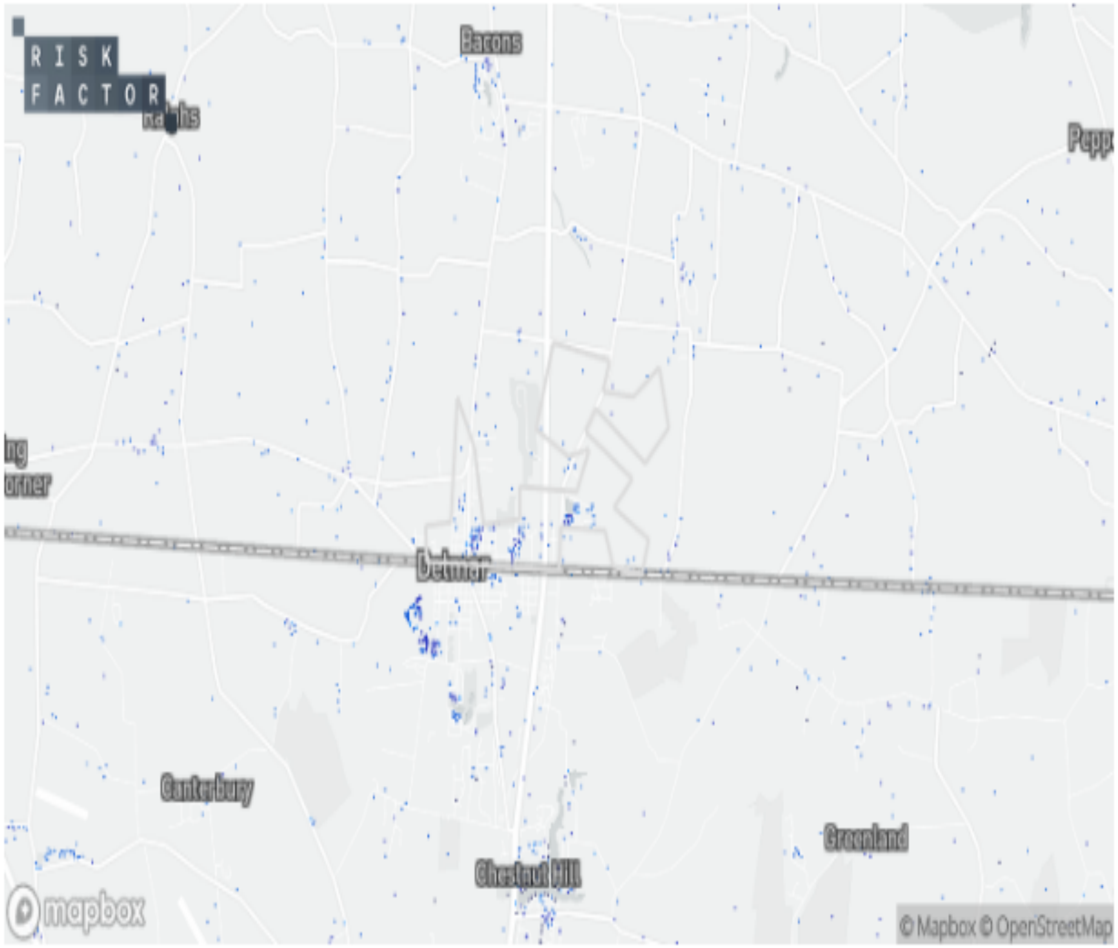
This year ↔ **In 30 years**

Properties at risk

144 Today

157 In 30 years

0 0.5 1 2 3+
Depth of flooding (ft.)



View additional community impacts with Risk Factor Pro™.

Delmar Flood Risk

Residential **Minor Risk**

163 out of 527 homes

Road **Minor Risk**

8 out of 25 miles of roads

Commercial **Minor Risk**

12 out of 63 commercial properties

Critical Infrastructure **Minimal Risk**

0 out of 1 infrastructure facilities

Social Facilities **Minimal Risk**

0 out of 3 social facilities

Minimal Minor Moderate Major Severe Extreme

TOWN OF DEWEY BEACH

General Profile

a. Town of Dewey Beach is a coastal town that encompassed 0,3 square miles
b 2020 Census, the population of the Town of Dewey Beach is 424
c Economy centers on the tourism and vacation industry.

Top Hazards

a. flooding
b. wind related events and
c. winter storms
d. extreme heat / cold

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Dewey Beach			X		X	X	X				P	X		X	X	X	X	X	X

P=Pending

Codes

a. 2012 IRC/IBC Sussex County

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		2021	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		6/18/82	
CRS Communities	CRS Entry Date	10/1/94	CRS Class:	9 (2022)

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	H	H	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Severe Repetitive Loss Properties			
	1	**5**	**$211,718**
	1	**4**	**$64,997**
	1	**4**	**$84,004**

Issues

a. RL 30 RL over 10 years old. Last claim sept 2006 Other residence $15,555.90

b. Reed Avenue? Claim about 5 years ago?

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Develop a Disaster Warning System to notify the community of an impending disaster.	No	High	Short term	Website upgrade	$6300	Own Sources
Consider reconstructing the Rehoboth Bay shoreline which has been eroded due to heavy flooding from seawater and drainage from Nor' Easter storms. Inland Bays Street Beach Land Restoration	No	Moderate	Short term	Not started	$1M	HMGP, FMA,PDM, USACE
Prepare and stock handouts of what to do in case of a disaster.	No	High	Short term	Not started	$1,500	HMGP, FMA, PDM, CDBG
Prepare an update to the Town's Emergency Operation Plan.	No	High	Short term	Not started	$25,000	CDBG, HSGP

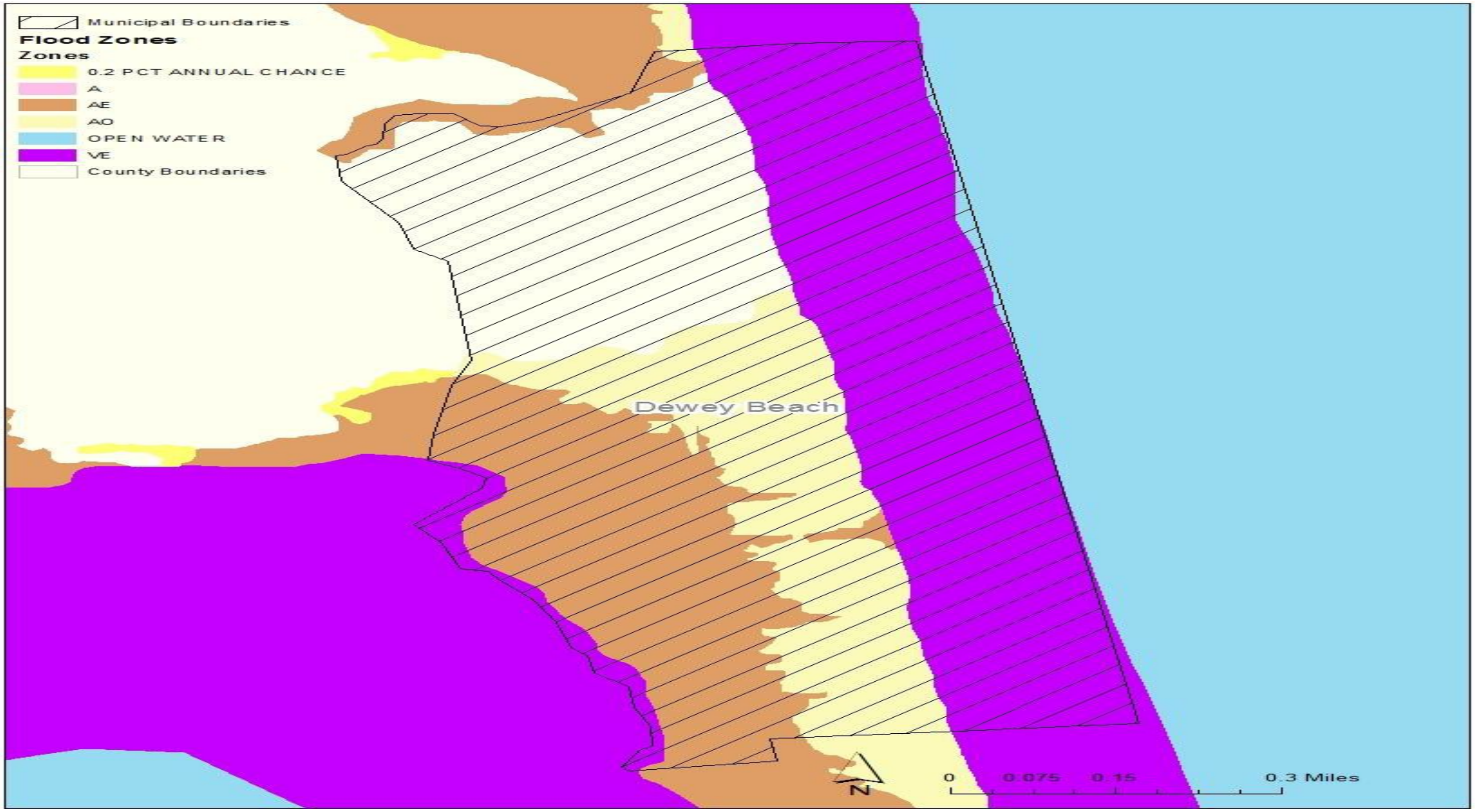
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Pump station instillation Byard and Belview.	Yes	High	High	Completed	1M+	Town
Enter for Inland Bays Street Beach land Restoration. New outfall Reed Street, relining, upgraded duckbill valves	No			Ongoing	$480,000 approved	ARPA, EDA

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Residential Elevation Program				Pending up to 5 feet per	$50,000 to $75,000 per	FEMA, BRIC, Homeowner

Issues

a. Main concern is stormwater and infrastructure management Infrastructure fund in place.

b. Elevation of repetitive loss structures


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Dewey Beach
N
0
0.075
0.15
0.3 Miles

TOWN OF ELLENDALE

General Profile

a. Size: Gateway to Delaware's Resort Beaches and encompasses 0.3 square miles

b 2020 Census: 487

c Major Economy: Rail hub and health care

d Government size: President Council, Police Chief, P/T maintenance worker and 5 nonpaid elected officials

Top Hazards

a. Flooding
b. Severe wind
c. Winter storms
d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Ellendale				X					X					X	X				X

Codes:

a. Sussex County

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	2022		
BCEGS Grades	BCEGS Grade	8		
NFIP Participation	NFIP Entry Date	NA		
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	L	L	L

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

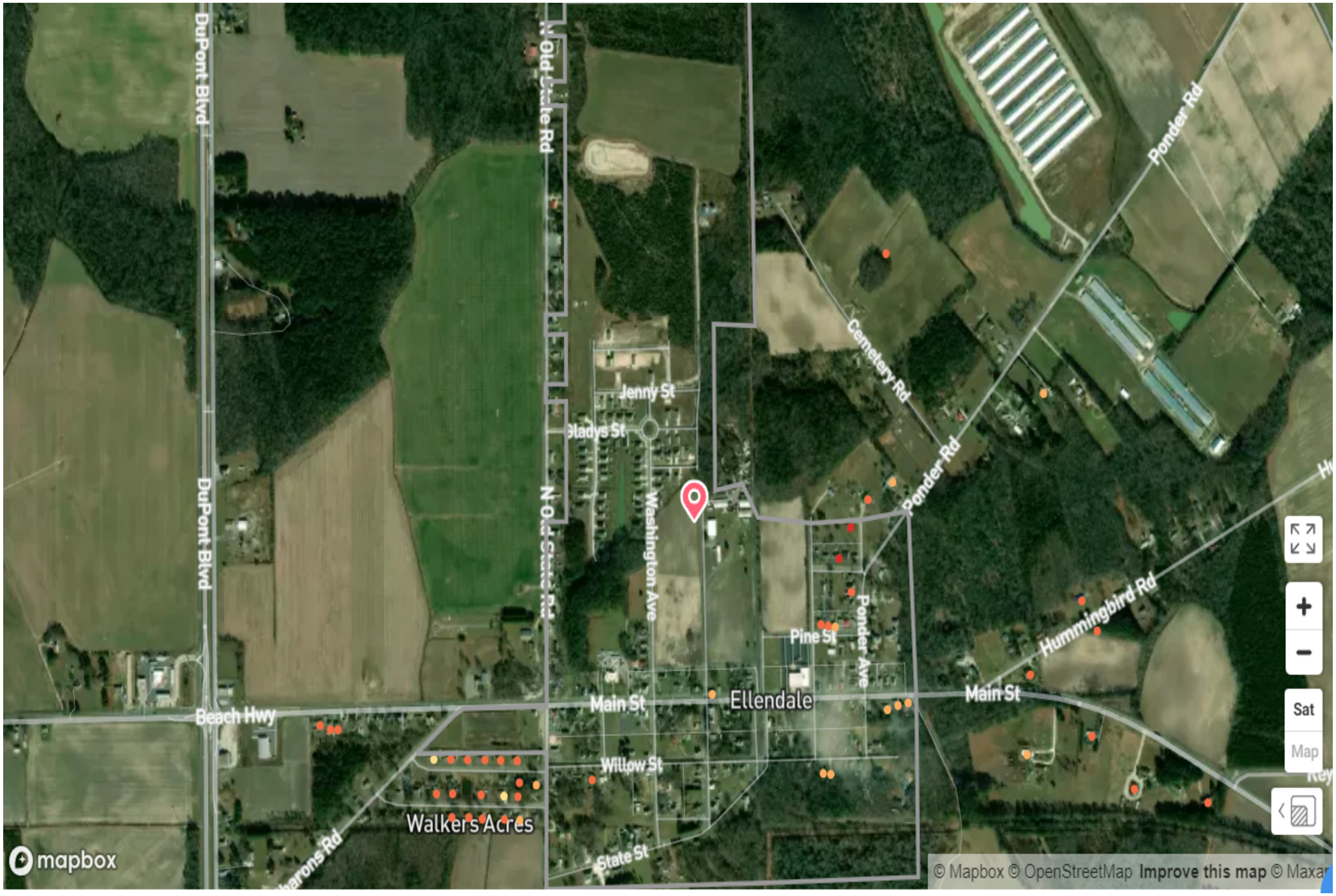
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Evaluate the Town's storm drainage systems to identify problem areas.	No	High	Short term	Pending funding source	$20,000	HMGP, BRIC, DNREC
Continue to educate residents and improve public awareness on being better prepared to face hazards.	No	High	Ongoing	Not started	$1,000	Self-funding

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Centralized water system to include hydrants Well Water documented to contain contaminants such as benzine, etc.	No	High	Long Term	Pending Funding	Unknown	PS, HMEPG DNREC, Rural USDA
Curbs/streetscape to assist with stormwater flow away from residential structures	No	High	Long Term	Pending Funding	Unknown	DelDOT, HMGP,

Issues

a. Well Water documented to contain contaminants such as benzine, etc.


DuPont Blvd
N Old State Rd
Ponder Rd
Cemetery Rd
Jenny St
Washington Ave
Pine St
Ponder Ave
Hummingbird Rd
Main St
Ellendale
Beach Hwy
Willow St
Walkers Acres
State St
mapbox
Sat
Map
© Mapbox © OpenStreetMap Improve this map © Maxar

TOWN OF FENWICK ISLAND

General Profile

a. Size: directly across from Ocean City Maryland and encompasses 0.5 square miles

b. The town does not sit on a barrier island but on a narrow peninsula whichresembles a barrier island.

c. 2020 Census: 472 with 5,000 during summer months

d. Major Economy: Tourism, vacation, small commercial district

e. Entire town in floodplain special hazard area

Top Hazards

a. Flooding

b. Severe winds

c. Winter storms

d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Fenwick Island	X		X	X	X	X			X		X	X		X	X	X	X	X	X

building Codes

a. Sussex County

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		2022 In Progress	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		3/23/73	
CRS Communities	CRS Entry Date	10/1/94	CRS Class:	9

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	M	M	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	1	2	$57,259
	1	2	$57,877
Severe Repetitive Loss Properties			
	1	4	$60,185

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Continue retrofitting drainage system and back water valves.	Yes	High	Short term	Phase 1 complete, Phase 2 continuing	$45,000	HMGP, FMA, PDM
Educate property owners of water runoff- to bulkhead should be the responsibility of the homeowner.	Yes	Moderate	Ongoing	Continuing	Administrative	N/A
Adopt a stormwater management ordinance that regulates private property water runoff.	Yes	Moderate	Ongoing	Completed	$2,500	Self-funding
Re-grade Street ends at intersections along Bunting Avenue to direct the flow of water towards Coastal Highway.	No	Moderate	Short term	Completed	$55,000	HMGP, FMA, PDM

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
West Dagsboro Street upgrade and improvement of stormwater management culverts - 1000 ft	Yes	High	N/A	Completed	$130,000	N/A
North Schultz Road upgrade and improvement of stormwater management culverts - 40 ft	Yes	High	N/A	Completed	$50,000	N/A
Bay Street upgrade and improvement of stormwater management culverts - 500 ft	Yes	High	N/A	Completed	$65,000	N/A
1 NFIP House Elevations	Yes	High	N/A	COMPLETED	$120,000	N/A
Implemented freeboard into zoning ordinance	Yes	High	N/A	Completed	Self-funding	N/A

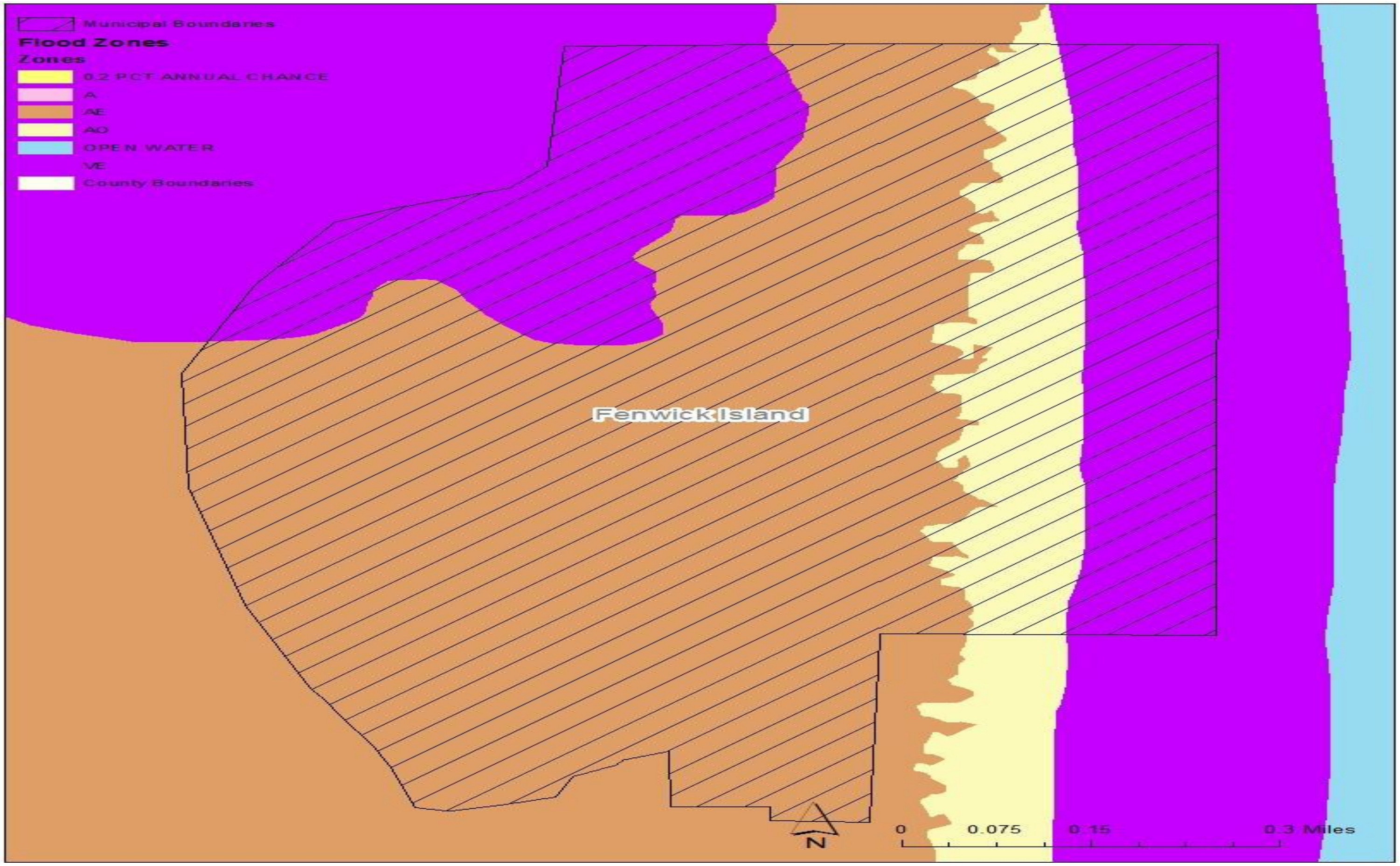
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Upgrade Bayside area ROW drainage and run off	Yes	High	Short term	Ongoing	Unknown	Self-funded

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Develop disaster preparedness outreach program	No	Moderate	Short term	Ongoing	$2,000	HMGP, FMA,
Continue replacement/ retrofitting drainage system and back water valves Phase 2 with new back flow technology	Yes	High	Ongoing	Pending	$55,000	Town Resources
Stormwater draining project: North Schultz Road	Yes	Moderate	Short term	Underway	Admin	N/A
1 NFIP House Elevations W. Jane Street	Yes	High	N/A	Completed	$120,000	N/A HMGP
Resiliency strategy implementation	Yes	High	Short term	Pending study and funding	Unknown	BRIC, RCP GRANT, HMGP

Issues

a. Resiliency underway by town engineering

b. Identify areas of highest needs to reduce flooding and damage from sea level rising


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Fenwick Island
N
0
0.075
0.15
0.3 Miles

TOWN OF FRANKFORD

General Profile

a. Size: Located on US Route 113 and encompasses 0.7 square miles
b 2020 Census: 1041
c Major Economy: Construction and agricultural

Top Hazards

a. Flooding
b. Severe winds
c. Winter Storms
d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Frankford	X		X	X										X	X	X	X		X

Building Codes

a. Sussex County

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		Adopted 2021	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		9/16/81	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	M	L	M

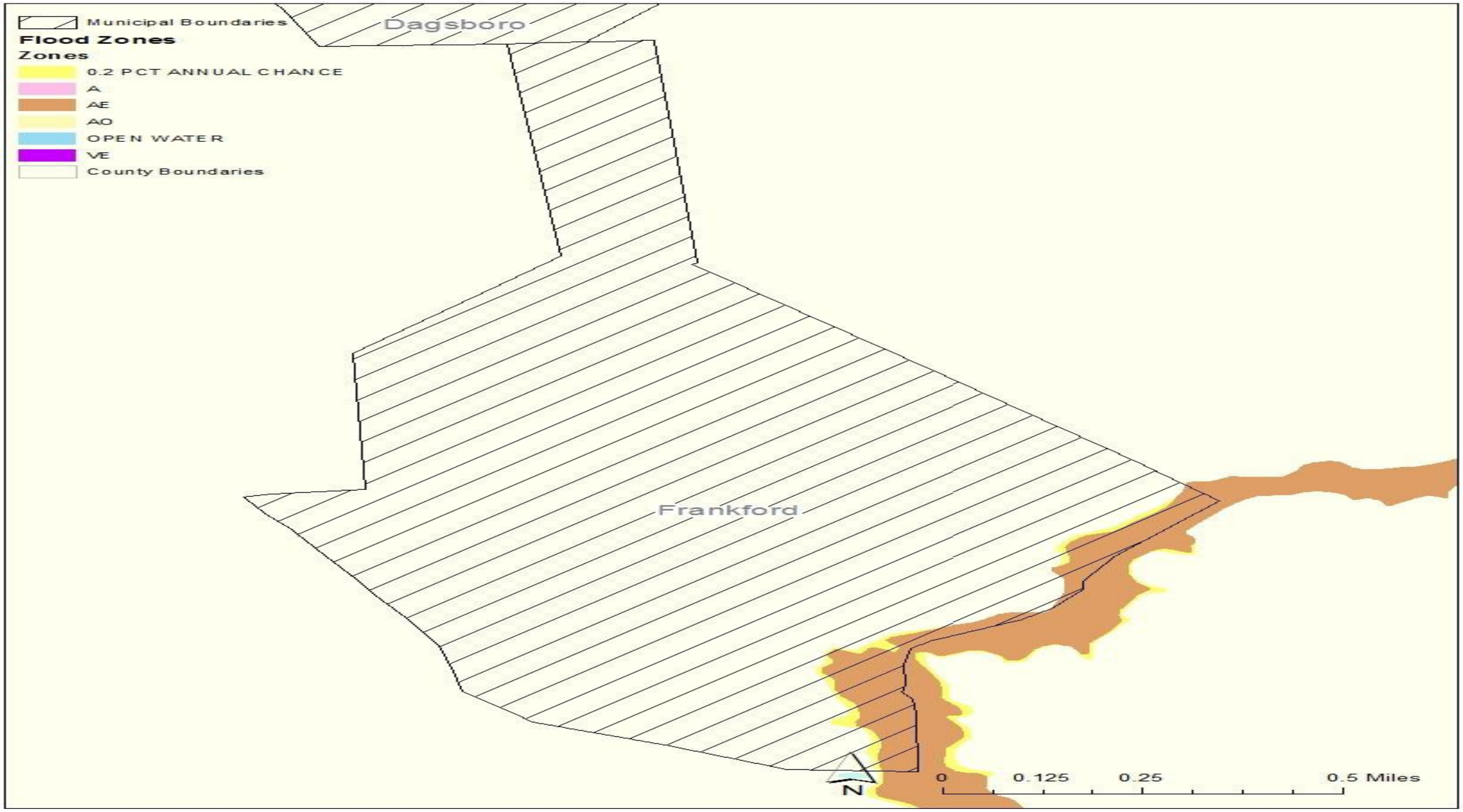
NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Identify private and county owned ditches, determine drainage patterns and what should be done to reduce flood related impacts.	Yes	High	Short term	In process	$50,000	DNREC, Soils Conservation District
Conduct stormwater drainage assessment for the town.	Yes	High	Short term	Delayed	$40,000	ARPA
Create and distribute material targeted to Frankford residents to include contact numbers and "What to do in the event of information."	Yes	High	As funds become available	Not started	$1,200	Town Resources
Update the community's web page to address emergency contact information for individuals and departments specific to the Town of Frankford.	Yes	Moderat e	As funds become available	Not started	Administrative costs	N/A

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Working on ditch along Green Street to Delaware Avenue. Stormwater Management strategy	Yes	Moderate	Ongoing	Pending	Unknown	DNREC, Soils Conservation District

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Stormwater management inventory and analysis	No	Low	Pending	Not Started	$50,000	DNREC, Town


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Dagsboro
Frankford
N
0 0.125 0.25 0.5 Miles

GEORGETOWN

General Profile

a. Size: Georgetown is the county seat and encompasses 4.1 square miles

b 2020 Census: 7200

c Major Economy: Poultry and tourism

Top Hazards

a. Flooding

b. Extreme wind

c. Winter storms

d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Georgetown	X		X	X		I/C			X		W/W	X		X	X	X	X		X

I/C= In Town code/charter

W/W= Wastewater

Building Codes

a. Sussex County 2012 but will be adopting 2021 IBC/IRC

Significant indicators for a local jurisdictions ability to implementmitigation strategy

Comprehensive Plan Update	Plan Status:		Adopted 2021	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		5/5/03	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	L	M	L

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Issues

a. Needs updated information from DEMA

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Establish critical facility emergency back-up power (police and fire stations).	Yes	High	Completed Police, Admin and Pump Stations	Pending funding source	$29,000 Backup system	Own Resources
Develop a brochure for the public dealing with emergency situations.	Yes	Moderate	Short term	Ongoing Via Web outreach Flood, winter storm	Administrative	Own Resources
Develop corrective actions for Route 9, Route 113 and Route 18/404 that tend to bottleneck during the evacuation of residents, college students and transients.	Yes	Low	Short term	Ongoing Improvement Rt 9 at Airport Road (Redesign) Park and Aero safety Road Under way widening roadway. Rt. 113 and Rt 18/404 Separated Intersection	$45 Mil plus	FHA & State Del DOT

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Tree cutback/trimming to clear power lines to protect against wind related tree impacts to said power lines	Yes	High	N/A	Complete	N/A	DELMARVA

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Georgetown East Gateway Improvements	Yes	High	Short Term	Awarded	$8.5M	DelDOT

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions For Consideration						
Hurricane Info outreach education program (multi-lingual) (Spanish)	No	High	Short term	Pending	2500	HMGP, FMA, (ARPA)
Hazard related warning system	No	High	Short term	Pending	15,000	HMGP, FMA (ARPA)
Pump Upgrade	Yes	High	Short term	Pending	$1 M	ARPA

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Upgrade wastewater Treatment	Yes	High	Short term	Pending	.$5 M	ARPA
Elevated water tower to enhance water pressure	Yes	High	Short term	Pending	$1 M	ARPA
Pallet temporary housing (Homeless Coordination)	Pending	High	Short term	Pending	$6 M	ARPA
Park Avenue Relocation,	Yes	Med	Long Term	Pending	$16M	DelDOT
US 113 @ SR 18/SR 404 (Georgetown) Grade Separated Intersection	Yes	High	Long Term	Pending	$54K	DelDOT

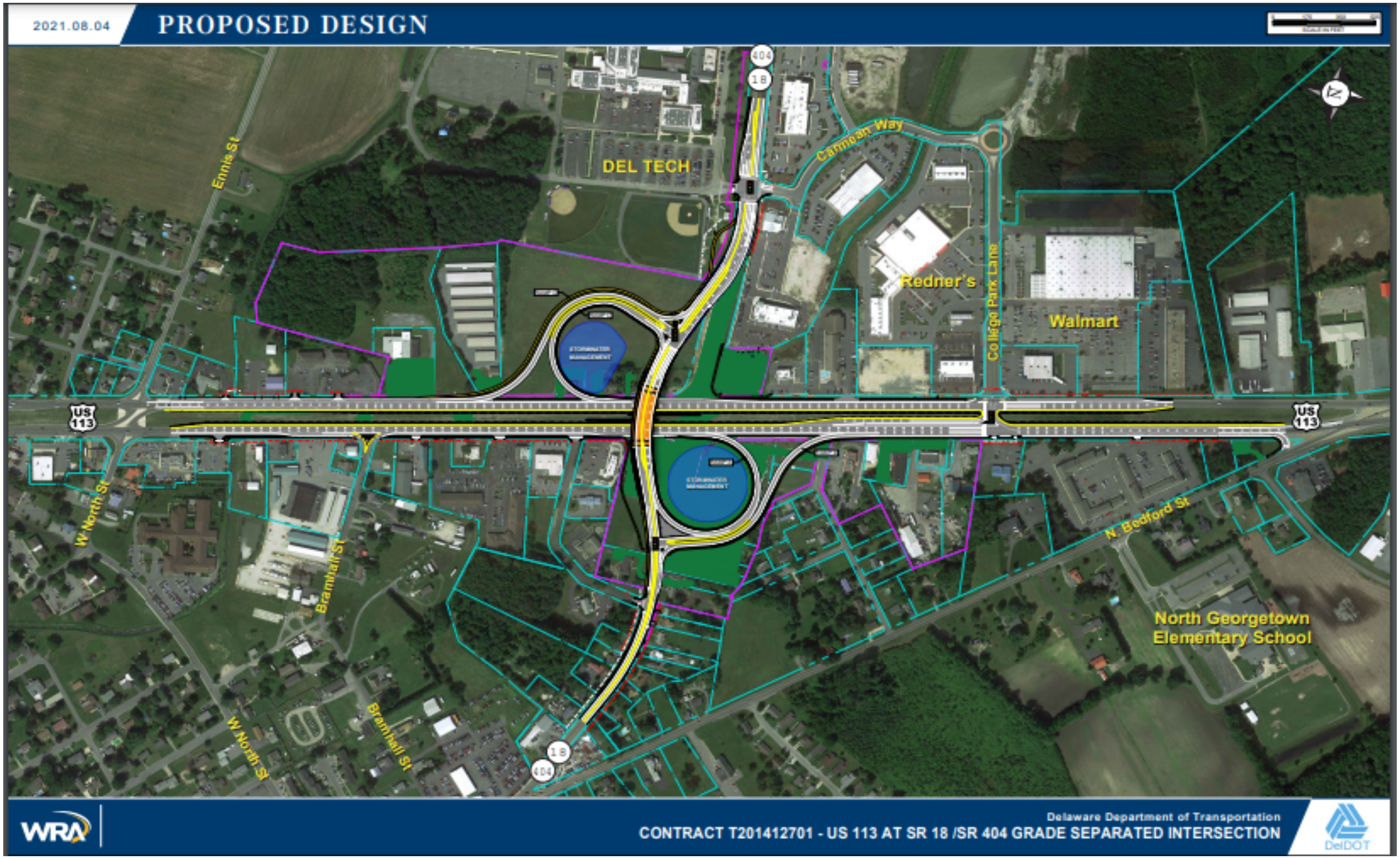
Issues

a. Street camera's
b. Violent crime and situational awareness
c. Enhanced remote capability

Additional Information

Below are the estimated costs related to the DelDOT projects mentioned during our call:

1. Georgetown East Gateway Improvements: $8,847,777.00 awarded (Project information: https://DelDOT.gov/projects/index.shtml?dc=details&projectNumber=T201804301)
2. Park Avenue Relocation, Phase 1: $16,000,000.00 est. (Project information: https://DelDOT.gov/projects/index.shtml?dc=details&projectNumber=T202004601)
3. US 113 @ SR 18/SR 404 (Georgetown) Grade Separated Intersection: $53,230,000.00 est. (Project information: https://DelDOT.gov/projects/index.shtml?dc=details&projectNumber=T201412701


2021.08.04
PROPOSED DESIGN
DEL TECH
Carmean Way
Redner's
College Park Lane
Walmart
Ennis St
US 113
US 113
W North St
Bramhall St
N. Bedford St
North Georgetown Elementary School
W North St
Bramhall St
404
18
18
404
WRA
Delaware Department of Transportation
CONTRACT T201412701 - US 113 AT SR 18 /SR 404 GRADE SEPARATED INTERSECTION
DelDOT

TOWN OF HENLOPEN ACRES

General Profile

a. Size: The Town of Henlopen Acres is the smallest incorporated town in Delaware and encompasses 0.3 square miles. The town borders the Atlantic Ocean to the northeast, Rehoboth Beach to thesoutheast and unincorporated sections of Sussex County on the west and north.

b 2020 Census: 153 but over 800 during summer vacation season

c Major Economy: Summer rental properties

Top Hazards

a. Extreme wind events

b. Flooding

c. Severe coastal storms

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Henlopen Acres		X	X	X	X	X	X		X	X	X	X		X	X	X	X		X

Building Codes

a. 2012 IRC

b. Town issues permits, inspections, enforcement

Significant indicators for a local jurisdictions ability to implementmitigation strategy

Comprehensive Plan Update	Plan Status:		2016	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		8/15/78	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	M	M	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Maintain beach dune system.	Yes	Moderate	Ongoing	Ongoing		HMGP, FMA, PDM

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Develop a marine plan for the town.	Yes	High	Ongoing	Completed	$1K	N/A
Develop an Emergency Management Plan for the town.	Yes	Moderate	Ongoing	Completed	$3K	N/A
Risk and Vulnerability Assessment of town hall	No	Moderate	Completed	Completed	$3K	
Instillation of backflow valves on storm watermanagement system	No	High	Completed	Completed	$10K	HMGP,FM,PDM, CDBG

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Back-up generator for town hall (Active)	No	Moderate	Short term	Pending funding	$145K	HMGP, HSGP
Debris Management Plan	Yes	Moderate	Short Term	Pending funding	Ongoing	
North Shore Canal jetty/seawall – Provide structural management to mitigate water flow into area from Canal.	No	Moderate	Long term	Pending funding	$1M to $1.25M	HMGP, BRIC, CDBG

Henlopen Acres Flood Risk

Residential **Extreme Risk**
118 out of **190** homes

Road **Extreme Risk**
3 out of **5** miles of roads

Commercial **Extreme Risk**
1 out of **1** commercial properties

Critical Infrastructure **Risk - N/A**
-- out of -- infrastructure facilities

Social Facilities **Minimal Risk**
0 out of **2** social facilities

Minimal Minor Moderate Major Severe Extreme

https://floodfactor.com/city/henlopen-acres-delaware/1033900_fsid

CITY OF LEWES

General Profile

a. Size: The City of Lewes is located on the Delaware Bay directly across from Cape May New Jersey and encompasses 4.3 square miles.

b 2020 Census: 3,303 with increase during summer season to almost 15,000.

c Major Economy: Tourism and vacation.

Top Hazards

a. Severe coastal storms
b. Flooding
c. Tidal flooding
d. Winter storms
e. Extreme heat/cold

Pans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Lewes	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Building Codes

a. 2012 ICC/IBC

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	2017		
BCEGS Grades	BCEGS Grade	9		
NFIP Participation	NFIP Entry Date	3/15/77		
CRS Communities	CRS Entry Date	UNK	CRS Class:	8

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	H	M	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Review and update evacuation and notification procedures for the city.	Yes	High	Ongoing	Ongoing	Staff costs	City Resources
Improve stormwater management throughout the city. Study of Lewes Beach for retrofit	Yes	Moderate	Short term	Pending	Unknown	ARPA, City
Increase participation in the National Flood Insurance Program. Annual report underway.	Yes	Moderate	Short term	Unknown	Staff costs	
Minimize damages from high wind events. (Wind part of Severe Coastal Storm, Beach Erosion.	Yes	Moderate	Ongoing	Ongoing	$25,000	HMGP, FMA, PDM
Implement Continue application and improvement of hazard mitigation education community outreach program.	Yes	Moderate	Ongoing	Ongoing	$5000	City, FEMA, DEMA
Reduce vulnerability to wildfires. MARSH issue with invasive species of Phragmites. (Controlled burns, spraying etc.	Yes	Moderate	Short term	Ongoing	Unknown W/State	State Forestry
Continue data acquisition and enhancements to the GIS.	Yes	Moderate	Short term	Ongoing	Staff costs	State Partnership on state datasets
Enlist the services of City service organizations in implementing a disaster preparedness outreach program. (HMPT) Pending reinitiating	No	High	Ongoing	Pending funding source	$2,000	HMGP, FMA, PDM

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
New Road study. DelDOT Causeway	Yes	High	N/A	Ongoing	Unknown	DelDOT
Adoption of International Building Codes (2021 IBC/ICC update)	Yes	High	N/A	Pending	No cost	N/A
Completing W. Cedar Street Flood study.	Yes	High		Completed	$118,000	BRIC

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Implementation and construction of Tidewater floodgate	Yes	High		Pending funding	$3M	HMGP
Development of Resiliency Fund	No	Moderate		Unknown	$500,000	City
Real Estate disclosure of flood and sea level rise concerns	No	Low			Pending study	
Establishment and maintenance of Resiliency Committee	No	Low			Pending study	

https://floodfactor.com/city/lewes-delaware/1041830_fsid

Lewes Web

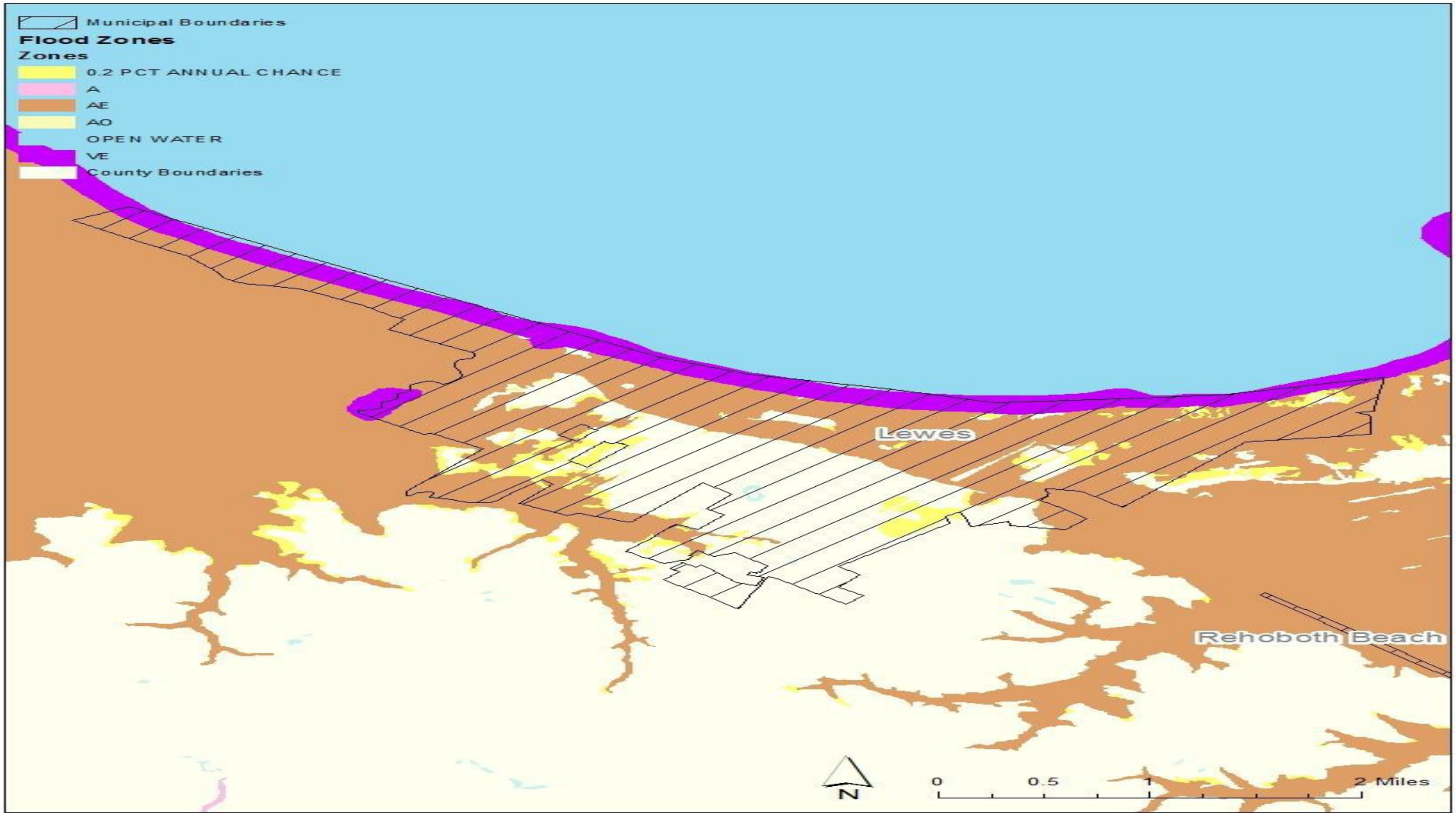
https://www.ci.lewes.de.us/DocumentCenter/View/1279/Flooding-in-Lewes-PDF?bidId=

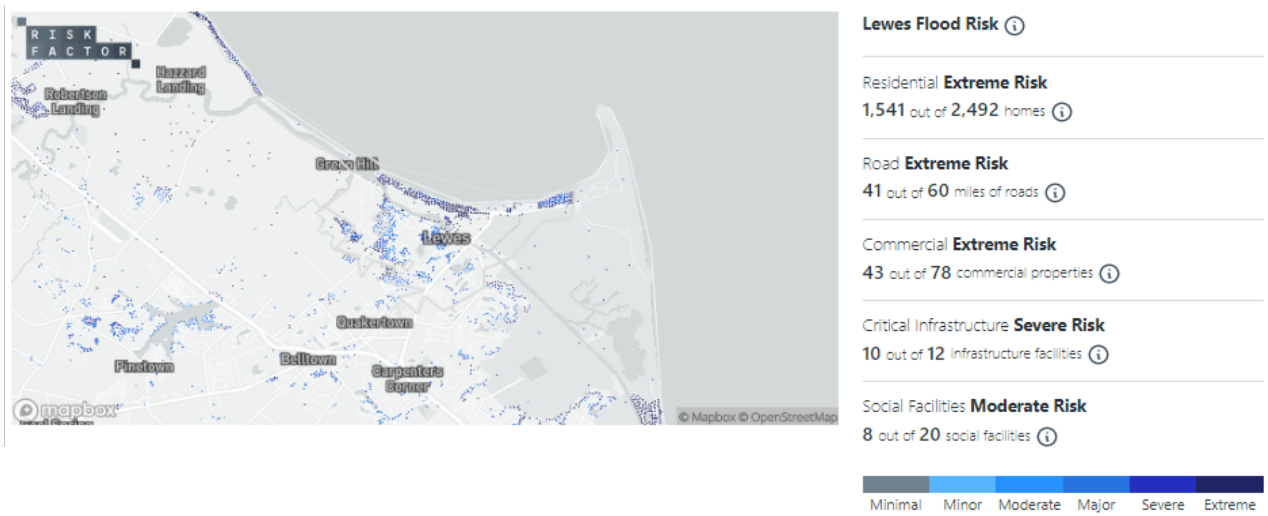
Surge Sea Level Rise

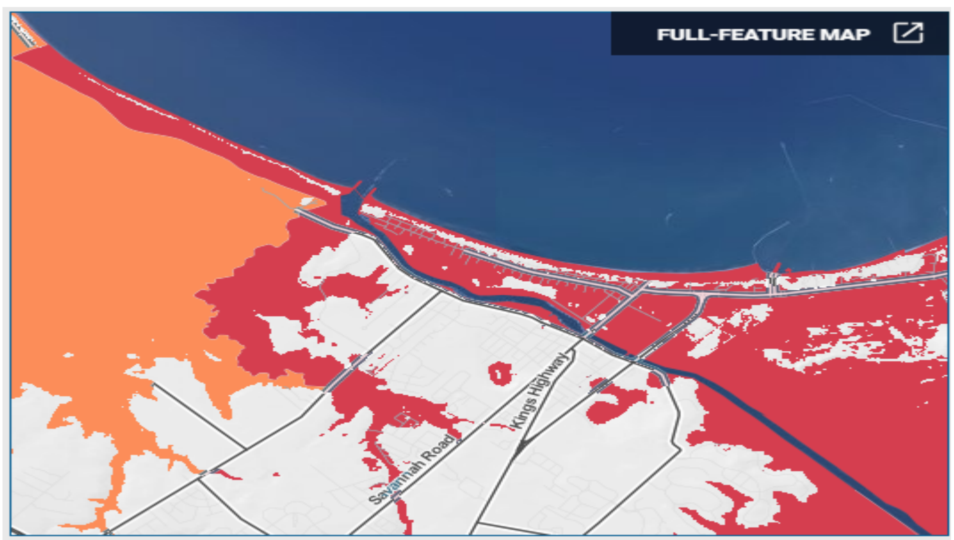
https://riskfinder.climatecentral.org/place/lewes.de.us?comparisonType=place&forecastType=NOAA2017_extreme_p50&level=5&unit=ft

Sea Level Rise

https://www.spur.org/publications/urbanist-article/2009-11-01/strategies-managing-sea-level-rise


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Lewes
Rehoboth Beach
N
0
0.5
1
2 Miles





Lewes area land below 5 ft is colored yellow through red to denote populations with low through high social vulnerability. Social vulnerability (e.g. from low income) can compound coastal risk. Maroon lines are levees. See full-feature map for legends and details. Switch to property value map layer

TOWN OF LAUREL

General Profile

a. Size: The Town of Laurel is located on the Atlantic Coastal Plain in southwestern Delaware and encompasses 1.7 square miles.

b 2020 Census: 4608

c Major Economy: Centers on the tourism and vacation industry.

Top Hazards

a. Flooding

b. Extreme wind/storms

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Town of Laurel	X	X	X	X	X	A/CP								X	X	X	X		X

A/CP= Needs to adopt Sussex County EOP

Building Codes

a. Sussex County

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		2018	
BCEGS Grades	BCEGS Grade		6	
NFIP Participation	NFIP Entry Date		1/18/81	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	L	L	M

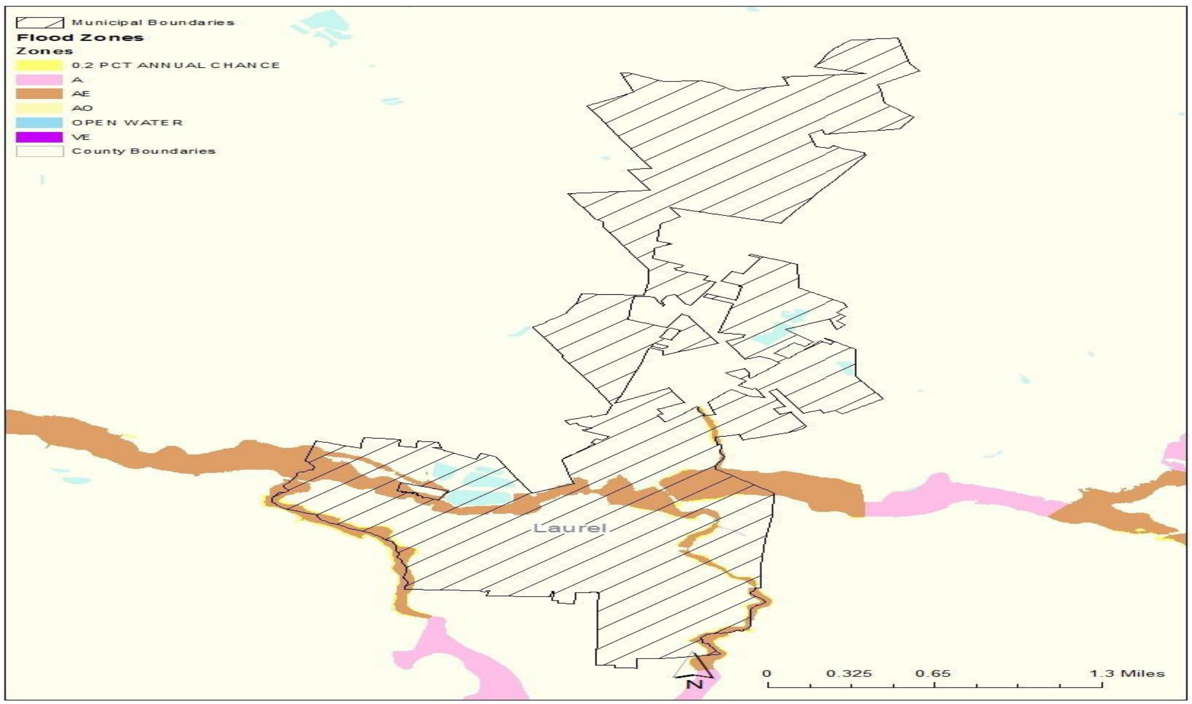
NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Create a service road to the wastewater manholes on West Sixth Street. Road is Private Property	Yes	High	Short term	Delayed due to funding.	$50,000	ARPA, Own Resources
Replace bulkhead on the north side of Broad Creek, between Popular Street and the railroad bridge.	Yes	High	Short term	Delayed due to funding.	$1M	HMGP, FMA, BRIC
Relocate the Town Hall, Public Works, and Police Departments.	Yes	Low	Short term	Partial (PD) Pending funding	$1M	HMGP, FMA, BRIC

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Segregate stormwater system from sanitary system.	Yes	High	Short term	Completed	$1M	State Revolving Funds
Closing the well at 10th & Deshields Street Replacewaterlines on 10th Street.	Yes	Moderate	Ongoing	Completed	$15,000	Own Funds

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Community Outreach Programs						



TOWN OF MILTON

General Profile

a Size: The Town of Milton is located on the Delmarva Peninsula and encompasses 1.20 square miles.It is located on the Broadkill River, which empties into Delaware Bay

b 2020 Census: 3,189 full time residents

c Major Economy: Tourism, vacation, and retail.

Top Hazards

a. Flooding
b. Extreme wind
c. Winter storms
d. Extreme heat/cold
e. Retail in AE 9 Flood Zone

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Town of Milton	X		X			X								X	X	X	X		X

Building Codes

a. 2015 IBC/IR
b. Inspection, permits issued by Milton

Significant indicators for a local jurisdictions ability to implement mitigation strategy

Comprehensive Plan Update	Plan Status:	2018		
BCEGS Grades	BCEGS Grade	8		
NFIP Participation	NFIP Entry Date	8/1/78		
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

	Technical Capability	Fiscal Capability	Administrative Capability
Self-Assessment	L	M	M

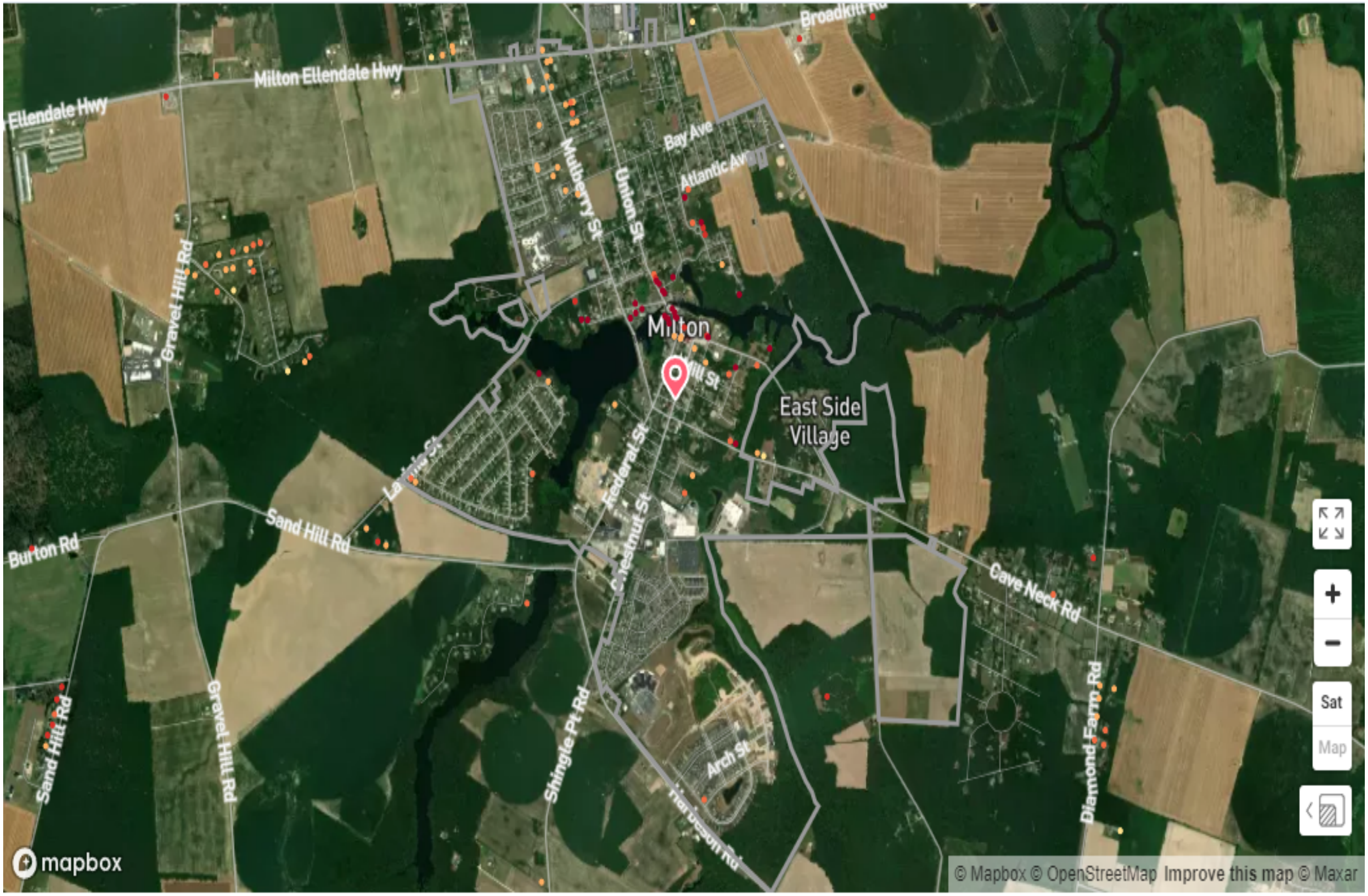
NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	1	**2**	**$188,072**
Severe Repetitive Loss Properties			
	1	**5**	**$405,659**

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Promote emergency preparedness information. Community Outreach	Yes	Moderate	Short term	Ongoing	No cost	HMGP, FMA, DNREC CDBG
Secure water towers and wellheads by enclosing them with approximately 1,200 feet of fence.	Yes	Moderate	Short term	Completed	$35,000	DEMA
Join the Community Rating System.	Yes	Moderate	Short term	Delayed due to staffing	Administrative Costs	N/A
Conduct a study to identify measures to mitigate flooding in downtown	No	High	Short term	Pending	Unknown	HMGP, FMA, PDM, CDBG
Develop a riparian buffer standard for building setbacks along the Broadkill River and other waterways. Phase 1: Study and plan development	Yes	Moderate	Short term	Pending funding source	$50,000	FMA, HMGP, Del Open Space Program, Watershed Surveys and Planning
Develop a riparian buffer standard for building setbacks along the Mispillion River and other waterways. Phase II: Construction	Yes	Moderate	Short term	Pending funding source	Study dependent	FMA, HMGP, Del Open Space Program, Del Coastal Management

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Route 5 stormwater management strategy study	Yes		N/A	Completed	$30,000	Coastal Management Grant

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions For Consideration						
Modify floodplain management plan to include criticalinfrastructure protection strategies for police and fire facilities. Relocation of police department to new building	No	High	Short term	Pending Acquisition	Unknown	HMGP, FMA, CDBG
Sea Level Rise Awareness Outreach	Yes	Moderate	Short term	Ongoing	Administrative Costs	Self-funding
Seal Level Rise Awareness Study to develop mitigation practices and considerations. Suggest Capital Improvement and FPM ordinance changes	Yes	High	Short term	Ongoing	$63,000 Improvements Pending	Self-funding
Retrofit of Repetitive Loss property Flood doors installed	Yes	High	Short Term	Completed	Unknown	Property Owner
Magnolia St Bulkhead & Drainage	yes	High	Short term	ongoing	$1M	Bill funding/DNREC


Broadkill Rd
Milton Ellendale Hwy
Ellendale Hwy
Bay Ave
Atlantic Ave
Mulberry St
Union St
Gravel Hill Rd
Milton
East Side Village
Lavinia St
Federal St
Chestnut St
Sand Hill Rd
Burton Rd
Cave Neck Rd
Shingle Pt Rd
Arch St
Sand Hill Rd
Gravel Hill Rd
Diamond Farm Rd
Sat
Map
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© Mapbox © OpenStreetMap Improve this map © Maxar

TOWN OF MILLSBORO

General Profile

a. Size: Located at the head of the Indian River Bay and encompasses 1.9 square miles

b 2020 Census: 6,863

c Major Economy: Tourism, vacation industry, 2 industrial facilities, pharmaceutical manufacturing, R and D for animal vaccine production

Top Hazards

a. Flooding
b. Extreme wind
c. Winter storms
d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Millsboro		X	X	X	@					D/D	X			X	X	X	X		X

D/D= DelDOT

CLUP=Adopted 2021

@= Stormwater surface matching planning grant for stormwater infrastructure management

Building Codes

a. 2018 ICC/IRC

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		2021	
BCEGS Grades	BCEGS Grade		7	
NFIP Participation	NFIP Entry Date		9/1/78	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	H	H	H

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	1	2	$13,082
	1	2	$57,757
Severe Repetitive Loss Properties			
	1	2	$28,226

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Improve storm-water drainage within the town limits. (Wilson Highway and Progress)	Yes	High	Short term	Completed	$500,000	HMGP, FMA, PDM
Conduct a study to identify roads that need to be elevated and culverts that need to be widened.	Yes	Moderate	Short term	Completed	$100,000	HMGP, FMA, PDM
Retrofit one pump station. Move second pump station to new location	Yes	Moderate	Short term	Ongoing	$3M relocation $750,000	

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Improve storm-water drainage within town limits. (Wilson Highway and Progress) Town Center Area	Yes	High	Short term	Completed	$200,000 +	HMGP, FMA, PDM
Retrofit one pump station. Move second pump station to new location	Yes	Moderate	Short term	Ongoing	$3 M relocation $750,000	State Revolving Funds Cupula Park, Town Funds.

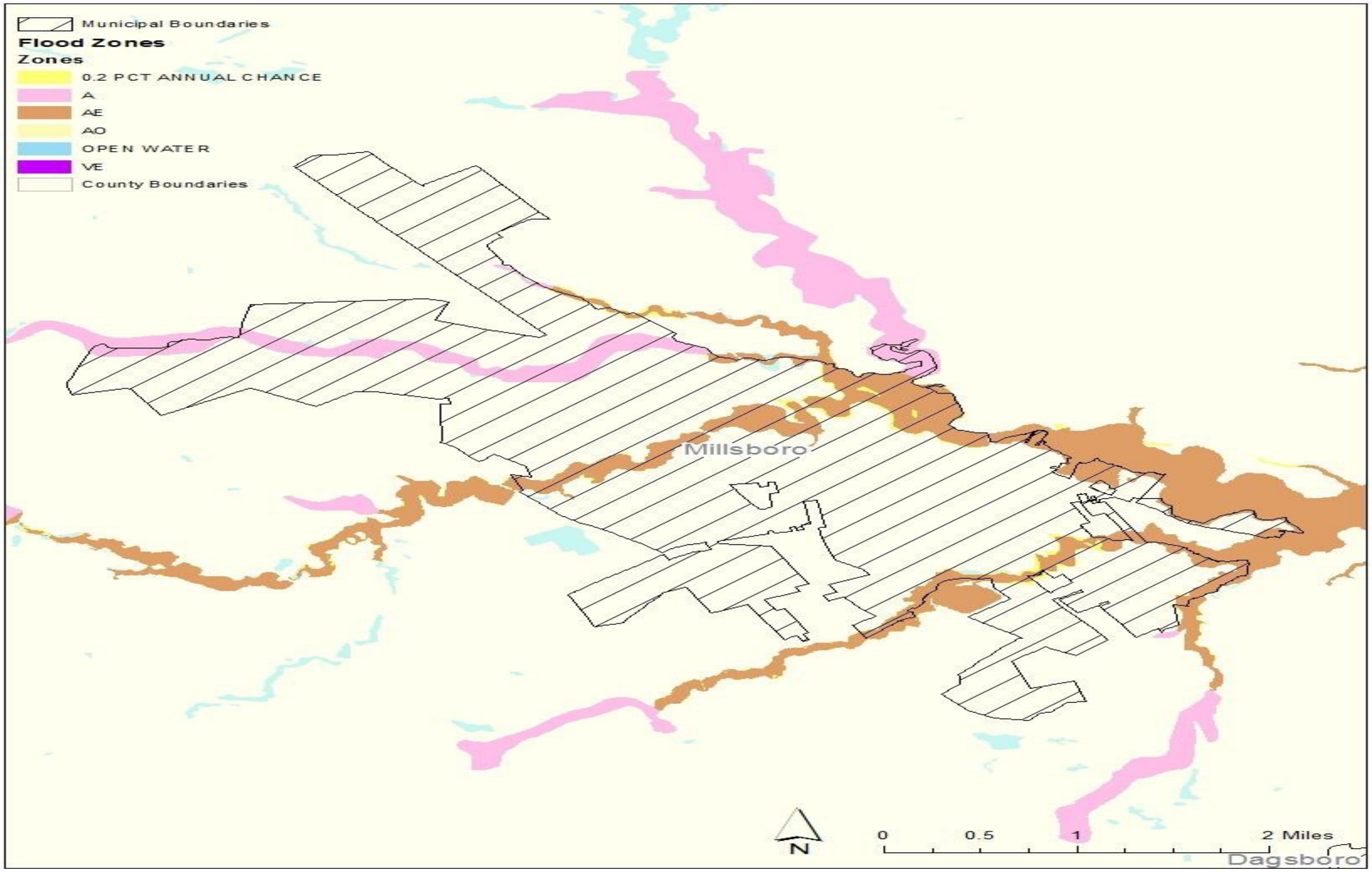
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Mitchel Street study to evaluate potential bulkhead instillation. Behind the Roses' Shopping Center	No	High	Ongoing	Pending funding source	$100,000	developer
Develop storm-water management plan, Structure inventory underway.	No	High	Ongoing	Ongoing	$120,000	DNREC, Town Funds
Cupola Park (Indian River) bulkhead upgrade	No	High	Ongoing	Pending study	$5M	HMGP, FMA, BRIC
Inventory of high hazard areas within developments	Yes	Moderate	Long Term	Ongoing	Administrative	Town Resources
Tiger Branch shoreline stabilization and sediment removal	Yes	Moderate	Short Term	Ongoing	Unknown	Town Resource, Pending
Public Safety Campus Relocation	Yes	High	Short-Term	Ongoing	$7M	Town Funds/ BRIC / USDA Rural Development Loan
Tiger Branch (Indian River) Wastewater Treatment Relocation out of floodplain area	No	High	Short-Term	Pending Funding	$29M	Local ARPA/BRIC/State SRF

Issues

a. New public safety campus needed for adequate management

b. EOC development and training

c. Generator needed for continual and sustainable operations



TOWN OF MILLVILLE

General Profile

a. Size: The Town of Millville is encompassing ½ square mile. The town is bordered to the north, west, and south by unincorporated sections of Sussex County. Ocean View and the Atlantic Ocean border to the east.

b 2020 Census: 662, but as high as 5,000 during peak summer season

c Major Economy: Tourism and vacation industries

Top Hazards

a. Flooding
b. Extreme wind events
c. Winter storms
d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Millville	**X**		**X**	**X**					**X**			**X**		**X**	**X**	**X**	**X**		**X**

Building Codes

a. Sussex County

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	2019		
BCEGS Grades	BCEGS Grade	8		
NFIP Participation	NFIP Entry Date	9/25/81		
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	L	L	L

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
N/A					Pending study	

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Retrofit the Millville Town Hall to include back up power supply. Install a propane powered generator.	Yes	High	Short term	Completed	$360,000	N/A
Assess all culverts to include proper size and design based on current infrastructure and future development.	Yes	Moderate	Short term	Completed by DelDOT	N/A	N/A

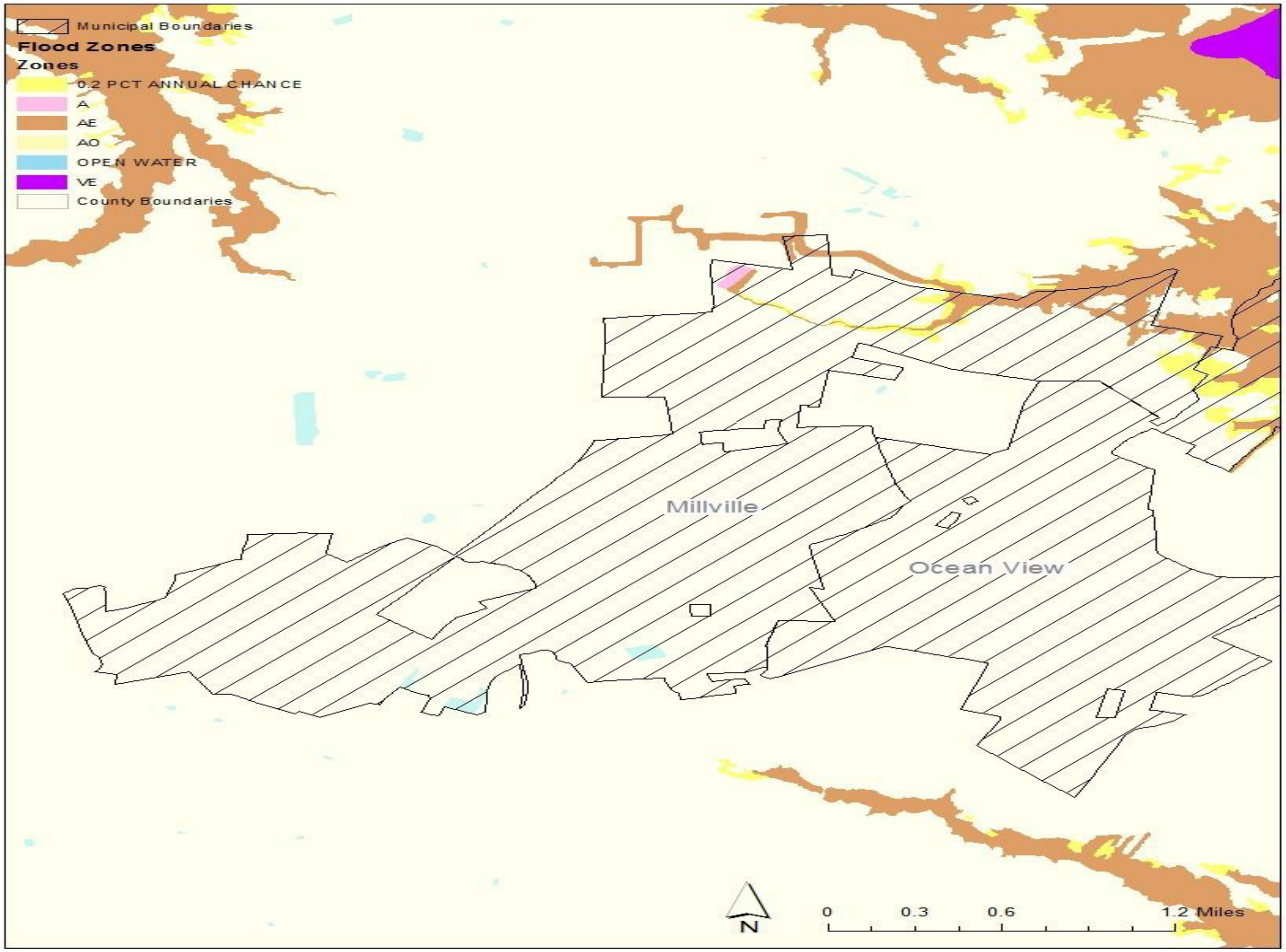
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Develop mitigation (wind loads) outreach program specifically targeting Millville by the Sea development	No	Moderate	Short term	Pending funding source	$2,000	HMGP, FMA, BRIC, CDBG

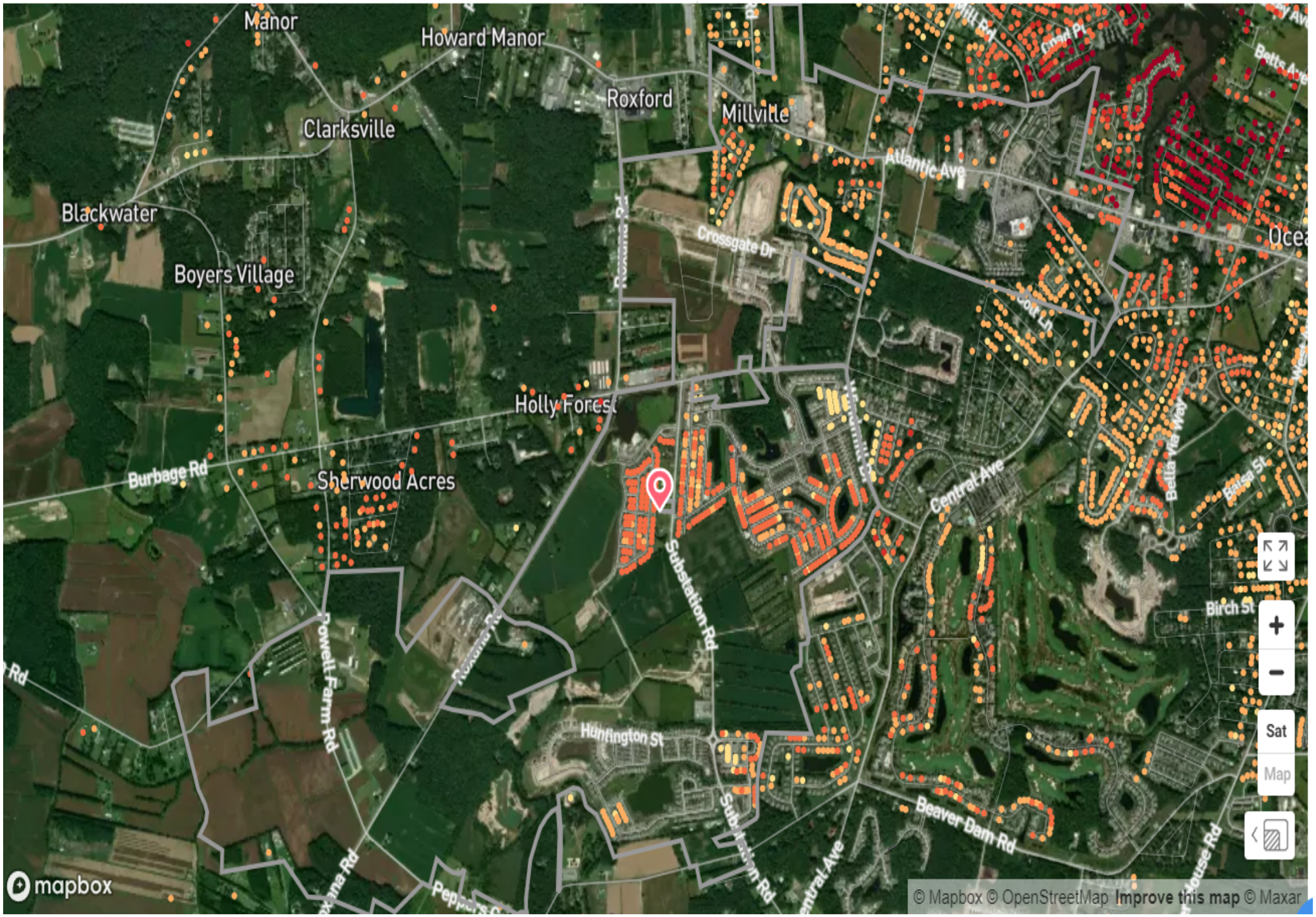
Issues

a. **Town has no road ownership. Each development must have a stormwater management plan and system.**

https://floodplanning.dnrec.delaware.gov/#pills-summary

https://floodfactor.com/city/millville-delaware/1048200_fsid


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Millville
Ocean View
N
0 0.3 0.6 1.2 Miles


Manor
Howard Manor
Roxford
Millville
Clarksville
Atlantic Ave
Blackwater
Crossgate Dr
Boyers Village
Holly Forest
Burbage Rd
Sherwood Acres
Central Ave
Substation Rd
Powell Farm Rd
Birch St
Huntington St
Beaver Dam Rd
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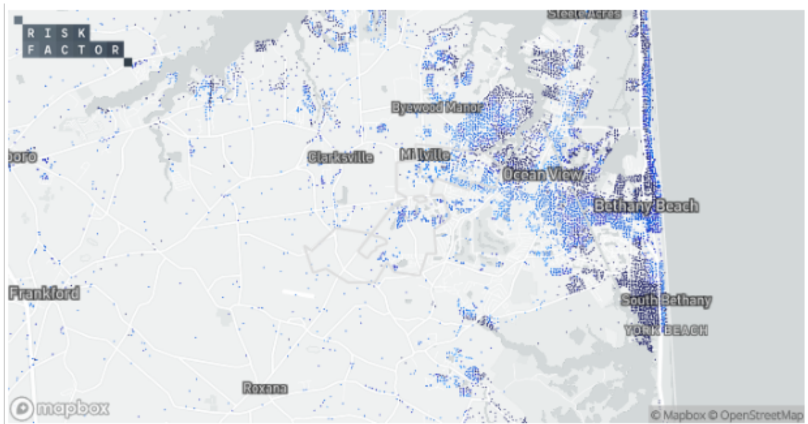


Millville Flood Risk

Residential **Moderate Risk**
544 out of 1,442 homes

Road **Moderate Risk**
18 out of 34 miles of roads

Commercial **Major Risk**
40 out of 55 commercial properties

Critical Infrastructure **Minor Risk**
1 out of 1 infrastructure facilities

Social Facilities **Moderate Risk**
1 out of 1 social facilities

Minimal Minor Moderate Major Severe Extreme

TOWN OF OCEAN VIEW

General Profile

a. The Town of Ocean View is located to the east of the Atlantic Ocean, south of Indian River Bay. Bethany Beach borders to the to the east, Millville is on the west border, and unincorporatedsections of Sussex County border the south.

b. 2020 Census: 2,636. Increased year around population in part due to influx of seasonal owners moving to their homes on a more permanent basis, in part due to shift to remote work and in-place sheltering.

c. Major Economy: Town of Ocean View economy centers on the tourism and vacation industry

Top Hazards

a. Flooding

b. Severe coastal storms and tidal surge

c. Extreme wind

d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Ocean View	X		X		X	X	X		X	X	X		X	X	X	X	X		X

Building Codes

a. Sussex County 2012 but will be adopting 2021 IBC/IRC

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:	Updated 2020		
BCEGS Grades	BCEGS Grade	8		
NFIP Participation	NFIP Entry Date	9/3/80		
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	H	M	H

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

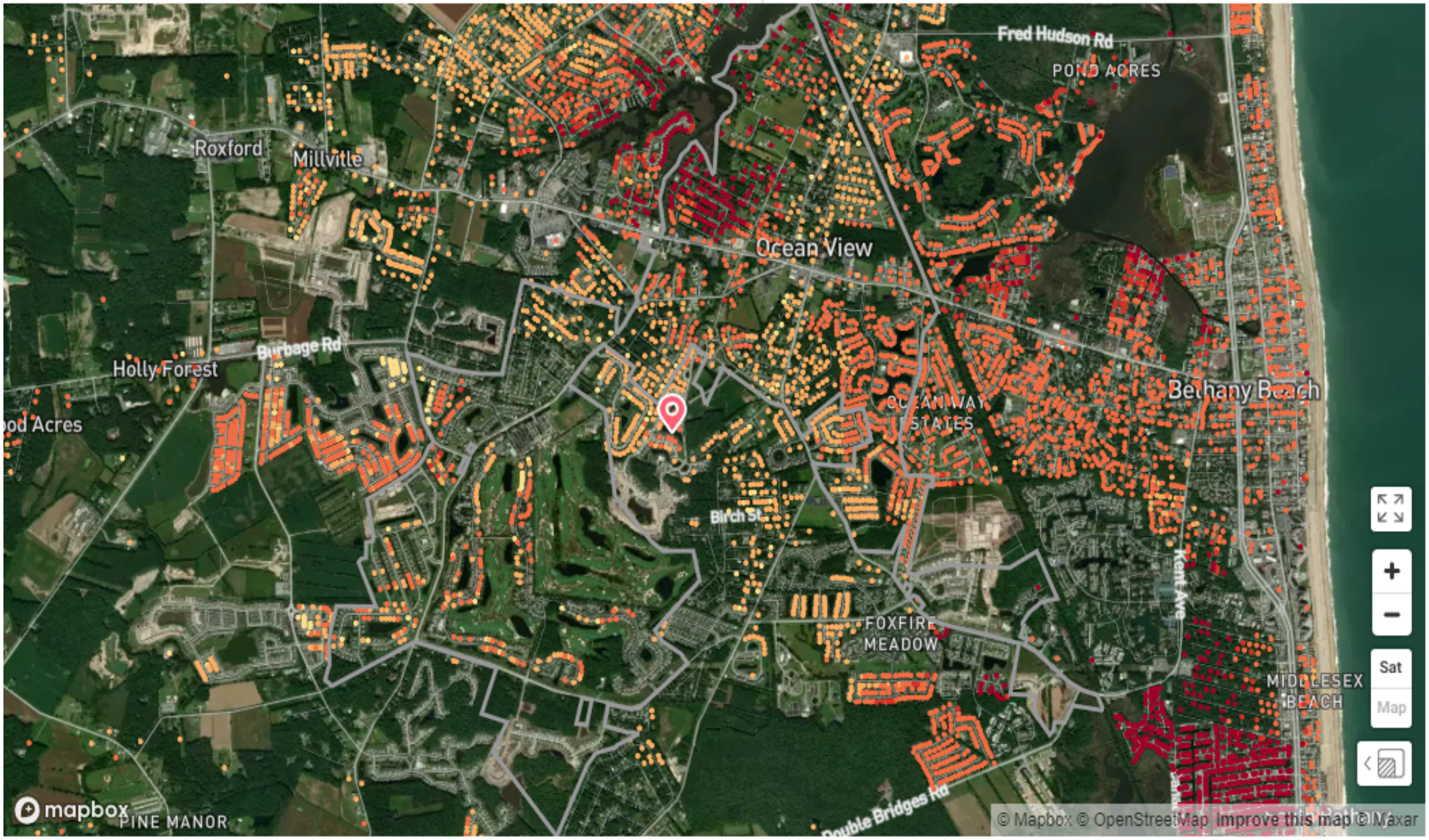
Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Improve the Town's stormwater management system in some of the older sections of the Town: (County Village, County Estates, Corner of Daisy and Woodland Avenue, West View Development, and Cottageson Whites Creek). * Meyle Estates These improvements would include engineering costs to redesign or improve the drainage systems, and the costs to reconstruct and repair swales, drains and culvert piping, and ditches.	Yes	High	Ongoing	In Progress Partially complete	▪ $750,000 done ▪ $3M outstanding	HMGP, FMS, PDM, CDBG, PG
Implement public education and awareness activities to advise residents and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Local Television Outreach Website	Yes	Moderate	Ongoing	In Progress	$5,000	Town Regional Approach

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Purchase and install GIS to map hazardous areas and events.	Yes	Low	Short term	Completed	$1000	Self-funded
Adopt a building code ordinance for the Town.	Yes	Low	Short term	County Enforces	N/A	N/A

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Goodman Park, Meyle Estates West View Development				Completed	$250,000	Self-funded
Woodlyn Park drainage improvements				Completed	$565,000	Self-funded
Storm water management projects (3) drainage for roads	Yes	High	Short term	Completed	$750,000	Self-funded
Stormwater Drainage pipe system install: Central Ave – 100 feet (Banks Bennetts Tax Ditch floods)	Yes	High	Short term	Completed	$500,000	DelDOT

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
(3) Shovel ready stormwater management projects awaiting easement rights.	Yes	High	Short term	Pending funding source	$1.5M	HMGP, FMS, PDM
Stormwater Drainage pipe system install: Hudson Ave – 100 feet (Banks Bennett's Tax Ditch floods)	Yes	High	Short term	Pending Construction	$500,000	Self-funded/FEMA
Improve the Town's stormwater management system in some of the older sections of the Town (County Village, County Estates, Corner of Daisy, and Woodland Avenue, and Cottages on Whites Creek). These improvements would include engineering costs to redesign or improve the drainage systems, and the costs to reconstruct and repair swales, drains and culvert piping, and ditches.			Short term		$425,000 $440,000 $900,000	Self-funded/ ARPA
Woodland Avenue Draining improvements and construction			Short term		$900,000	Self-funded
West Avenue streetscape, drainage, and sidewalks Safe Corridor project			Short term	In construction	$675,000	Self-funded

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Woodland Avenue Rt 26 to Hudson Avenue drainage and sidewalks Safe Corridor project			Short term	In design	$300,000	Self-funded
Woodland Avenue Hudson to Daisey drainage and sidewalks Safe Corridor project			Short term		$907,000	Town
West Avenue Oakwood to Assawoman Canal drainage and sidewalks Safe Corridor project			Short term		$900,000	Town
Evacuation student & Staff LB School pedestrian bridge over drainage ditch			Short term	Pending funding	$107,000	Self-funded/ RSD
Hudson Avenue Flood Control Project			Short term	Pending	$150,000	Self-funded/ ARPA


Fred Hudson Rd
POND ACRES
Roxford
Millville
Ocean View
Burbage Rd
Holly Forest
Bethany Beach
OCEAN WAY ESTATES
Birch St
FOXFIRE MEADOW
Kent Ave
MIDDLESEX BEACH
Sat
Map
mapbox
PINE MANOR
Double Bridges Rd
© Mapbox © OpenStreetMap Improve this map © Maxar

REHOBOTH BEACH

General Profile

a. The City of Rehoboth is one of the principal cities of Delaware.

b. The city is located along the Atlantic coast of Delaware and encompasses 1.6 square miles. Henlopen Acres and unincorporated sections of Sussex County to the west border the city to the north. Dewey Beach borders the city to the south and the Atlantic Ocean to the east.

c. According to the 2020 Census, the population of Rehoboth Beach is 1,400 but will swell toover 25,000 during the summer vacation season.

d Major Economy: Tourism, vacation industry, agriculture, and commercial fishing.

e. President Summer Home

Top Hazards

a. Flooding

b. Tidal flooding (Downtown)

c. Heavy winds and severe coastal storms

d. Winter storms

e. Extreme heat/cold

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Rehoboth Beach	X	**X**	**X**	**X**	**X**	**X**	**X**		**X**		**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**

Building Codes

a. Not sure what building codes using

b. Enforced locally

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status		Revised 2014 PLUS Review (2020 Draft)	
BCEGS Grades	BCEGS Grade		6	
NFIP Participation	NFIP Entry Date		3/30/1973	
CRS Communities	CRS Entry Date	UNK	CRS Class:	8

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	H	M	H

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
City of Rehoboth Beach	1	2	$77,137

Severe Repetitive Loss Properties			
City of Rehoboth Beach	1	4	$150,295
City of Rehoboth Beach	1	6	$119,278
City of Rehoboth Beach	1	4	$108,445
City of Rehoboth Beach	1	5	$77,558

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Build retaining wall along boardwalk to prevent damage to businesses, the boardwalk, and our street ends.	Yes	High	N/A	Completed	$750,000	USACE, DENREC
Conduct drainage improvements on First Street to increase efficiency by increasing piping capacity.	No	Moderate	N/A	Completed	$75,000	HMGP, FMA, PDM

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
N/A						

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions For Consideration						
Storm-water management system town wide	Yes	High	Short-term	Pending funding source	$9M	HMGP, FMA, PDM
Elevation and engineering study for barrier protection on County Road 300 (Surf Avenue). (In A/V Zone)	No	High	Short-term	Pending funding source	$50,000	HMGP, FMA, PDM
Wilmington and Delaware Ave storm-water management study	Yes	High	Completed	Completed	$ 1M (2 Phases)	HMGP, FMA, PDM
Develop multi-lingual community outreach	No	High	Short-term	Completed	$15,000	HMGP, FMA, PDM, CDBG
Annual Capital improvement plan to conduct CCTV assessments of stormwater and drainage CIPP to many	Yes	High	Annual	Ongoing	$1M	Own Resources, DNREC

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
sies as needed. Stormwater and sewer.						
Streetscape – Pedestrian Enhancement to support larger sidewalk. Baltimore and Wilmington Avenues. Widening sidewalks, movement, and armoring utilities. 7 ft pedestrian route with buffer areas to allow access for individuals with mobility impairment. (MAY WANT TO MAKE TWO ITEMS)	Yes	Moderate	7 years	Pending funding	$35M	HMGP. FMA, BRICK, DelDOT, Own Resources

TOWN OF SEAFORD

General Profile

a. The City of Seaford is the largest city within Sussex County and encompasses 3.5 square miles.

b. 2020 Census: 8,457

c. Major Economy: Tourism and vacation

Top Hazards

a. Flooding

b. Extreme wind

c. Winter storms

d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Seaford	X	X	X	X		X	X		X	X		X	X	X	X	X	X	X	X

Codes

a. 2018 ICC/IBC/PC

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status		Updated 2020	
BCEGS Grades	BCEGS Grade		6	
NFIP Participation	NFIP Entry Date		2/1/79	
CRS Communities	CRS Entry Date	10/1/96	CRS Class	9

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	M	M	M

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Stormwater Conduct computer modeling of key drainage in and around the City to identify restrictions and/or potential problems. Also identify necessary modification or repairs to improve functionality.	Yes	High	Short term	In process	Zero cost	N/A
Ensure security of water production sites and storage facilities.	Yes	High	Short term	Pending funding source	$50,000	HSGP, ARPA, HMPG, CDBG

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Stormwater management system Virginia Ave (regional system project to mitigate rep loss properties due to improper construction.	Yes	High	Short term	Completed	$200K	DNREC
Address street flooding in the Washington and State Street area- identify necessary modification or repairs to improve functionality.	Yes	High	Short term	Completed	$1.99M	Town, US DOT

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Construct storms drain improvements on Washington Street to increase the drainage capacity of the area and prevent future flooding.	No	Moderate	Short term	Completed	Same and part of project as 2	N/A
Construct stormwater drains on Porter Street to increase the drainage capacity of the area and prevent future flooding.	No	Moderate	Short term	Completed	$50,000	N/A

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions For Consideration						
Chapple Branch Stormwater Management, Revise drainage for heavy rain events	No	Moderate	Short Term	Pending funding	$200,000	HMGP, FMA, DNREC, DelDOT
Natural Hazard risk outreach					Pending study	

Issues

a. Main business district at 26 to 29 feet

b. https://www.seafordde.com/government/departments_offices/code/flood_zone_information

TOWN OF SELBYVILLE

General Profile

a. Size: Town encompasses 4 square miles

b 2020 Census: 2684

c Major Economy: Poultry and light industry

Top Hazards

a. Flooding

b. Extreme wind

c. Winter storms

d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Selbyville	X		X	X								X	X	X	X	X	X		X

Building Codes

a. 2012 ICC

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		Updated 2020	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		7/16/91	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

Self-Assessment	**Technical Capability**	**Fiscal Capability**	**Administrative Capability**
	M	M	M

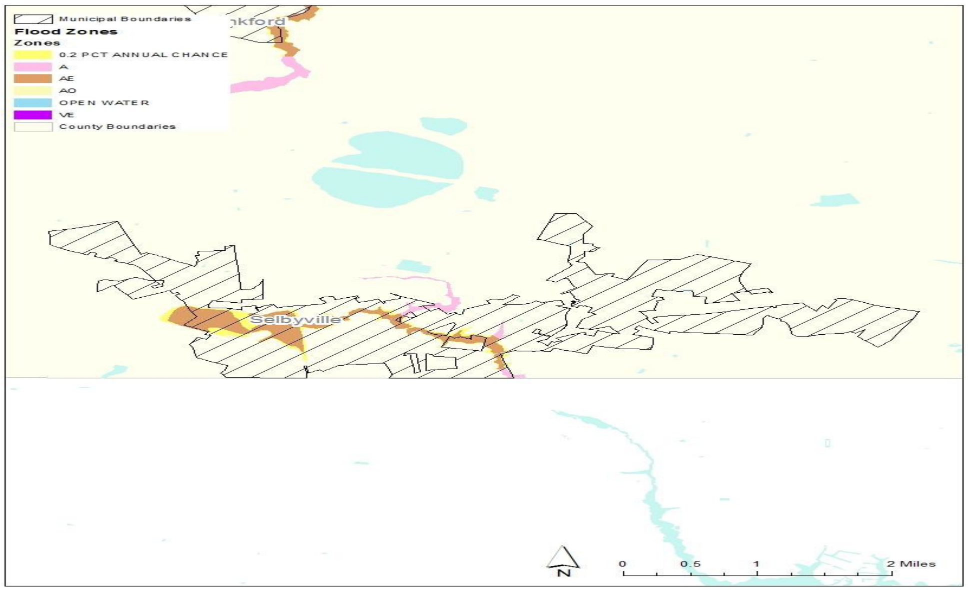
NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Educate residents and improve public awareness on being better prepared to face hazards. Website	Yes	High	Ongoing	Ongoing	$1000	HMGP, FMA, PDM, CDBG

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Storm Preparedness Plan: plan calls for community alerts, storm vulnerable materials removal by public works	Yes	High	N/A	Ongoing	Minimal (built in)	N/A
Replace deteriorating bridge and culverts on Railroad Avenue over major storm water management ditch.	Yes	High	Completed	Completed	$395,000	Private/Public Partnership DNREC RCDF
Installed culverts along railroad avenue and Hosier Avenue Storm Water Management along Baker alley New Drainage line and pond.	Yes	High	Completed	Completed	$2,000	Private/Public partnership state and local assistance

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Stormwater Management Study Asset Inventory and Infrastructure Assessment	Yes	High	N/A	Pending	$120,000	DNREC ARPA BRIC



SOUTH BETHANY

General Profile

a. The Town of South Bethany is encompassing 0.5 square miles.

b. The town is bordered to the north by Bethany Beach, Fenwick Island to the south, the Atlantic Ocean to the east, andunincorporated sections of Sussex County to the west.

c. According to the 2020 Census, the population of the Town of South Bethany is 563 but willswell to over 1400 during the summer vacation season.

d. The Town of South Bethany economy centers on the tourism and vacation industry.

Top Hazards

a. Flooding

b. Tidal flooding (Downtown)

c. Heavy winds and severe coastal storms

d. Winter storms

e. Extreme heat/cold

Plans and Programs

	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
South Bethany	X	X	X	X	P	X	X		X	X	X	X		X	X	X	X	X	X

P=PENDING

Building Codes

a. Not sure what building codes using

b. Enforced locally

Significant indicators for a local jurisdiction's ability to implement a mitigation strategy

Comprehensive Plan Update	Plan Status:		Complete 10-year re-cert (2016) Pending (Five yr. update)	
BCEGS Grades	BCEGS Grade		DECLINED	
NFIP Participation	NFIP Entry Date		10/6/1976	
CRS Communities	CRS Entry Date	10/1/2007	CRS Class:	8/9

Self-Assessment	Technical Capability	Fiscal Capability	Administrative Capability
	M	L	H

NFIP Registered Repetitive Loss Properties

	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
Town of South Bethany	1	5	$100,038 Remediated Elevated

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Improve existing drainage system throughout the town. Rain Garden	Yes	High	Ongoing	In Progress Migrating to smaller projects as needed	$250,000. $20,000/$30,000 per year	HMGP, FMA, BRIC, DelDOT, DNREC
Upgrade the Town's Building and Zoning Ordinances to reflect NFIP and ISO requirements. Pending County Update.	Yes	Moderate	Short term	Complete	$1000	Self-funding
Continue to identify and promote flood-proofing/elevation solutions for at-risk homes throughout the Town in accordance with current FEMA regulations.	Yes	Moderate	Shortterm	Complete	$5,000	HMGP, FMA, BRIC

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Flood elevation one house: Back Bay (204 Carlisle Road/Drive)	Yes	High	Short term	Complete	$59,000	N/A 7 years ago
2019 – Resilient Community Partnership Project – Partnership includes Fenwick, South Bethany, Bethany, Dewey, Henlopen Acres, Lewes, Rehoboth. Funding from DCMP OCM and NOAA. Study of impervious surface coverage to address its impacts on stormwater management, flooding, and water quality.				Completed		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
Sea level Rise Committee formed: Elevation mapping of entire Town Mapping completed 2015 Updates pending appeals	Yes	High	Ongoing	Ongoing	$10,000	HMGP, FMA,
Public Outreach by Sea Level Committee. Direct mailings and website management	Yes	High	Ongoing	Ongoing	$1,000	Self-funding

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Brochure/Public Open House.						
Street infrastructure and stormwater management. Elevate and resilient design revision York Drive. Secondary evacuation area	No	High	Long Term	Pending Funding	Est $10M	DNREC, ACE, DelDOT, FEMA, BRICK
Cats Hill area resilient roadway design. Area dense.	No	High	Long Term	Pending	Pending study	DNREC, ACE, DelDOT, FEMA, BRICK

SLAUGHTER BEACH

General Profile

a The Town of Slaughter Beach is encompassing 1.3 square miles.

b 2020 Census: 253

c Major Economy: Tourism and vacation

Top Hazards

a. Flooding

b. Extreme wind

c. Winter storms

d. Extreme heat/cold

Plans and Programs

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Slaughter Beach			X			X	X		X			X		X	X	X	X		X

Building Codes

a. Sussex County

Significant indicators for a local jurisdictions ability to implement mitigation strategy

Comprehensive Plan Update	Plan Status		Updated 2016	
BCEGS Grades	BCEGS Grade		8	
NFIP Participation	NFIP Entry Date		7/02/80	
CRS Communities	CRS Entry Date	NA	CRS Class:	NA

	Technical Capability	Fiscal Capability	Administrative Capability
Self-Assessment	L	L	L

NFIP Registered Repetitive Loss Properties

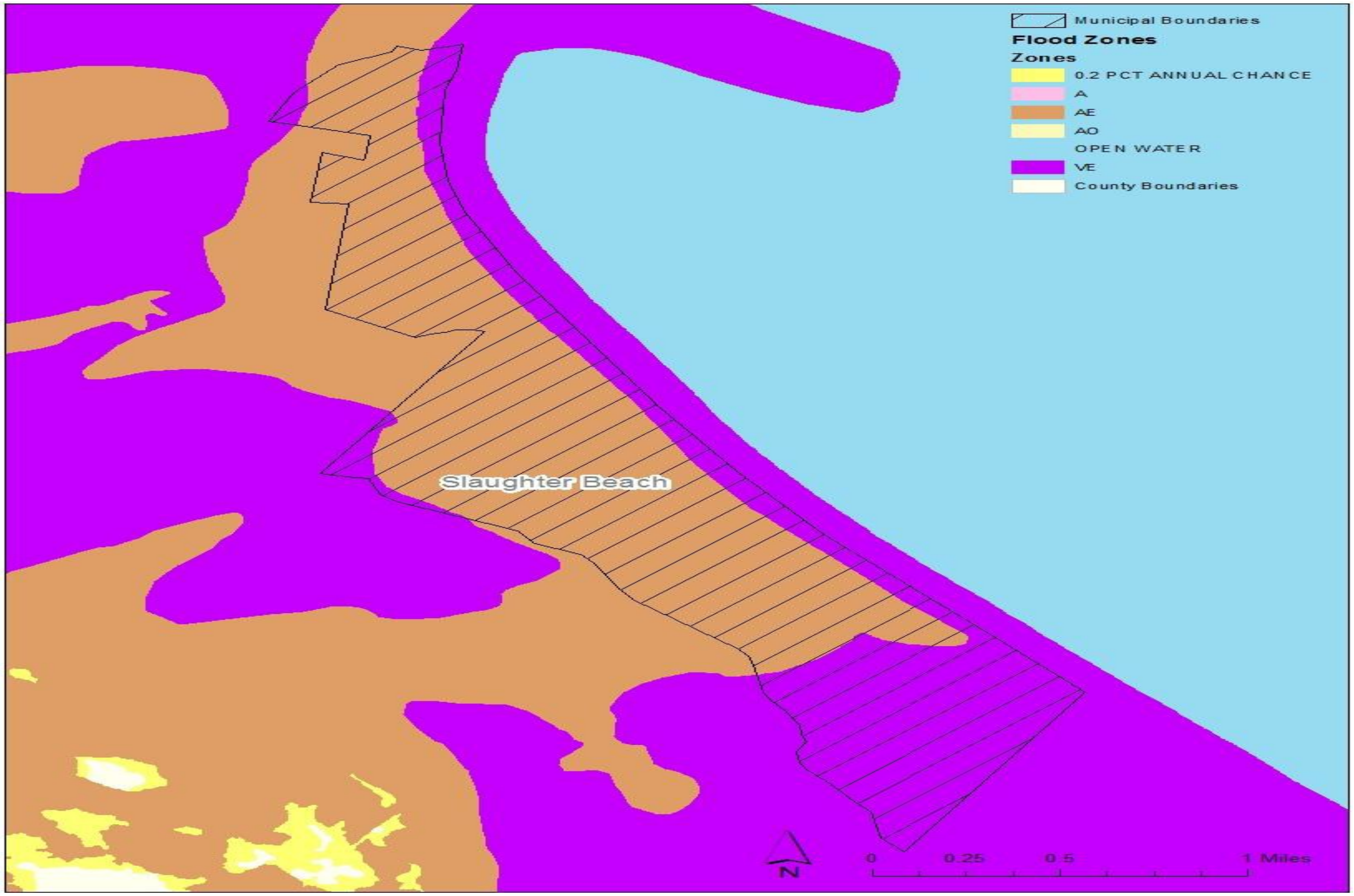
	Number of Properties	Number of Losses	Total Cost
Repetitive Loss Properties			
	Pending updated data		
Severe Repetitive Loss Properties			
	Pending updated data		

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Previous Plan Mitigation Actions Review						
Improve stormwater drainage throughout entire town	Yes	High	12 to 18 months	Ongoing	$180,000	Funded in North End of town
Flood-proof water pumping stations.	Yes	High	24 months	Ongoing	Unknown	One head has been raised. Private entity.
Elevate access and evacuation roads that flood (Route 224 - Slaughter Beach Road 1' - 4' from intersection of Bay Avenue to west boundary of Prime Hook National Wildlife Refuge (± 1 mile).	Yes	High	24 months	Delayed	$1M	Pending vulnerability Assessment
Elevate flood-prone homes.	Yes	High	24 months	Ongoing	$205,000	Working with DEMA awarded contract
Perform regular beach replenishment	Yes	High	12 months	Ongoing	$15,000	State reformed and replenished beach and beach grass. DENRC
Restore and/or renourish beach and protective dunes.	Yes	High	When funds become available	Not started	Pending study	See above
Initiate stormwater management system improvements along ± 1 mile of North Bay	Yes	Low	When funds become available	Not started	Pending study	Stormwater drainage study above.

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Mitigation Actions Started / Completed since 2016 Plan Update						
Develop automated telephone warning system.	Yes	High	When funds become available	Completed	$1,000	Put in place an email outreach system
Develop a strategy to improve NFIP enforcement processes to include local permitting processes.	Yes	High	6 months	Completed	Pending study	CAV report completed and updated
Provide building/zoning/flood zone ordinances to public via Web site or other electronic means.	Yes	Moderate	When funds become available	Completed	Pending study	

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Potential / New Mitigation Actions for Consideration						
In process of studying Sewer wastewater mgmt. lines	Yes	Moderate	12 months	ongoing	$60,000	Feasibility study
Updating water quality					Pending study	
Del Forrest Service Study for Frag study	Yes	Moderate	12 months	Ongoing	$10,000	In Process

Project Description	Adopted	Priority	Timeline	Status	Estimated Cost	Potential Funding Source
Univ of Del Study Marsh water elevation.	Yes	Low	12 months	Ongoing	Unknown	In progress in partnership with UD
Jetty repair north side of town	No	Low	24 Months		$30M	Major restoration project
Propane tank tiedown ordinance	No	Low	12 months	Pending	$1500	
Plan for Severe weather sheltering	No	Low	12 months	Ongoing	Vulnerability	Pending Vulnerability Assessment


Municipal Boundaries
Flood Zones
Zones
0.2 PCT ANNUAL CHANCE
A
AE
AO
OPEN WATER
VE
County Boundaries
Slaughter Beach
N
0
0.25
0.5
1 Miles

Appendix B: Acronyms

Acronym	Definition
A/CP	Needs to adopt Sussex County EOP
AE	Areas of Inundation
BC	Building Codes
BCEGS	Building Code Effectiveness Grading Schedule
BFE	Base Flood Elevation
BRIC	Building Resilient Infrastructure and Communities
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CIP	Capital Investment Plan (that regulates infrastructure in hazard areas)
CLUP	Comprehensive Land Use Plan
COOP	Continuity of Operations Plan
COVID	Coronavirus Disease
CPRI	Calculated Priority Risk Index
CRS	Community Rating System
D/D	Delaware Department of Transportation
DEMA	Delaware Emergency Management Agency
DFIRM	Digital Flood Insurance Rate Maps
DGS	Delaware Geological Survey
DLLG	Delaware League of Local Governments
DNP	Did not Participate

Acronym	Definition
DNREC	Delaware National Estuarine Research Reserve
DOE	Department of Education
DRP	Disaster Recovery Plan
DT	Domestic Terrorists
EF	Enhanced Fujita
EM	Emergency Management
EOC	Emergency Operation Center
EOP	Emergency Operation Plan
EPCRA	Emergency Planning and Community Right-to-Know Act
FBI	Federal Bauru of Investigation
FDPO	Flood Damage Prevention Ordinance
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FMP	Floodplain Management Plan/ Floodplain Mitigation Plan
FTP	File Transfer Protocol
FY	Fiscal Year
GIS	Geographic Information System
HAZUS	Hazards United States
HI	Heat Index
HIRA	Hazard Identification and Risk Assessment

Acronym	Definition
HMP	Hazard Mitigation Plan
HMSC	Hazard Mitigation Steering Committee
HMWG	Hazard Mitigation Working Group
HPP	Historic Preservation Plan
I/C	In Jurisdictional City Code
IBC	International Building Code
IPCC	International Panel on Climate Changes
IRC	International Residential Code
ISO	Insurance Service Office
IT	Information Technology
LEPC	Local Emergency Planning Committee
LIDAR	Light Detection And Ranging
LNG	Liquefied Natural Gas
LTI	Long-Term Impact
MOU	Memorandum of Understanding
MPH	Miles per Hour
MSL	Mean Sea Level
NCDC	National Climate Data Center
NESIS	Northeast Snowfall Impact Scale
NFIP	National Flood Insurance Program
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration

Acronym	Definition
NTDE	National Tidal Datum Epoch
NWS	National Weather Service
OEM	Office of Emergency Management
OGL	Olson Group Ltd
P	Pending
PDM	Pre-Disaster Mitigation
PDSI	Palmer Drought Severity Index
PIO	Public Information Officer
POE	Probability of Event
REG-PL	Regional Planning
REP	Radiological Emergency Plan
RFC	Repetitive Flood Claims
ROW	Right-of-Way
RSA	Rivest-Shamir-Adleman (algorithm)
S/C	Sussex County
SARA	SARA Title III Emergency Response Plan
SC	Sussex County
SCAT	Sussex County Association of Towns
SCEOC	Sussex County Emergency Operations Center
SCO	Santa Cruz Operations
SERC	State Emergency Response Commissions
SFHA	Special Flood Hazard Area

Acronym	Definition
SLR	Sea Level Rise
SME	Subject Matter Expert
SMP	Stormwater Management Plan/ Floodwater Mitigation Plan
SO	Subdivision Ordinance
SOI	Survey of Impact
SRL	Severe Repetitive Loss
TBD	To Be Determined
TRANS	Transportation Plan
UNK	Unknown
US	United States
USC	United States Code
USGS	United States Geological Survey
W/W	Wastewater
WCT	Wind Chill Temperature
WRDE	News Station Name
ZO	Zoning Ordinance

APPENDIX C: MEETING DOCUMENTATION

Initial Planning Meeting:

Date/Location: On Friday October 29, 2021, the Olson Group Ltd. (OGL) facilitated an HMP Initial Planning Meeting with the Sussex County HMP Steering and Working Group committees. The meeting was held virtually via Microsoft Teams.

Meeting Participants: Representatives from Sussex County Emergency Management Department, GIS, and the Olson Group Ltd participated as part of the working group.

Name	Organization
Adam Montella	OGL
Joseph Thomas	Sussex County
Anthony Mangeri	OGL
Andrew Forcucci	OGL
Scott Sleeman	OGL
Brian Tolley	Sussex County GIS mapping department
Joseph Bucovetsky	FEMA Region 3
Charles	Sussex County
Chief Keith Banks	City of Rehoboth Beach
Dr. Rodric Bowman	OGL
Ellen Lorraine McCabe	City of Louis
Gene Dvornick	Georgetown
James W. Bailey	Broadkill Beach
Jamie Burk	Millsboro
Janelle Cornwell	City of Lewes Planning
John Apple	Bethany Beach

Name	Organization
Joe Thomas	Sussex County
Kathleen Lock	Slaughter Beach
Matt McCall	FEMA
Kenny West	Count of Laurel
Megan Nehrbas	Sussex County Geographic Information office
Meghan Martin	Sussex County
Corey Shinko	City of Rehoboth Beach
Joanne Perry	City of Rehoboth Beach

Meeting Agenda

- Introductions
- Steering Committee & Working Group
- Hazard Mitigation Planning Overview
- Work Plan/ General Schedule
- Data & Information Needs
- Next Steps
- Project Administration
- Next Meeting/ Action Items

Potential Mitigation Projects

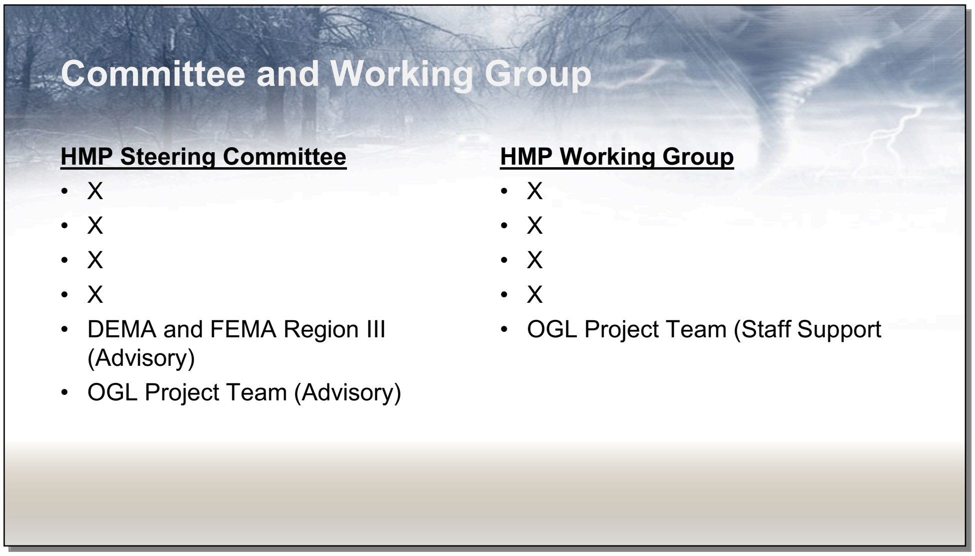
- **Soft mitigation projects:**
    - Ensuring buildings are up to code.
    - Land development regulations
    - Public education
- **Hard mitigation projects:**
    - Elevation, reconstruction, retrofits, drainage improvements, utility improvements, physical security.
    - Hardening/Retrofitting of Structures/Critical Facilities

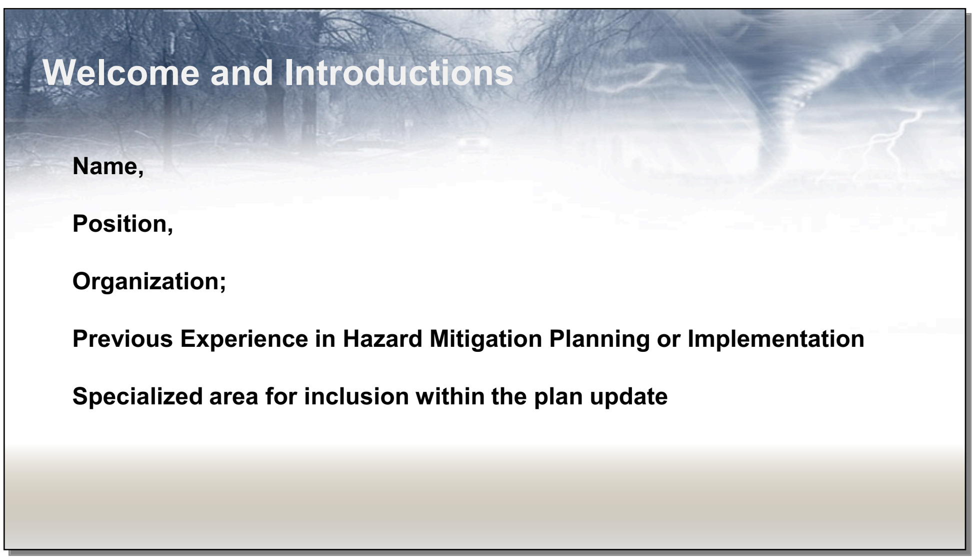
    - Window shutters, strengthening doors, hurricane straps
- **Community Shelters**: Build to withstand extreme winds and flying debris accessible to the public. (Shelter cannot be used for anything else.)
- **Alert/Warning systems**
- **Trainings**: Active Shooters, Terrorism, Civil Unrest.

Planning Timeline:

Activity	Date & Time
Conduct Project Kickoff Meeting	(Week 1)
Review Documents	(Week 2-4)
Conduct Stakeholder Kick-off Meeting	(Week 3)
Update Hazard Identification and Risk Assessment	(Week 5 & 6)
Review and Update Mitigation Strategy	(Week 7 & 8)
Complete Revised Draft	(Week 8-10)
Review and Finalize Updated Draft	(Week 11-14)
Concurrently Submit final plan and draft update to DEMA and FEMA region III for review and approval	(Week 15-20)
Facilitate adoption and project closeout	(Week 26)
Conduct close-out meeting	(Week 26)

Initial Planning Meeting Slides


Committee and Working Group
HMP Steering Committee
• X
• X
• X
• X
• DEMA and FEMA Region III (Advisory)
• OGL Project Team (Advisory)
HMP Working Group
• X
• X
• X
• X
• OGL Project Team (Staff Support


Welcome and Introductions
Name,
Position,
Organization;
Previous Experience in Hazard Mitigation Planning or Implementation
Specialized area for inclusion within the plan update

HMP PURPOSE

Today's workshop will:

- Provide stakeholders with an overview of hazard mitigation planning in Sussex County.
- Provide stakeholders with an overview of the planning project, planning components, and processes.
- Provide stakeholders with an understanding of their roles and responsibilities.

HMP Benefits

- More resilient community.
- Reduced risk (Insurance Cost).
- Required for pre-disaster hazard mitigation grant programs.
- Required for post-disaster public assistance and hazard mitigation grant programs.

Sussex County, Delaware
Hazard Mitigation Plan Update Overview

Potential Mitigation Projects

"Soft" Mitigation Projects:
- Building code enforcement.
- Land development regulations.
- Public education.
- Studies and plans.
- More…

Potential Mitigation Projects

"Hard" Mitigation Projects or "Property Protection" Construction:

- Elevation, mitigation, and reconstruction of structures.
- Retrofits for high wind loads such as installing hurricane shutters.
- Improving drainage.
- Utility improvements.
- Physical Security Enhancements (equipment)
- More…

Elevation

- Raising a structure above the Base Flood Elevation.
- Building size, structural integrity, and type of foundation must be considered.
- There are different types of elevation which can be used depending on the structure.

Top Picture: A house in Miami in the process of being elevated.
Bottom Picture: That same house once completed.
Taken from FEMA, *Above the Flood, 2000*

Mitigation Reconstruction

- Pilot program funded under Disaster Declarations 1603 and 1607 (Hurricanes Katrina and Rita).
- If elevation is not feasible then accept risk or reconstruct at the same location and meet current construction codes and standards.

Hardening or Retrofitting of Critical Facilities

Potential Projects for county buildings (hospitals, health care facilities, utilities, police stations, emergency operations center, housing, physical plant, etc.):

- Install shutters or impact resistant glass on windows.
- Strengthen the doors.
- Install hurricane straps and clips to strengthen roof.
- Bolt walls to foundation.
- Relocate utility lines underground.
- Elevate the heating, ventilating and cooling (HVAC) equipment, such as furnace and hot water heater.

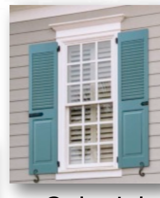
Hardening or Retrofitting of Critical Facilities

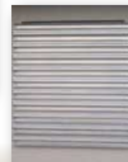
Install Shutters or Impact Resistant Glass on Windows


Accordion Shutters


Roll-Down Shutters

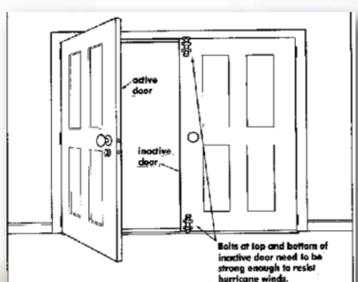

Impact-Resistant Glass


Colonial Shutters

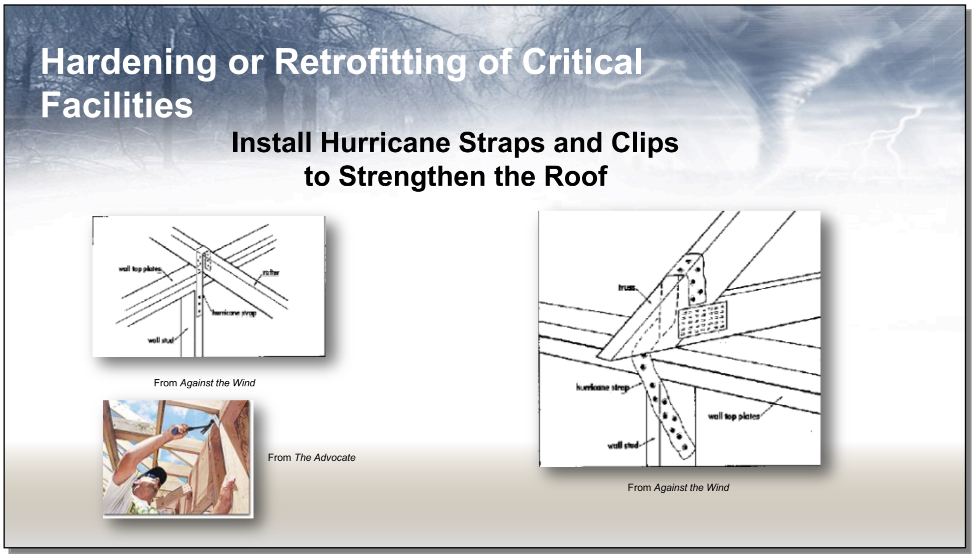

Corrugated Metal Panel

Hardening or Retrofitting of Critical Facilities

Strengthen the Doors



From *Against the Wind*


Hardening or Retrofitting of Critical Facilities
Install Hurricane Straps and Clips
to Strengthen the Roof
wall top plates
rafter
hurricane strap
wall stud
From Against the Wind
From The Advocate
truss
hurricane strap
wall top plates
wall stud
From Against the Wind

Status Update Meeting

Date/Location: On Tuesday April 12, 2022, Representatives from Sussex County and The Olson Group Ltd. (OGL) facilitated a meeting to update the process and schedule the next several meetings. The meeting was held virtually via Microsoft Teams.

Name	Organization
Anthony S. Mangeri	Olson Group Ltd.
Scott T Sleeman	Olson Group Ltd.
Joseph Thomas	Sussex County EM

Meeting Objective:

- Status update of jurisdictional interviews and schedule required meetings

Overview of discussion:

- Updated jurisdictional interviews. 3 jurisdictions have not responded (Greenwood, Dagsboro, and Bethel)
- Will complete remainder of interviews on April 19, 2022
- Update each jurisdiction to validate information before public meeting
- Joe was contacted by DEMA that the current HMP that was adopted by the County on April 11, 2016, had expired on April 11, 2022.
- Anthony was in the process of writing an extension request to send to Joe for him to forward with Sussex letter head with the extension request to June 2022.
- DEMA representatives have been included in all email and was aware that we were finalizing the jurisdictional interviews and updated timeline.
- 22 April 2022 Meetings
    - 9am for Steering Committee Members
    - 915am for Working Group Members
    - 10am for Public Comment Meeting #1
    - Scott will send out Agenda and 2 Teams meeting invitations for all jurisdictions to comply with the County 7-day notice of public hearings
- Need to determine the status of HAZUS analysis by County GIS
- Discussed need for MOU with County and jurisdictions who are dependent upon County building codes, permits, inspections, and enforcement.
- Currently using 2012 IRC/IBC
- Discussed County PIO to update Website to publish 2022 Plan

Next Steps:

Responsible Party	Activity	Date
Scott S. (OGL)	▪ Send out meeting Teams invitations and agenda. ▪ Develop slide deck for meeting	Completed by April 14, 2022
Scott S. (OGL)	▪ Schedule meeting with GIS for status of HAZUS analysis ▪ Forward all jurisdictional interviews	N/A.
Anthony M. (OGL)	▪ Write letter of to request HMP extension	N/A

Mid-Term Planning Meeting

Date/Location: On Friday April 22, 2022, The Olson Group Ltd. (OGL) facilitated an HMP Mid-Term Planning Meeting with the Sussex County HMP Steering and Working Group committees. The meeting was held virtually via Microsoft Teams.

NAME	ORGANIZATION	NAME	ORGANIZATION
Scott Sleeman	Olson Group Ltd.	Phil Cane	DEMA
Anthony Mangeri	Olson Group Ltd.	Puchalsky, Justin	DEMA
Megan Nehrbas	Sussex County, GIS	Jamie Burk	Town of Millsboro
Brian Tilley	Sussex County, GIS	Teresa Tieman	Town of Bethany Beach
Jeff Sellman	Town of North Shores	Carey, Nicole (DEMA)	DEMA
Evan Miller	Rehoboth Beach	Mike Bailey	Town of Seaford
Chief Keith Banks	Rehoboth Beach	Joseph Thomas	Sussex County, EM
Tom Quass	Town of Milton		

Meeting Participants: Representatives from Sussex County Emergency Management Department, GIS, along with representatives from Delaware Emergency Management Agency (DEMA). As part of the working group, representatives from local jurisdictions and OGL were present at the meeting.

Meeting Agenda:

I. Identify members of the Steering Committee
II. Identify members of the Working Group
III. Hazard and Risk Matrix
IV. Hazard Priority
V. Next Steps
VI. Timeline
VII. Public Meetings

Meeting Objective: To finalize the HMP's hazards and priority, and other information still needed such as deliverables, timeline and dates for additional steering and working group meetings, public comment meetings, and the submissions of draft and final copy to DEMA/FEMA.

Topic Points:

- Participating requirements for jurisdictions.
- Commitment to read plan materials and participate in jurisdictional interviews.
- Adoption of Sussex County Plan by each participating local jurisdiction
- Identified members of the Steering Committee
- Identified participating jurisdictions and members of the working group.
- Discussion of identified hazards and the Risk Matrix
- Identified the Hazards and their ranking by priority.
- Future meeting schedule
- Dates of deliverables.

Discussion Points:

1. Joe Thomas from Sussex County Emergency Management Office welcomed all those who were participating in the call. He recognized that all jurisdictions (except 3) are actively participating in the process and completed their respective interviews with the OGL team.
2. Introductions of participating jurisdictions who were present for the meeting.
3. Emphasis was made that this plan was a regional hazard plan, however, each jurisdictions need to adopt the plan after it is approved by DEMA/FEMA.
4. Issue of repetitive loss for jurisdictions. Some of the reported losses have exceed the time reporting standards and need to be removed from the records.
5. The need for community participation in the Public Meetings and continual means to update when appropriate.

6. Requested that jurisdictions that have not submitted their record of town adoption from the 2016 plan, to please forward to OGL.
7. Discussion on the purpose of identifying the hazards that pose the greatest threat to Sussex County and rank them on how the hazard will affect the county both short term and long term.
8. Discussed all the hazards that were considered and that the top 10 would be the major focus of this plan. However, the other identified hazards will be discussed.
9. One new hazard identified in the survey for 2022, was the addition of terrorism, and that was not considered in the 2016 plan.
10. Discussion on what definition of terrorism was used in the survey, and it was noted that it was left up in general terms. After discussing the importance of adding terrorism, DEMA agreed to send OGL verbiage that they are currently using to update their other plans at the state level.
11. This plan will use the current CFR requirements, which terrorism is not required.
12. Once the hazards were identified and their priority, it was approved by each member of the committees who were present on the call.
13. Discussion of using the best available data, and limitations of the state of Delaware in requiring critical facilities inventories. Sussex GIS has added known critical facilities in their HAZUS run.
14. Building codes currently being used is the 2012 IRC/IBC.
15. Sussex produced a copy of the jurisdictions that the county currently conducts plan reviews, inspections, issue permits, and provides enforcement.
16. Discussion of impacts resulting from COVID and was answered that it should be addressed in an After Action Review and not in this current plan.
17. Discussion of adding new hazards and risks due to adapting circumstances can always be addressed in the next plan cycle.
18. Project timeline and deliverables were discussed
19. Dates of future steering/working group, and public comment meetings were scheduled.

Next Steps:

Organization	Activity
DEMA/FEMA	DEMA/FEMA has agreed to meet to review the draft copy together so speed up the turnaround time needed to make changes before the final draft is submitted at the end of June.
OGL Staff	Publish all read-ahead materials, and presentations 5 days prior to meetings.

County GIS Discussion

Date/Location: On Friday April 22, 2022, The Olson Group Ltd. (OGL) facilitated a discussion with Sussex County GIS department regarding HAZUS. The meeting was held virtually via Microsoft Teams.

Meeting Participants: Representatives from Sussex County Emergency Management Department, GIS, and OGL were present at the meeting.

NAME	ORGANIZATION
Scott Sleeman	Olson Group Ltd.
Anthony Mangeri	Olson Group Ltd.
Megan Nehrbas	Sussex County, GIS
Brian Tilley	Sussex County, GIS
Joe Thomas	Sussex County EM

Meeting Objective: To discuss the information that is needed from the HAZUS including maps and analysis.

Overview of Discussion:

- GIS uses standard FEMA data sets
- Critical facilities (analysis will not be completed for this cycle)
- Use data from 2016 as a benchmark
- Need to update maps and tables for the HMP.
- Population data can be pulled from the new 2020 census data.
- Sussex County undergoing re-assessment which will require a data footprint of all facilities in the county.
- OGL will follow up with GIS on Wednesday 27 April

Next Steps:

Organization	Task
GIS department	Send all applicable information, maps, etc. and link to OGL.
Sussex County	Write the narratives and the analysis.
OGL Staff	Follow up with GIS on Wednesday 27 April

Sussex County HMP Public Meeting #1

Date/Location: On Monday, May 2, 2022, the Sussex County Emergency Management, and the Olson Group Ltd., conducted the first of three public comment meetings to outline the Hazard Mitigation Plan (HMP) for 2022. Individuals from Sussex County, Olson Group, Delaware Emergency Management Agency (DEMA), local jurisdictions and members of the public were invited to attend and participate

Meeting Participants: Below are the individuals who attended the meeting.

Name	Agency	Name	Agency
Scott Sleeman	Olson Group	Joe Thomas	Sussex County
Anthony Mangeri	Olson Group	Tom Quass	
Julia Geha	Slaughter Beach	Cane, Phil	DEMA
Mike Bailey	Seaford	Joseph Hinks	South Bethany
Ronald Verosko	Sussex County	Teresa Tieman	Bethany Beach
Daune Hinks (Guest)		WRDE News (Guest)	
Town Clerk	Fenwick Island	Bethany DeBussy	
Puchalsky, Justin	DEMA	Carey, Nicole (DEMA)	DEMA
Georgetown (Guest)		Ken Cimino (Guest)	
Meghan Dunigan	Olson Group	13025393011	
Dave Thomas (Guest)		12026899103	

Agenda:

1. Introduction and welcome to all participants
2. Introduction of Steering Committee and Working Group
3. HMP Overview
4. Work Plan/ General Schedule
5. Data and Information
6. Next Steps
7. Next Meeting
8. Public Comment and questions

Discussion Outline:

- Soft mitigation projects
- Hard mitigation projects

- Elevation of existing/new structures
- Retrofitting of critical facilities
- Draining improvements
- Wet flood proofing
- Dry flood proofing
- Community strategies

Data Collection:

Interviews from each participating localities were conducted where they self-rated their ability to respond to and actively mitigate a hazard or risk. Each jurisdiction also identified past projects that were completed since 2016, currently in progress, and future projects wish list.

Planning Timeline:

Activity	Date
Second public meeting scheduled	17 May 2022
Third public meeting	TBD
Final copy to DEMA/FEMA and end of project briefing	30 June 2022

- Draft copy still being updated and will send to the Steering Committee and Working Group for approval.
- Second public meeting scheduled for 17 May
- Third public meeting scheduled for XXXX
- Final copy to DEMA/FEMA and end of project briefing on 30 June.

Public Comment:

1. **Question**: Julie

   Where is the assessment for Slaughter Beach located as it stands today?

   - **Answer**: Anthony Mangeri
     So the 2016 plan does have the assessments for Slaughter Beach from 2016. We are in the process of running those HAZUS models today and will be revising those and making those available to each of the communities. Right now, the draft plan analysis is still under way, but at the end of the document, you will see that there is a profile for each community and information of threats and activities for the community.

2. **Question**: Dave Thomas:

Back in 2016, there was substantial material submitted by e.g., Melissa Golden and others respecting Mallard Lakes in the aftermath of Sandy and the lack of inspections, accurate reporting, occupancy permits, the need for condominium associations and other common interest communities to have mitigation plans and compliance measures and so on. Whatever was done about any of this?

- **Answer:** Anthony Mangeri
  Regarding Miss Golden and others respecting Mari regarding Merrill Mallard lakes, I do not see where anything was either accepted as accurate, rejected as inaccurate, or reason, explanation, or otherwise dealt with or responded to. Indeed, the last I heard while this was quite a mess. It was said to be a dispute that was going nowhere.
- Only earlier this year, 2022, that Mallard Lakes property have been listed for sale based on not being in a flood zone, according to the disclosure of condition and so on, where it appeared that it was in an AE flood zone and so on, should not a condominium association have to identify accurate flooding information and status?
- The letters that were submitted years ago, where detailed and deserved a point-by-point answer in several. Joe, if you do not mind, I would like to start from a planning perspective so that everyone's aware Mallard lakes and Hurricane Sandy received our support.
- There was flooding in an area of the property in 2016, we visited the property, and we did an assessment of the damages. FEMA has also assessed it, and there were building damage assessments done. The county has looked at it, and we even met with the residents there and had a public meeting. The comments were addressed both at the meeting and I am not so sure there is remaining issues there and that is something for the county to tell us. I believe that's unincorporated area.
- **Answer**: Joseph Thomas
  It is part of a subdivision, but yes, it is in the unincorporated part of the county.
- **Answer**: Anthony Mangeri
  And do you want to comment on any of the other issues there, Joe? I do not know if the properties being sold, I do not know what condition of sales were done that that would be outside our purview except for the floodplain manager of the county. But from a planning perspective, we are aware of the inundations there. The mapping is correct. Is there anything you want to add you?
- **Answer**: Joseph Thomas
  No. As you said, the floodplain manager for the county is the one that is involved when it comes to the points that you just identified. You are right, we went down and met with them and talked to them.
- **Answer**: Anthony Mangeri
  Yeah, from a planning perspective, we do look at the threat. We want to continue to look at threats in any community. So certainly, one of the things that has changed in a variety of communities not to address Mallard lakes, but in general is obviously we have improvements and development in areas encroaching or coming close to high hazard areas. But just the density alone in the changes or properties and developments being built decades before we knew of the severity of inundation concerns and changes of that

profile. That is why one of the first things we do is a threat profile. Each time we revise this plan to look at how the communities have shifted or changed.

3. **Comment:** Gary Horbacher:

   From the perspective of someone who has experienced a category two hurricane coming ashore on South Carolina coast. The area not unlike ours, particularly with respect to roadways and evacuation issues. One of the most unanticipated planning issues that developed occurred when literally thousands of voters raced to local waterways to recover the trailer and hinge. And there are large and small boats, far too many of the trailers broke down on the roadways, were hard to recover because of the absence of sufficient Road assistance and crowded Road delays. Too often, trailer boats were simply abandoned, and traffic was temporarily stopped or restricted to a single lane. I hope pre-evacuation planning eliminates our elements, rather includes such potential issues.

   - **Answer** Joseph Thomas
     So the Delaware Department of Transportation has a traffic management plan and an incident management plan that they had this statewide plan. Under that plan, there is an annex for the evacuation of Sussex County. Primarily for a hurricane event, but any type of event that we must see evacuation. Basically, Department of Transportation is responsible to manage the road network during that evacuation as well as logistically manage the roadways so. This is interesting information, and it is valuable information, and we will pass that on the Dell dot, but at the end of the day, once we declare evacuation, Delaware Department of Transportation basically takes over at that point.

No other questions or comments were made, and the meeting ended.

Sussex County HMP Public Meeting #1 Slides

Steering Committee

Name	Organization
Joe Thomas, Director	Sussex County EOC
Charles Stevenson, LEPC Chair	Sussex County EOC
Jeff Shockley, Sussex County Floodplain Manager	Sussex County Planning and Zoning
Megan Nehrbas, GIS Manager	Sussex County GIS Office
Nicole Carey– State Mitigation Planner	DEMA
Phillip Cane – State Mitigation Officer	DEMA
Joshua Norris- Hazard Mitigation Planner	FEMA Region III
Adam Montella, Project Manager	The Olson Group, Ltd. (OGL)
Andrew Forcucci, Director of Planning	The Olson Group, Ltd. (OGL)
Anthony Mangeri, Planning Lead	The Olson Group, Ltd. (OGL)
Scott Sleeman, Planner	The Olson Group, Ltd. (OGL

Working Group Committee(1/2)

Name	Organization
Aaron Moore	Town of Ellendale
Ann Marie Townshend	City of Lewes
Bethany DeBussy	Town of Bridgeville
Bill Zolper	Dewey Beach
Cheryl Lynch	Town of Frankford
Eric Evans	Town of Millville
Evan Miller	City of Rehoboth Beach
Gene Dvornick	Georgetown
Jamie Burk	Town of Millsboro
Jamie Smith	Town of Laurel
Jeff Sellman	North Shores

Working Group Committee (2/2)

Name	Organization
Kathy Lock	Town of Slaughter Beach
Kenneth Cimino	Town of Ocean View
Kristy Rogers	Town of Milton
Lisa Marks	Town of Blades
Maureen Hartman	Town of South Bethany
Mike Bailey	Town of Seaford
Pat Schuchman	Town of Fenwick Island
Sara Bynum-King	Town of Delmar
Stacey Long	Town of Selbyville
Teresa Tieman	Town of Bethany Beach
Thomas Roth	Town of Henlopen Acres

HMP PURPOSE

Today's workshop will:

- Provide stakeholders and the public with an overview of hazard mitigation planning in Sussex County.
- Provide stakeholders and public with an overview of the planning project, planning components, and processes.
- Provide stakeholders and public with an understanding of their roles and responsibilities

HMP Benefits

- More resilient community.
- Reduced risk (Insurance Cost).
- Required for pre-disaster hazard mitigation grant programs.
- Required for post-disaster public assistance and hazard mitigation grant programs.

Municipal Participation

- Attendance at regularly scheduled local Mitigation coordination meetings.
- A commitment to read plan materials and to participate in the joint planning process.
- Incorporate into the County's plan (at the end of the process).

Risk Matrix and Hazards

Hazards and Risk Matrix

	Unlikely	Somewhat Likely	Likely	Most Likely	Highly Likely
Catastrophic	5	10	15	20	25
Critical	4	8	12	16	20
Minimal	3	6	9	12	15
Negligible	2	4	6	8	10
Insignificant	1	2	3	4	5
	Not Severe	Minimal Severity	Somewhat Severe	Moderate Severity	Most Severe

Hazards Ranking

The hazard identification, analysis, and vulnerability assessment, completed as part of the Plan Update, identified Eleven (11) Natural, Five (5) Human-caused, and Two (2) Technological hazard that have the greatest potential to adversely affect Sussex County and have long-term impacts on the ability to provide basic services.

Flooding (Riverine and Coastal)	25	Terrorism*	10
Hurricane/Straight Line Wind	20	Beach/Soil Erosion ^^	8
Severe Thunderstorms	15	Active Shooter ^^	8
Drought	15	Cyber Ransomware ^^	8
Extreme Heat/Cold	15	Dam Levee Failure ^^	8
Hazmat	12	Cyber Infrastructure ^^	6
Winter Storms	12	Pipeline Failure ^^	6
Tornado	12	Earthquake ^^	6
Hail-Storms	12	Wildfire ^^	6

*Not a previous identified hazard
^^ Not rated

Sussex County, Delaware
Hazard Mitigation Plan Overview

Potential Mitigation Projects

“Soft” Mitigation Projects:

- Building code enforcement.
- Land development regulations.
- Public education.
- Studies and plans.
- More…

Potential Mitigation Projects

“Hard” Mitigation Projects or “Property Protection” Construction:

- Elevation, mitigation, and reconstruction of structures.
- Retrofits for high wind loads such as installing hurricane shutters.
- Improving drainage.
- Utility improvements.
- Physical Security Enhancements (equipment)
- More…

Elevation

- Raising a structure above the Base Flood Elevation.
- Building size, structural integrity, and type of foundation must be considered.
- There are different types of elevation which can be used depending on the structure.

Top Picture: A house in Miami in the process of being elevated.
Bottom Picture: That same house once completed.
Taken from FEMA, *Above the Flood, 2000*

Mitigation Reconstruction

- Pilot program funded under Disaster Declarations 1603 and 1607 (Hurricanes Katrina and Rita).
- If elevation is not feasible then accept risk or reconstruct at the same location and meet current construction codes and standards.

Hardening or Retrofitting of Critical Facilities

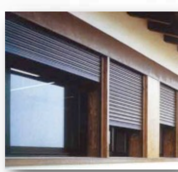
Potential Projects for county buildings (hospitals, health care facilities, utilities, police stations, emergency operations center, housing, physical plant, etc.):

- Install shutters or impact resistant glass on windows.
- Strengthen the doors.
- Install hurricane straps and clips to strengthen roof.
- Bolt walls to foundation.
- Relocate utility lines underground.
- Elevate the heating, ventilating and cooling (HVAC) equipment, such as furnace and hot water heater.

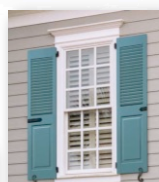
Hardening or Retrofitting of Critical Facilities

Install Shutters or Impact Resistant Glass on Windows

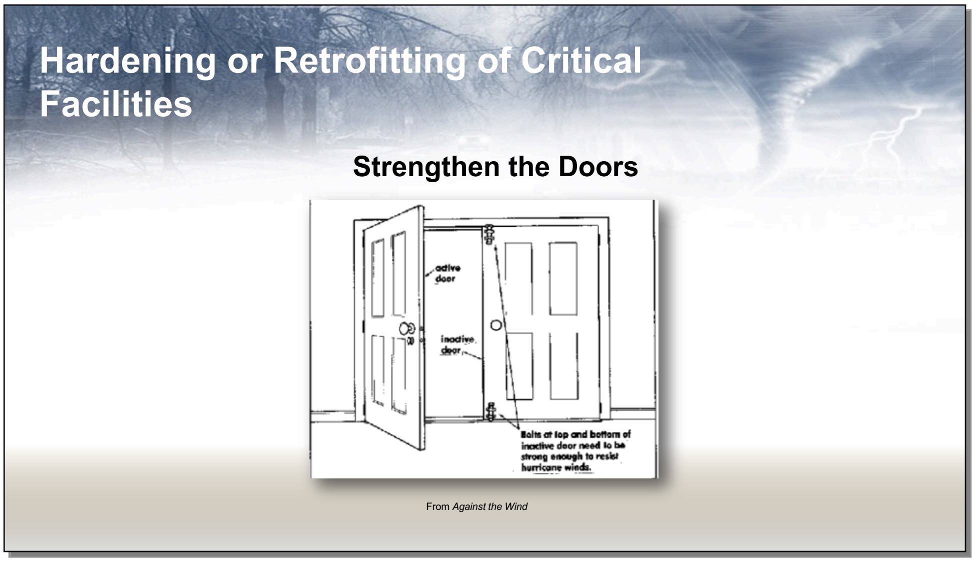

Accordion Shutters

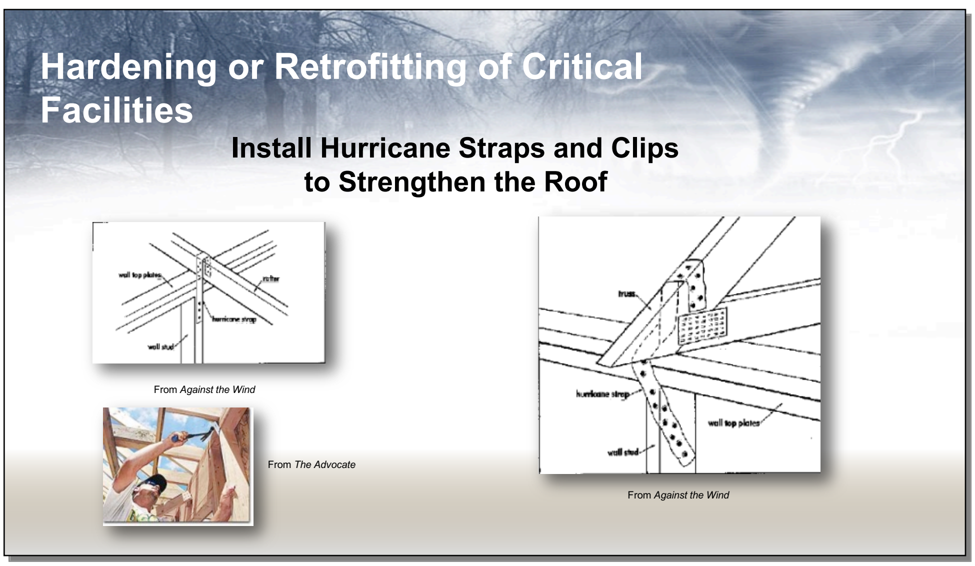

Roll-Down Shutters


Impact-Resistant Glass


Colonial Shutters

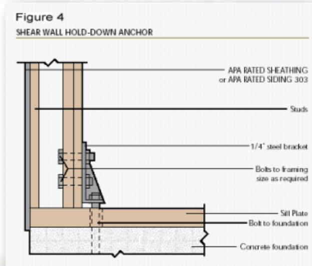

Corrugated Metal Panel


Hardening or Retrofitting of Critical Facilities
Strengthen the Doors
active door
inactive door
Bolts at top and bottom of inactive door need to be strong enough to resist hurricane winds.
From Against the Wind


Hardening or Retrofitting of Critical Facilities
Install Hurricane Straps and Clips to Strengthen the Roof
wall top plates
rafter
hurricane strap
wall stud
From Against the Wind
From The Advocate
truss
hurricane strap
wall top plates
wall stud
From Against the Wind

Hardening or Retrofitting of Critical Facilities

Bolt Walls to Foundation



From www.townparkconstruction.com

Hardening or Retrofitting of Critical Facilities

Relocate Utility Lines Underground

Fallen utility lines after Wilma. From www.galtmile.com

Hardening or Retrofitting of Critical Facilities

Elevate The Heating, Ventilating and Cooling (HVAC) Equipment, Such as Furnace and Hot Water Heater.

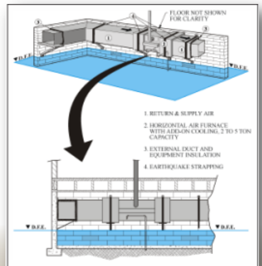


Figure 3.1.4A: Elevation of HVAC components below a floor, but above the DFE

From FEMA, *Protecting Building Utilities*

Hardening or Retrofitting of Critical Facilities

Potential projects for pump stations, water control facilities, water treatment and delivery systems, power generation and treatment facilities:

- Install backflow valves.
- Elevate the generators and pumps.
- Anchor fuel tanks.
- Eliminate infiltration problems with underground utility systems.

Drainage Improvements

- Creating detention/retention ponds and reservoirs.
- Building floodwalls and diversions.
- Constructing storm sewers and increasing culvert capacity.
- Maintenance is not an eligible project.

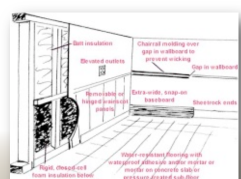
Retention Pond in North Carolina

Culvert

Wet Flood Proofing

- Modifying uninhabited portions of the structure to allow floodwaters to enter without causing significant damage.
- Materials must be water resistant.
- Not practical for most slab-on-grade structures with living space near ground level.

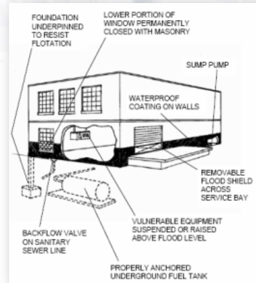
Elevated Appliances from www.louisianafloods.org



From www.louisianafloods.org

Dry Flood Proofing

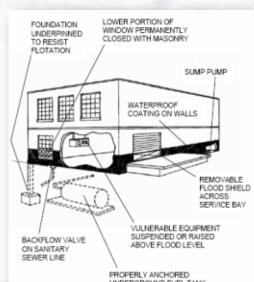
- Making the structure watertight below the level that needs flood protection.
- Requires sealing the walls and providing waterproof closures for any openings such as doors.



From FEMA, *Protecting Your Business from Flooding*

Dry Flood Proofing

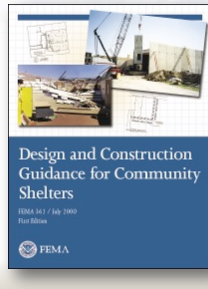
- Effective for low duration flooding with depths under 3 feet.
- Not effective for high velocity flooding.



From FEMA, *Protecting Your Business from Flooding*

Community Shelters?

- A structure built to withstand extreme winds and flying debris from tornadoes, hurricanes, and other storms that is accessible to the public.
- Guidelines can be found in FEMA 361.
- The shelter cannot be used for anything else.

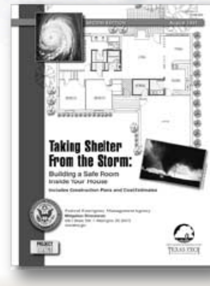


Shelter in Place Areas

- Must be securely anchored to the foundation and structurally isolated from the main structure.
- Can be on the first floor, in a basement, or outside.
- Guidelines are outlined in FEMA Publication 320.

Active Threat Mitigation

- **Alert/Warning Systems**
- **Training**
  - Active Shooters
  - Terrorism
  - Civil Unrest



NEXT STEPS

Next Steps

- **Data Acquisition**
  - Finalizing Jurisdictional Interviews (Assessments, and Projects)
  - Review of Current HAZUS.
  - Hazard Identification Review & Profiling.
  - Capability Assessment Survey.

General Schedule

Time-Line

DATE	TASK
22-Apr	I and II to Sussex County for validation
	Steering/Working Group Meeting
	HAZUS analysis to OGL
28-Apr	I and II validated and return to OGL
1-May	III send to Sussex County for validation
2-May	1st Public Comment Meeting
11-May	III validated and return to OGL
	IV, V, VI, and VII send to Sussex County for validation
17-May	2nd Public Meeting
20-May	IV, V, VI, and VII validated and returned to OGL
	Draft copy send to DEMA
20-30 May	Validate Annex's A-D
22-Jun	Draft copy returned to OGL
27-Jun	3rd Public Meeting
30-Jun	Final Meeting/Close-Out and final copy to DEMA/FEMA

Questions and Comments

Contacts

- **Andrew Forcucci, Project Manager**
  - aforcucci@olsongroupltd.com
  - 563-581-5775
- **Adam Montella, Lead HMP SME**
  - amontella@olsongroupltd.com
  - 813-355-7988
- **Anthony S. Mangeri, HMP and SME Advisor**
  - amangeri@olsongroupltd.com
  - (856) 217-9172
- **Scott Sleeman, HMP Planner**
  - ssleeman@olsongroupltd.com
  - (512) 534-1878

Public Comment Meeting #2

Date/Location: On Tuesday May 17, 2022, Representatives from Sussex County and The Olson Group Ltd. (OGL) facilitated Public Comment Meeting open to the Sussex County departments and the surrounding. The meeting was held virtually via Microsoft Teams.

Meeting Participants: Representatives from SC, OGL, and the surrounding community were present at the meeting.

Name	Organization
Scott Sleeman	OGL
Anthony Mangeri	OGL
Jakob Jones	OGL
Bethany DeBussy	Guest
Joseph Thomas	Guest
Carey Nichole	DEMA
Justin Puchalsky	DEMA
Mike Bailey	Seaford
Megan Nehrbas	Guest
Eric Evens	Millville
Phillip Cane	DEMA
John Morton	Guest
Pat S	Guest

Meeting Agenda

1. Introduction
    a. Plan Organization
    b. Purpose of the Plan
    c. Scope
2. Planning
    a. Forming the Collaborative Planning Team

   b. Understanding the Situation
   c. Goals & Objectives
3. Hazards Identification
   a. Summary
   b. Potential impacts
   c. Probability of future events
4. Mitigation Strategy
   a. Mitigation Goals
   b. Objectives
   c. Actions
5. Monitoring and Maintenance
   a. Monitoring of Plan
   b. Schedule of HMP cycle
   c. Plan amendment process
   d. Update Implementation
   e. Other planning mechanisms
   f. Continued public involvement

Overview of discussion:

- Completed Tasks
- Reviewed existing and similar plans
- Reviewed Delaware All Hazards Mitigation Plan
- Hazard Identification Survey
- Hazards Prioritization Survey
- Jurisdictional Interviews and Assessments

Identified Hazards:

- Flooding (Riverine and Coastal)
- Hurricane/Straight Line Wind
- Severe Thunderstorms
- Drought
- Extreme Heat/Cold
- Winter Storms
- Tornado

- Hailstorms
- Terrorism

Planning Timeline:

Activity	Date & Time
Section III send to Sussex County for validation	1-May
1st Public Comment Meeting	2- May
Section III validated and returned to OGL Sections IV, V, VI, and VII send to Sussex County for validation.	11-May
Second Public Meeting	17-May
Working copy to Steering Committee and Jurisdictions for their review	30 Jun
Draft Copy send to DEMA/FEMA (45 Days to review)	30 Jun
Final Copy to Steering Committee and Jurisdictions	1 Aug
Third Public Meeting/Close Out Meeting	TBD

Public Comment:

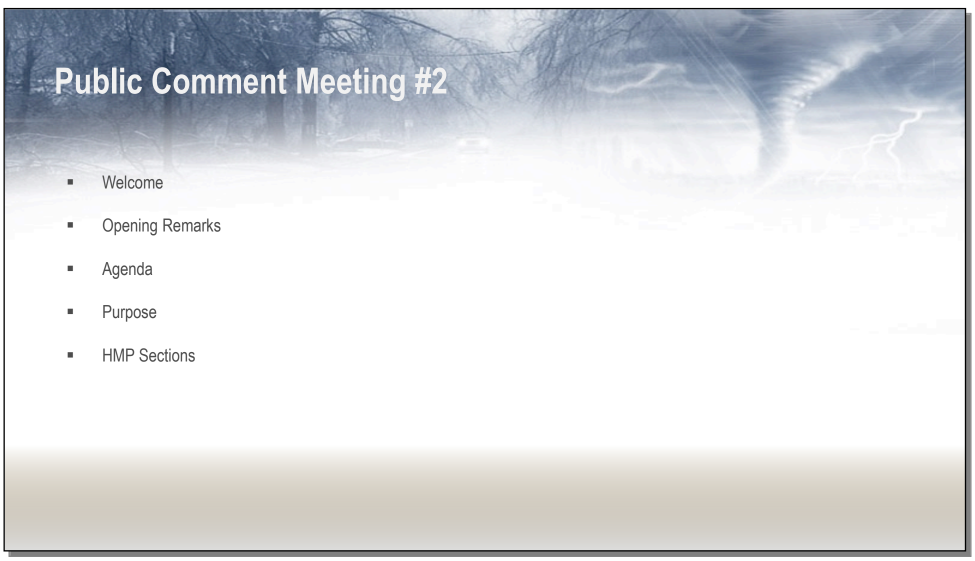
1. Question:

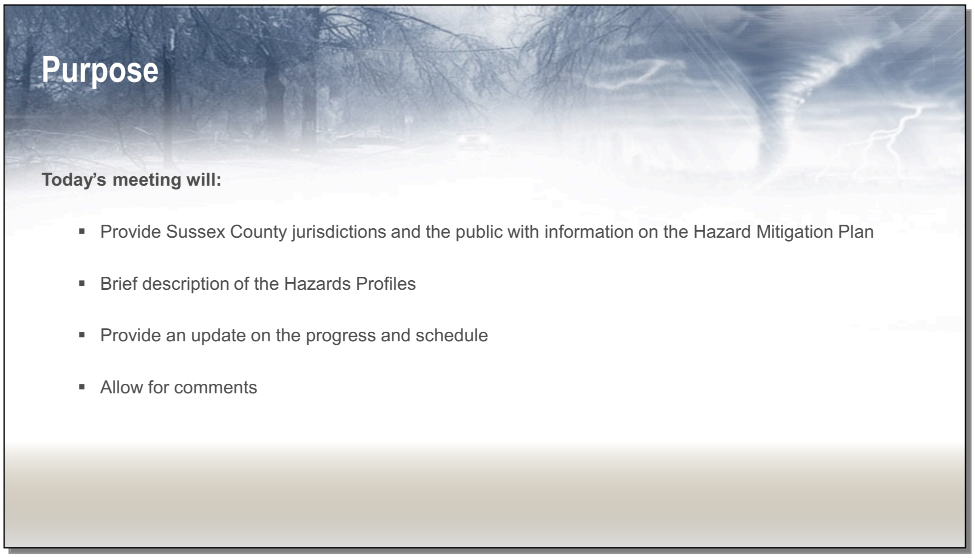
- What was the criteria for the inclusion or exclusion of jurisdictional stakeholder engagement? And was the small business administration consulted?
    - Answer:
- The inclusion was based on the decision made by the planning committee. These public meetings were the method that the committee decided to use to best outreach.

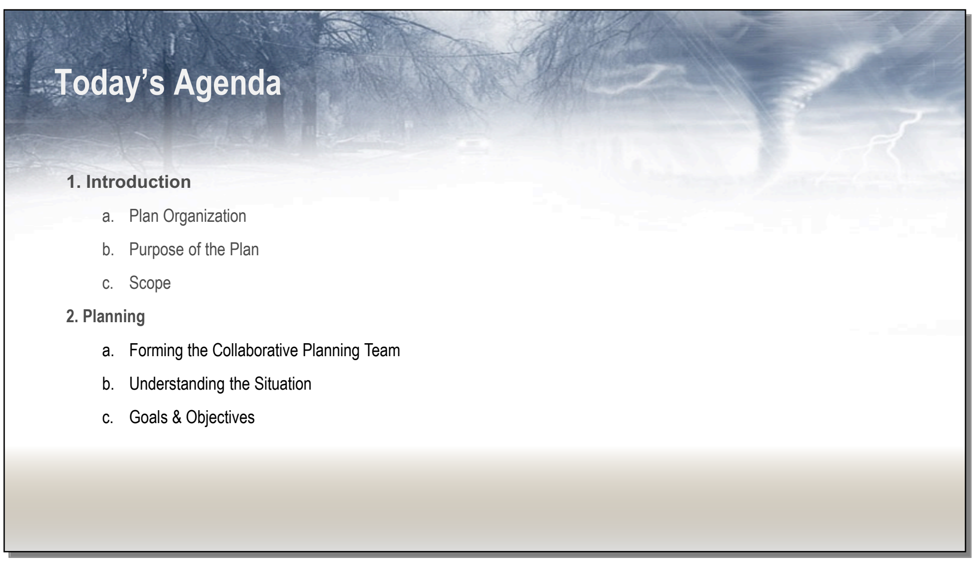
2. Question:

- How did the public handle the two back-to-back tropical storms that happened a few years ago?
    - Answer:
- Residence have become somewhat resilient due to the high volume of tropical storms that the county endures each year. A major advantage of Delaware is the size and shape. Although the two storms were back-to-back, the storm's damage impacted different areas and zones throughout the state.

Public Comment Meeting #2 slides




Purpose
Today's meeting will:
Provide Sussex County jurisdictions and the public with information on the Hazard Mitigation Plan
Brief description of the Hazards Profiles
Provide an update on the progress and schedule
Allow for comments


Today's Agenda
1. Introduction
a. Plan Organization
b. Purpose of the Plan
c. Scope
2. Planning
a. Forming the Collaborative Planning Team
b. Understanding the Situation
c. Goals & Objectives

Today's Agenda (continued)

3. Hazards Identification

a. Brief summary
b. Potential impacts
c. Probability of future events

4. Mitigation Strategy

a. Mitigation Goals
b. Objectives
c. Actions

Today's Agenda (continued)

5. Monitoring and Maintenance

a. Monitoring of Plan
b. Schedule of HMP cycle
c. Plan amendment process
d. Update Implementation
e. Other planning mechanisms
f. Continued public involvement

Completed Tasks

Completed Tasks

- Reviewed existing and similar plans
- Reviewed Delaware All Hazards Mitigation Plan
- Hazard Identification Survey
- Hazards Prioritization Survey
- Jurisdictional Interviews and Assessments

1. Introduction

Purpose:

- The purpose of the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan Update (from now on referred to as the "Plan") is to continue providing guidance for hazard mitigation in Sussex County. It identifies hazard mitigation goals, objectives, and recommended actions and initiatives for County and jurisdictional governments to reduce injury and damage from natural hazards.
- This Plan update keeps Sussex County qualified to obtain all disaster assistance, including all categories of Public Assistance, Individual Assistance, and Hazard Mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93288, as amended

Plan Organization

- The Plans organization parallels the structure provided in the Final Rule, 44 CFR 201.4. It has seven sections, appendices containing mitigation assessment annexes., supporting documentation, and adoption resolutions. In addition, there are references to the CFR throughout the Plan. Where possible, these provide specific section and subsection notations to aid the review process .

1. Introduction (continued)

Goals and Objectives

The Hazard Mitigation Steering Committee supported updating the goals, objectives, and mitigation actions. The mitigation actions address or solve local mitigation issues and problems. Therefore, the Sussex County Hazard Mitigation Steering Committee developed the following mission statement for the Sussex County All-Hazard Mitigation Plan and the following goals for hazard mitigation.

1. Sussex County and participating jurisdictions will continue to adopt enhanced stormwater management practices.
2. Sussex County and participating jurisdictions will continue to adopt and enforce codes and regulations designed to reduce the impact of natural hazards.
3. Sussex County and participating jurisdictions will continue to retrofit and protect critical facilities and infrastructure from natural and human-caused hazards.
4. Sussex County and participating jurisdictions will continue to enhance education and outreach strategies to improve the dissemination of information to the public regarding hazards, including the steps to reduce their impact.
5. Sussex County and participating jurisdictions will continue to improve pre-event planning and preparedness activities.
6. Sussex County and participating jurisdictions will continue to identify and implement sound hazard mitigation projects.

.

1. Introduction (continued)

Participating Jurisdictions

City of Lewes	Town of Bridgeville	Town of Henlopen Acres
Town of Slaughter Beach	Town of Blades	Town of Laurel
Georgetown	Town of Delmar	Town of Millsboro
City of Rehoboth Beach	Town of Dewey Beach	Town of Millville
City of Seaford	Town of Ellendale	Town of Milton
Town of South Bethany	Town of Fenwick Island	Town of Ocean View
Town of Bethany Beach	Town of Frankford	Town of Selbyville

2. Planning

Planning Process:

The process includes four basic steps.

1. Organize resources.
2. Assess risks.
3. Develop a mitigation plan.
4. Implement the plan and monitor progress.

2. Planning (continued)

Methodology:

- Data Collection – A "wish list" of desired information was provided by The Olson Group and relayed to the participating jurisdictions via the local OEM coordinators. A copy of the "wish list" is included in Appendix C.
- Critical Infrastructure Inventory – The Olson Group provided the HMWG with spreadsheets with default data listings per HAZUS-MH. The HMWG members reviewed the information and provided revisions compiled for use in developing mitigation actions. The Olson Group also provided directions for capturing more detailed information regarding critical infrastructure for use in this Plan update and future planning efforts via the County EOC Director.
- Jurisdictional Stakeholder Engagement – HMSC identified the stakeholders to enlist in the planning effort, including other local departments, schools, and hospitals. The HMWG m embers were then responsible for following up with potential stakeholders. In some cases, stakeholders participated with the local coordinators in the one-on-one meetings to identify and document mitigation actions.

2. Planning (continued)

Meetings:

- Kick-Off Workshop
- Initial Planning Workshop
- Survey Validation Meeting
- Jurisdictional Interviews
- Project Update Meetings
- Mid-Term Planning Meeting
- Public Comment Meetings (3)

2. Planning (continued)

Risk Assessment:

The assessment determined several aspects of the risks of hazards faced by the County and the participating jurisdictions:

- Natural hazards are most likely to affect Sussex County.
- How often hazards are expected to impact Sussex County.
- Expected severity of the dangers
- Areas of Sussex County that are likely to be affected by risks.
- Threats may impact Sussex County's assets, operations, people, and infrastructure.
- How private and commercial assets, procedures, and infrastructure may be affected by hazards.
- Expected future losses if the risk is not mitigated.

2. Planning (continued)

Additional Documents/Plans

- State of Delaware All-Hazard Mitigation Plan
- Sussex County
- Local Jurisdictions
- FEMA: National Flood Insurance Program Flood Maps (Flood Insurance Rate Maps, Digital Flood Insurance Rate Maps (DFIRM)
- FEMA: Severe Repetitive Loss data
- FEMA: The National Risk Index
- Delaware Department of Natural Resources and Environmental Control Flood Planning Tool
- Flood Factor

3. Hazard Identification

Risk and Vulnerability Assessments

a. Developed problem statements for each hazard
b. Considered the impacts that each hazard would have on campus life

Identified Hazards

a. Natural Disasters (11)
b. Human-Caused Disasters (5)
c. Technological Disasters (2)

Hazard Profiles

Identified Hazards

The hazard identification, analysis, and vulnerability assessment, completed as part of the Plan Update, identified Eleven (11) Natural, Five (5) Human-caused, and Two (2) Technological hazard that have the greatest potential to adversely affect Sussex County and have long-term impacts on the ability to provide basic services.

Flooding (Riverine and Coastal)	25	High	Terrorism	10	Low
Hurricane/Straight Line Wind	20	High	Beach/Soil Erosion	8	Not Rated
Severe Thunderstorms	15	High	Active Shooter	8	Not Rated
Drought	15	Medium	Cyber Ransomware	8	Not Rated
Extreme Heat/Cold	15	Medium	Dam Levee Failure	8	Not Rated
Hazmat	12	Medium	Cyber Infrastructure	6	Not Rated
Winter Storms	12	Low	Pipeline Failure	6	Not Rated
Tornado	12	Low	Earthquake	6	Not Rated
Hailstorm	12	Low	Wildfire	6	Not Rated

Flooding: Riverine/Coastal (HIGH)

Hazard Description:	A flood is an excess of water on land that is usually dry. Floods are typically caused by weather events that deliver more precipitation to a drainage basin than can be easily absorbed or stored within the basin. Flooding is a significant natural hazard throughout the United States. Causes include heavy precipitation, snowmelt, ice jams, dam failures, hurricanes, reservoir overflows, and local thunderstorms.
Historical Occurrences:	According to the National Climate Data Center (NCDC) databases, since 2016: ▪ 23 Flooding events ▪ 36 Coastal flooding events ▪ 3 Astronomical Low Tide
Future Occurrences:	Due to the continuous and ongoing nature of the flood hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard

Hurricane/Straight Line Wind

Hazard Description:	Hurricanes, tropical storms, nor'easters, and typhoons, also classified as cyclones, are any closed circulation developing around a low-pressure center where the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across.
Historical Occurrences:	According to the National Climatic Data Center (NCDC) databases, since completion of the 2016 Plan update, there have been no Hurricane events, however, there were 2 Tropical Storms that have affected the region.
Future Occurrences:	Due to the continuous and ongoing nature of the hurricane hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

Severe Thunderstorms

Hazard Description:	According to the National Weather Service, more than 100,000 thunderstorms occur each year. Only about 10 percent of these storms are classified as "severe." Although thunderstorms generally affect a small area when they occur, they are very dangerous because of their ability to generate tornadoes, hailstorms, strong winds, flash flooding, and dangerous lightning
Historical Occurrences:	According to the National Climatic Data Center (NCDC) databases, since 2016 there have been 105 significant occurrences of thunderstorm resulting in over $50 thousand in damages and 13 lightning events causing very minor property damage with only 1 reported injury
Future Occurrences:	Due to the continuous and ongoing nature of the thunderstorm winds hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

Drought

Hazard Description:	A drought is defined as "a period of abnormally dry weather sufficiently prolonged for the lack of water to cause a serious hydrologic imbalance in the affected area. Droughts are extended periods of dry weather that cause problems such as crop damage, affect water supplies, and increased fire danger. ▪ Meteorological droughts. ▪ Agricultural droughts ▪ Socio-economic
Historical Occurrences:	According to the NCDC databases, since 2016, no significant periods of drought events were reported.
Future Occurrences:	Due to the continuous and ongoing nature of the drought hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

Extreme Heat/Cold

Hazard Description:	Extreme heat can be defined as temperatures that hover 10 degrees or above the average high temperature for the region, last for prolonged periods, and are often accompanied by high humidity. Under normal conditions, the human body's internal thermostat produces perspiration that evaporates and cools the body
Historical Occurrences:	Only one reported excessive heat events occurred.
Future Occurrences:	Although there have been no recorded deaths, injuries, or damage from extreme heat/cold events in Sussex County since the plan update in 2016 to be of significant danger to the community and thus included as an identified hazard

Hazmat

Hazard Description:	Hazardous materials (HazMat) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the Nation's highways and on the water. In essence, HazMat incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack.
Historical Occurrences:	▪ September 2017: 18 employees from the DuPont Experimental Station in New Castle after being exposed to an unknown substance. ▪ June 2021: I-95 closed in both directions in New Castle County after a tractor trailer containing hazardous materials was involved in a collision. ▪ Dec 2021: Three commercial vehicles containing hazardous materials collided and required extrication.
Future Occurrences:	In summary, the HazMat data clearly establishes a high probability of a HazMat incident in Sussex County. However, a thorough review of the data suggests the probability of a significant HazMat incident resulting in severe injuries or fatalities is moderate at best.

Winter Storms

Hazard Description:	A winter storm can range from moderate snow over a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Some winter storms may be large enough to affect several states, while others may affect only a single community
Historical Occurrences:	According to the NCDC databases, since 2016, there were eight major winter storm warning events in Sussex County
Future Occurrences:	Although there have been no recorded deaths, injuries, or recorded damage from winter storm events in Sussex County

Tornado

Hazard Description:	Tornadoes are defined as violently rotating columns of air extending from thunderstorms down to the ground. Tornadoes are unpredictable and can occur at any time of day or night and in any season throughout the year.
Historical Occurrences:	According to the NCDC databases, since 2016, there was four EF-1 events and one EF-2 events that occurred in the area, with minimal damage, and 1 injury reported.
Future Occurrences:	Due to the continuous and ongoing nature of the tornado hazard threat, it was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard

Hail-Storms

Hazard Description:	Hailstorms are an outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass.
Historical Occurrences:	According to NCDC databases, since 2016 there have been nine hailstorm events within Sussex County that resulted in no losses.
Future Occurrences:	Hailstorm was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

Terrorism

Hazard Description:	Contamination, as it relates to terrorist activity, refers to the intentional release of chemical, biological or radiological agents, as well as nuclear hazards. Contamination can apply to human and animal life, a geographic area, agriculture/food supplies (as in agroterrorism"), and even the electronic world of computers and information via the Internet and e-mail (as in "cyber terrorism.")
Historical Occurrences:	▪ Bomb threats, in the distant and recent past, especially in schools and abortion clinics. ▪ Reports of "suspect" powders, actual threats, and hoaxes.
Future Occurrences:	No previously recorded deaths, injuries, or damage from terrorism in Sussex County, this hazard was judged by the HMSC and the HMWG to be of significant danger to the community and thus included as an identified hazard.

4. Mitigation Strategy

Mitigation Goals, Objectives, and Actions

- Goals are general guidelines that explain what the County and participating jurisdictions want to achieve. Goals are expressed as broad policy statements representing desired long-term results.
- Hazard Mitigation Policies are defined as a course of action agreed to by members of the Planning Team.
- Mitigation Actions are the specific steps (projects, policies, and programs) that advance a given objective. They are highly focused, precise, and measurable.

The broad goals of the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan are as follows:

- Goal 1: Sussex County and participating jurisdictions will continue to adopt enhanced stormwater management practices.
- Goal 2: Sussex County and participating jurisdictions will continue to adopt and enforce codes and regulations designed to reduce the impact of natural hazards.
- Goal 3: Sussex County and participating jurisdictions will continue to retrofit and protect critical facilities and infrastructure from natural hazards.

4. Mitigation Strategy (continued)

The broad goals of the Sussex County Multi-Jurisdictional All-Hazard Mitigation Plan are as follows:

- Goal 4: Sussex County and participating jurisdictions will continue to enhance education and outreach strategies to improve the dissemination of information to the public regarding hazards, including the steps that can be taken to reduce their impact.
- Goal 5: Sussex County and participating jurisdictions will continue to improve pre-event planning and preparedness activities.
- Goal 6: Sussex County and participating jurisdictions will continue identifying and implementing sound hazard mitigation projects.

Identification and Analysis of Mitigation Measures:

- Prevention: Preventative activities are intended to keep hazard problems from getting worse.
- Property Protection: Property protection measures enable structures to better withstand hazard events, remove structures from hazardous locations, or provide insurance to cover potential losses.
- Natural Resource Protection: Natural resource protection activities reduce the impactof hazards by preserving or restoring the function of natural systems.

4. Mitigation Strategy (continued)

Identification and Analysis of Mitigation Measures:

- Structural Projects: Structural mitigation projects are intended to lessen the impact of hazards by modifying the environment or hardening structures.
- Emergency Services: Although not typically considered a mitigation technique, emergency services minimize the impact of a hazard on people and property
- Public Information and Awareness: Public Information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards and mitigation techniques they can use to protect themselves and their property.

National Flood Insurance Program, Floodplain Management, and Building Codes

- Improved floodplain management, including land use planning, zoning, and enforcement at the local level, can reduce flood-related damages for both existing buildings and new development and are consistent with the stated Goals and Objectives of this plan.
- The NFIP requires that the facility must meet the exact construction requirements as a new building when the cost of reconstruction, rehabilitation, addition, or other improvements to a building equal or exceeds 50% of the fair market value

4. Mitigation Strategy (continued)

National Flood Insurance Program, Floodplain Management, and Building Codes

- Established through the NFIP, the Community Rating System (CRS) is a program that counties and jurisdictions can elect to join. Once the jurisdiction has been entered, participants in that jurisdiction receive a discount on their flood insurance premiums.

Outreach

- The first step in the Repetitive Loss Outreach Program is to advise the homeowners that they live in a repetitive loss area and could be subject to flooding.
- The second step is to give the homeowner appropriate property protection measure guidelines.
- The third is to make the homeowner aware of the basic facts about flood insurance.

Public Awareness

- The insurance industry and emergency management research have demonstrated that awareness of hazards is not enough. People must know how to prepare for, respond to, and take preventive measures against threats from natural hazards.

4. Mitigation Strategy (continued)

Flood Mitigation Actions

Retrofitting structures prone to periodic flooding is an effective mitigation technique to reduce the flood loss of property and is consistent with stated goals.

- Elevation
- Acquisition of structures
- Mitigation Reconstruction
- Dry flood-proofing
- Wet-flood proofing

Early Warning Systems

- With sufficient warning of a flood, a community and its residents can take protective measures such as moving personal property, cars, and people out of harm's way. When a flood threat recognition system is combined with an emergency response plan that addresses the jurisdictional flood problems, considerable flood damage can be prevented.

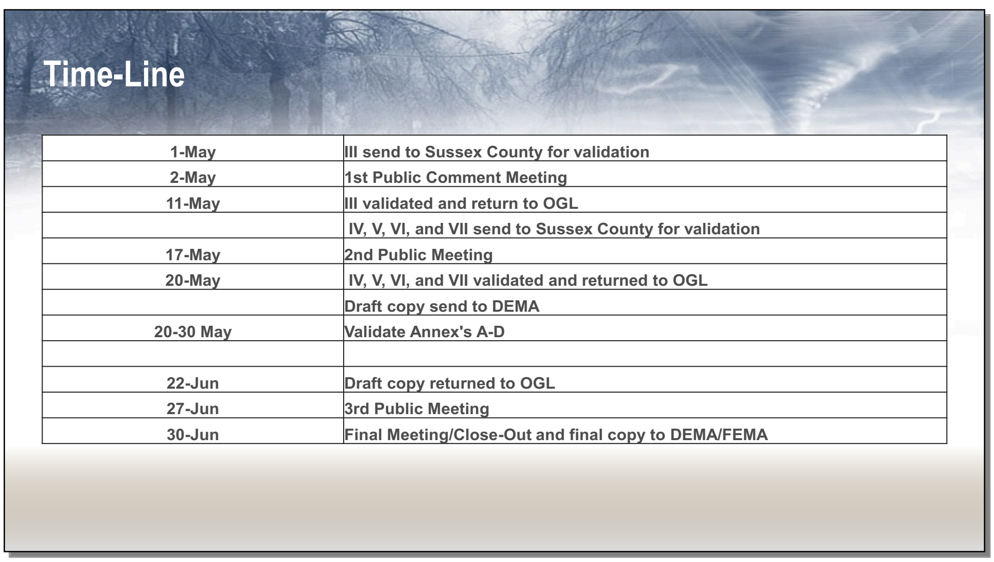
5. Plan Monitoring and Maintenance

Monitoring of the Plan

- The Director of the Emergency Operations Center will monitor the Plan for several related purposes:
- Maintain and update hazard and risk information,
- Ensure that mitigation projects and actions reflect the priorities of Sussex County and jurisdictional stakeholders,
- Comply with Federal Emergency Management Agency (FEMA) and the State of Delaware requirements for plan maintenance, and
- Maintain Sussex County's eligibility for federal disaster assistance and mitigation grants.

Plan Amendment Process

- Upon the initiation of the amendment process, Sussex County and its jurisdictions will forward information on the proposed change to all interested parties, including, but not limited to, all affected County and jurisdictional departments, residents, and businesses.



1-May	III send to Sussex County for validation
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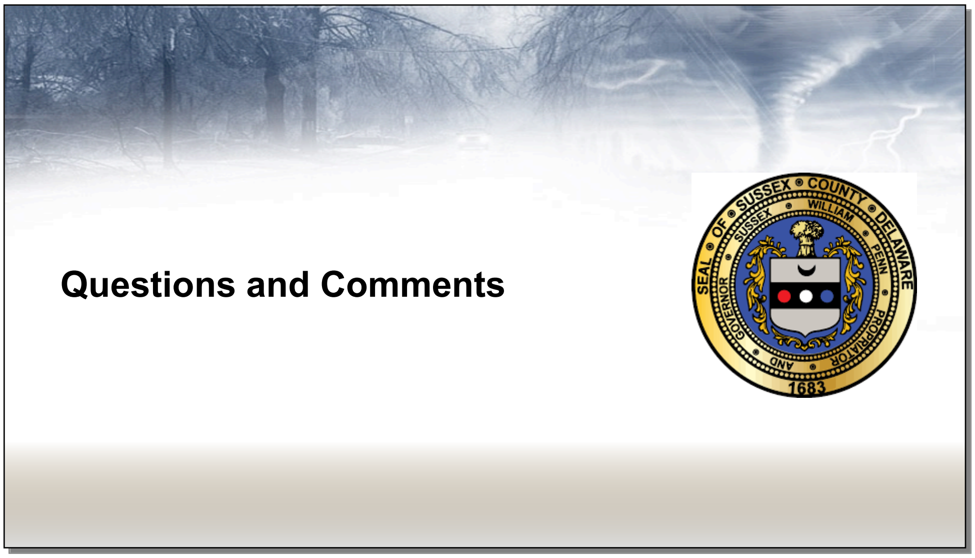
Questions and Comments
SEAL OF SUSSEX COUNTY DELAWARE
WILLIAM PENN PROPRIETOR AND GOVERNOR
SUSSEX
1683


Contacts
• Andrew Forcucci, Project Manager
– aforcucci@olsongroupltd.com
– 563-581-5775
• Adam Montella, Lead HMP SME
– amontella@olsongroupltd.com
– 813-355-7988
• Anthony S. Mangeri, HMP and SME Advisor
– amangeri@olsongroupltd.com
– (856) 217-9172
• Scott Sleeman, HMP Planner
– ssleeman@olsongroupltd.com
– (512) 534-1878

APPENDIX D. ADOPTION RESOLUTIONS FOR SUSSEX COUNTY AND PARTICIPATING JURISDICTIONS

Contents of this section

In accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and the Requirement §201.6(c)(5), Sussex County, Delaware, has developed this Multi-Jurisdictional All Hazard Mitigation Plan Update to address the hazards that threaten the county and ways to reduce future damages associated with these hazards.

Following this page is a sample adoption resolution template for the county's potential use and the signed adoption resolutions of the county and all participating jurisdictions that have adopted this Plan, authorizing municipal government staff to carry out the actions detailed herein.

D.1 Sussex County

[Insert copy of Sussex County resolution]

D.2 Municipalities

[Insert list and copies of Municipal resolutions]

RESOLUTION OF ADOPTION

Sussex County, Delaware All-Hazards Mitigation Plan Update

WHEREAS the [insert jurisdiction] is vulnerable to damages from hazard events which pose a threat to public health and safety and could result in property loss and economic hardship.

WHEREAS a Multi-Jurisdictional All-Hazards Mitigation Plan Update (the Plan) has been developed through the work of the Sussex County Hazard Mitigation Working Group and interested parties within the [insert jurisdiction].

WHEREAS the Plan recommends hazard mitigation actions that will protect people and property affected by hazards occurring within the [insert jurisdiction], that will reduce future public, private, community and personal costs of disaster response and recovery; and that will reinforce the [insert jurisdiction]'s leadership in emergency preparedness efforts.

WHEREAS the Disaster Mitigation Act of 2000 (P.L. 106-390) (DMA 2000) and associated Federal regulations published under 44 CFR (Code of Regulations) Part 201 require the [insert jurisdiction] to formally adopt an All-Hazard Mitigation Plan Update subject to the approval of the Federal Emergency Management Agency to be eligible for federal funds for hazard mitigation projects and activities.

WHEREAS public meetings were held to receive comment on the Plan as required by DMA 2000.

NOW THEREFORE BE IT RESOLVED by the [insert name of governing body] of the [insert jurisdiction] that:

1. [insert jurisdiction] adopts the Sussex County, Delaware Multi-Jurisdictional All Hazard Mitigation Plan Update, dated [insert date of final Plan] as this jurisdiction's official All Hazard Mitigation Plan, and resolves to execute the actions in the Plan.
2. [insert jurisdiction] officials identified in the Mitigation Action Plan (Section 6) are hereby directed to implement the recommended actions assigned to them. These officials will report quarterly on their activities, accomplishments, and progress to the [insert jurisdiction] Office of Emergency Management and the [insert jurisdiction] [name(s) of additional departments or organizations (if any)].
3. The [insert jurisdiction] Office of Emergency Management will provide annual progress reports on the status of implementation of the Plan to the [insert name of governing body]. This report shall be submitted to the [insert name of governing body] by [insert date] of each year.
4. The [insert jurisdiction] Office of Emergency Management will undertake periodic updates of the Plan in concert with the Sussex County Emergency Operations Center as indicated in the Plan Maintenance Program (Section 7) but no less frequent than every five years.

ADOPTED this [insert date] at the meeting of the [insert name of governing body].

____

([insert title of elected official])

____

([insert clerk)

APPENDIX E. FORMAL APPROVAL LETTERS FOR SUSSEX COUNTYAND THE PARTICIPATING MUNICIPALITIES.

Contents of this section

In accordance with the Disaster Mitigation Act of 2000 (DMA 2000) and the Requirement §201.6(c)(5), Sussex County, Delaware, has developed this Multi-Jurisdictional All Hazard Mitigation Plan Update to address hazards that threaten the county and ways to reduce future damages associated with these hazards.

Following this page are the signed approval letters to all participating jurisdictions that have been approved within this Plan

E.1 Sussex County

[Insert copy of Sussex County approval letter]

E.2 Municipalities

[Insert list and copies of Municipal approval letters]