

Sussex County Delaware



Multi-Jurisdictional Hazard Mitigation Plan (HMP)

PREPARED BY THE OLSON GROUP LTD.

DECEMBER 2022

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RECORD OF CHANGES

| CHANGE # | PAGE # | SECTION | SUMMARY OF CHANGE | CHANGE MADE BY | DATE |
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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: Stakeholder Survey

- Appendix E: Adoption Resolutions for Sussex County and the Participating Jurisdictions
- Appendix F: 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 mission statement above for the Sussex County All-Hazard Mitigation Plan and the following goals for hazard mitigation.

- Sussex County and participating jurisdictions will continue to adopt enhanced stormwater management practices.
- Sussex County and participating jurisdictions will continue to adopt and enforce codes and regulations designed to reduce the impact of natural hazards.
- Sussex County and participating jurisdictions will continue to retrofit and protect Critical Infrastructure and Key Resources from natural and human-caused hazards.
- 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.
- Sussex County and participating jurisdictions will continue to improve pre-event planning and preparedness activities.
- 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 were selected based on their ability to provide technical expertise, previous experience, prior HMP involvement, 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, 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. The representatives for each jurisdiction can be found in Table 2-2.

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

Table 1-1. Participating Jurisdictions

NON-PARTICIPATING JURISDICTIONS

The following jurisdictions chose not to participate in the update of this plan. Outreach attempts were made by both county representatives and OGL project managers:

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

Communities of Broadkill Beach and North Shores are un-incorporated areas and therefore any concerns are addressed by Sussex County.

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 process, 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. This list is not all inclusive but were identified as credible significant threats to the community as defined by the community. Other threats were reviewed, and a brief review of potential impact on the jurisdictions are in Section 3.

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 (Cyber Hardware/Software)
- 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.

PLAN DEVELOPMENT

Sussex County and participating jurisdictions developed the 2022 Hazard Mitigation Plan in conjunction with the 2016 Sussex County Hazard Mitigation Plan, 2020 Continuity Of Operations Plan (COOP), State of Delaware 2019-2022 Strategic Plan, and the State of Delaware 2018 All Hazards Mitigation Plan. The planning steps for developing these three plans included:

1. Forming the Collaborative Planning Team
2. Understanding the Situation
3. Goals & Objectives
4. Plan Development, Review, & Approval
5. Plan Refinement & Execution

Sussex County began organizing the Hazard Mitigation Planning Team, identifying plan requirements, and collecting necessary data in August 2021.

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 eight times 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 can be found in Appendix C.

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, Flood Plain 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:

- **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. Example would be the updated repetitive loss and severe repetitive loss reports. Sussex County requested updated information but was not available at the time of submission. Copy of the request can be found in Appendix C on page 385. 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 |
| Keith Banks | Chief of Police City of Rehoboth Beach | Daune Hinks | Building Inspector Dewey Beach |
| 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 Development | 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. The list of websites is found in *Appendix C*.

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. Below is the list of jurisdictions that participated in the survey. Results of the survey can be found in a supplemental document.

| Jurisdictional Survey Participation | |
|-------------------------------------|--------------------|
| Jurisdiction | Contact |
| City of Lewes | Janelle Cornwell |
| Dewey Beach | Duane Hinks |
| Town of Selbyville | Stacey Long |
| Seaford | Charles |
| Town of Fenwick Island | Patricia Schuchman |
| Town of Frankford | Cheryl Lynch |
| Town of Delmar | Sara Bynum-King |
| Town of Bethany Beach | John Apple |

| | |
|-------------------------|-----------------|
| Georgetown | Gene Dvornick |
| Rehoboth Beach | Evan Miller |
| Town of Laurel | Jamie Smith |
| Town of Ellendale | Aaron Moore |
| North Shores | Jeff Sellman |
| Town of Ocean View | Kenneth Cimino |
| Town of Bridgeville | Bethany DeBussy |
| Town of South Bethany | Maureen Hartman |
| Town of Millsboro | Jamie Burk |
| Town of Slaughter Beach | Kathleen Lock |
| Town of Millville | Eric Evans |
| Sussex County | Joe Thomas |
| Town of Henlopen Acres | Thomas Roth |
| Town of Milton | Kristy Rogers |
| Town of Blades | Lisa Marks |

Table 2-2A. Jurisdiction Survey Participants

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.

| Jurisdiction | Date | Contact | Email |
|-----------------|----------|-----------------|----------------------------------|
| Slaughter Beach | March 16 | Kathy Lock | mayor@slaughterbeachde.com |
| Georgetown | March 16 | Gene Dvornick | GDvornick@georgetowndel.com |
| Rehoboth Beach | March 17 | Evan Miller | emiller@cityofrehoboth.com |
| Laurel | March 17 | Jamie Smith | laurelm@comcast.net |
| South Bethany | March 18 | Maureen Hartman | townmanager@southbethany.org |
| Dewey Beach | March 18 | Bill Zolper | townmanager@townofdeweybeach.com |

| Jurisdiction | Date | Contact | Email |
|----------------|----------|---------------------|------------------------------------|
| North Shores | March 18 | Jeff Sellman | office@northshores.net |
| Millsboro | March 23 | Jamie Burk | jamieb@millsboro.org |
| Ocean View | March 23 | Kenneth Cimino | kcimino@oceanviewde.gov |
| Fenwick Island | March 23 | Pat Schuchman | pschuchman@fenwickisland.org |
| Milton | March 23 | Kristy Rogers | krogers@ci.milton.de.us |
| Sussex County | March 24 | Joe Thomas | jthomas@sussexcountyde.gov |
| Ellendale | March 28 | Aaron Moore | aaron.moore@ellendale.delaware.gov |
| Frankford | March 30 | Cheryl Lynch | Frankfordtownhall@mchsi.com |
| Seaford | March 31 | Mike Bailey | mbailey@seafordde.com |
| Bethany Beach | April 11 | Teresa Tieman | ttieman@townofbethanybeach.com |
| Henlopen Acres | April 12 | Thomas Roth | townmgr@henlopenacres.com |
| Delmar | April 12 | Sara Bynum-King | townmgr.delmar@verizon.net |
| Bridgeville | April 12 | Bethany DeBussy | bdebussy@townofbridgevillede.us |
| Millville | April 13 | Eric Evans | eevans@mvtown.com |
| Blades | April 13 | Lisa Marks | TownAdministrator@townofblades.com |
| Selbyville | April 14 | Stacey Long | tmselbyville@mchsi.com |
| City of Lewes | April 19 | Ann Marie Townshend | atownshend@ci.lewes.de.us |

Table 2-2B. Jurisdictional Participation Interview Schedule

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.

Sussex County HMP Public Meeting #1

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.

Sussex County HMP Public 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 final project and public comment meeting will be scheduled before the final plan is adopted by Sussex County and each participating jurisdiction.

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 |

| DATE | MEETING | ATTENDEES |
|------|---------------------------------|---|
| 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 updates. 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 plan update 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. For jurisdictions that do not currently have a flood plain manager, Sussex County Planning and Zoning aid when needed.

| JURISDICTIONS | 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 |
| Town of Delmar | Sara Bynum-King | Jurisdictional Point of Contact |
| Dewey Beach | Bill Zolper | Jurisdictional Point of Contact |
| Town of Ellendale | Jeff Shockley | Sussex County Floodplain Manager |
| Town of Fenwick Island | Patricia J Schuchman | Jurisdictional Point of Contact |
| Town of Frankford | Jeff Shockley | Sussex County Floodplain Manager |
| 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 | Jeff Shockley | Sussex County Floodplain Manager |
| Town of Slaughter Beach | Robert Clendaniel | Jurisdictional Point of Contact |

| JURISDICTIONS | ADMINISTRATOR NAME | METHOD OF INVOLVEMENT |
|-----------------------|--------------------|----------------------------------|
| Town of South Bethany | Maureen Hartman | Jurisdictional Point of Contact |
| Sussex County | Jeff Shockley | Sussex County Floodplain Manager |

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 of major 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 | Used in developing HIRA, strategies, and |

| EXISTING DOCUMENTS | METHOD OF INCORPORATION |
|--|---|
| database | 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 |
| 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 five 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. Survey questions and ranking are in **Appendix D**.

| | | Probability of Event | | | | |
|--------------------|---------------|----------------------|------------------|-----------------|-------------------|---------------|
| | | Unlikely | Somewhat Likely | Likely | Most Likely | Highly Likely |
| Severity of Impact | 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

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 combines user input and a mathematic equation to establish a ranking for each hazard. The CPRI is calculated based on the four selections with the following weightings for each criterion:

- Probability (P)= 45%
- Magnitude/Severity (M)= 30%
- Warning Time= 15%
- Duration (D)= 10%

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 3-2. Calculated Priority Risk Index Rating

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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 3-3. Probability of Future Occurrence Based on Previous Hazard Events

| MAGNITUDE/SEVERITY | INDEX VALUE | DESCRIPTION |
|--------------------|-------------|--|
| Catastrophic | 4 | <ul style="list-style-type: none"> ▪ Multiple deaths ▪ More than 50% of property is severely damaged ▪ Complete shutdown of facilities for more than 1 month |
| Critical | 3 | <ul style="list-style-type: none"> ▪ 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 |

| MAGNITUDE/SEVERITY | INDEX VALUE | DESCRIPTION |
|--------------------|-------------|---|
| Limited | 2 | <ul style="list-style-type: none"> ▪ 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 | <ul style="list-style-type: none"> ▪ 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 3-4. 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 3-5. 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 3-6. 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 3-7*. The CPRI generated values are found following in *Table 3-8* on the following pages.

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

Table 3-7. Overall, Hazard Ranking

| CALCULATED PRIORITY RANKING INDEX SUMMARY | | | | | | |
|---|-------------|--------------------|--------------|----------|------------|----------------|
| HAZARD | PROBABILITY | MAGNITUDE 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 |
| HAZARD | PROBABILITY | MAGNITUDE SEVERITY | WARNING TIME | DURATION | CPRI SCORE | HAZARD RANKING |
| 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 |
| Cyber Terrorism | -- | -- | -- | -- | -- | N/R |
| Dam Levee Failure | -- | -- | -- | -- | -- | N/R |
| Pipeline Failure | -- | -- | -- | -- | -- | N/R |
| Earthquake | -- | -- | -- | -- | -- | N/R |
| Wildfire | -- | -- | -- | -- | -- | N/R |

Table 3-8. CPRI Hazard Ranking Index

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 3-9*.

| HAZARD | 1. HAZARD TYPE | 2. HAZARD RANKING | 3. HAZARD PRIORITY | 4. HAZARD SCORE | 5. COUNTY EOP | 6. 2018 DELAWARE HMP |
|---------------------------------|----------------|-------------------|--------------------|-----------------|---------------|----------------------|
| 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 | 1. HAZARD TYPE | 2. HAZARD RANKING | 3. HAZARD PRIORITY | 4. HAZARD SCORE | 5. COUNTY EOP | 6. 2018 DELAWARE HMP |
|------------------|----------------|-------------------|--------------------|-----------------|---------------|----------------------|
| 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 3-9. Hazard Ranking

Notes:

1. Hazard Type:

N= Natural

H/C= Human-Caused

T= Technological

2. Hazard Ranking:

1-16

3. Hazard Priority:

H= High

M= Medium

L= Low

N/R= non-ranked: Considered a significant risk to the County and jurisdictions, but there was insufficient loss data to generate a ranking. However, they were included in the threat profile in Section 3.

4. Hazard Score: See Hazard Matrix

5. Hazard identified in County plan.

6. Hazard identified in State plan.

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 Natural 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.

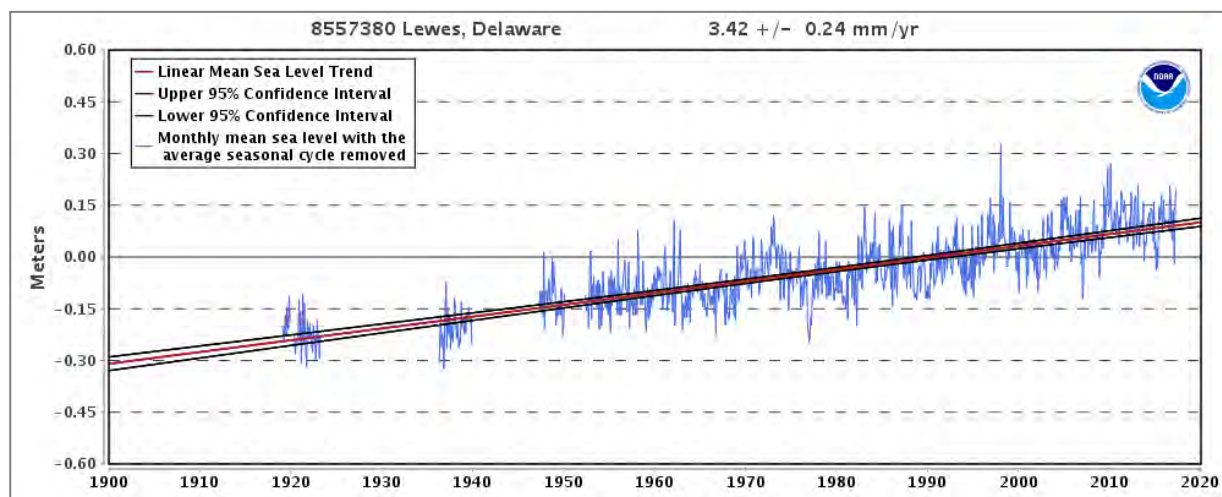
Effects of Sea Level Rise on Coastal Flooding

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 3-1.¹

Effects of Sea Level Rise on Extreme Coastal Flooding

According to the Fourth National Climate Assessment climate science special report released in 2017, assuming storm characteristics do not change, sea level rise will increase the frequency and extent of extreme flooding associated with coastal storms, such as hurricanes and nor'easters (very high confidence). A projected increase in the intensity of hurricanes in the North Atlantic (medium confidence) could increase the probability of extreme flooding along most of the U.S. Atlantic and Gulf Coast states beyond what would be projected based solely on relative sea level rise. However, there is low confidence in the projected increase in frequency of intense Atlantic hurricanes, and the associated flood risk amplification, and flood effects could be offset or amplified by such factors, such as changes in overall storm frequency or tracks.

Shallow/Minor Coastal Flooding

Major or extreme flooding due to coastal storms is not the only type of coastal flooding hazard to affect coastal communities. Shallow tidal flooding can also be a primary concern to Delaware citizens. Broadly defined, shallow tidal flooding begins when the water level reaches a point to cause a disruption to typical everyday life. Sometimes, this type of flooding is also called minor flooding or nuisance flooding, and most often numerically defined as when the observed water level exceeds the NWS Minor Coastal Flood Advisory level. Small vertical increases in sea level can cause large increases in horizontal extent in low, flat, open areas such as much of the Delaware coastal plain region. Shallow tidal flooding will reach further inland, and in areas not protected, can cause water on the road surface making the road impassable, can cause significant disruption in commercial activities and public services, or causing waterlogged properties near the shoreline, adjacent to aback bay or marsh, or along a tributary.

Data observed at NOAA Lewes tide gauge. Note the exponential increase in the number of days where the water levels from at least one high tide crosses over the NWS Minor Coastal Flood Advisory threshold. The NWS Minor Coastal Flood Advisory threshold at Lewes tide gauge is 6.0 ft / 1.83 m above MLLW, or 0.41 m.

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

| TIME PERIOD | TOTAL NUMBER OF DAYS WITH COASTAL FLOODING GREATER THEN NWD MINOR THRESHOLD | MEAN NUMBER OF DAYS PER YEAR WITH COASTAL FLOODING GREATER THAN NSW MINOR THRESHOLD |
|-------------|---|---|
| 1955-1964 | 47 | 4.7 |
| 1965-1974 | 61 | 6.1 |
| 1975-1984 | 47 | 4.7 |
| 1985-1994 | 69 | 6.9 |
| 1995-2004 | 105 | 10.5 |
| 2015-2014 | 214 | 21.4 |

Table 3-9a. Coastal Advisory Threshold Days

Effects of Sea-Level Rise on Shallow Tidal Flooding

Shallow tidal flooding has increased due to sea-level rise in the past, and it is also expected to increase at a faster rate in the future due to sea-level rise. As sea levels rise, the mean high tide level approaches the minor coastal flood advisory threshold. As that happens, a significantly larger number of high tides will therefore be above that level. Figure 4.1-2 displays the projected number of days experiencing shallow tidal flooding under sea-level rise caused by two greenhouse gas emissions scenarios. The higher emissions scenario corresponds to the IPCC RCP8.5 "business as usual" scenarios, while the lower emissions scenario corresponds to a reduced emissions scenario midway through the 21st century.

HAZARDS

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.

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 3-10*.

| 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 |

| LOCATION | DATE | TYPE | DEATHS | INJURIES |
|-------------------------|-----------|---------------|--------|----------|
| FENWICK IS | 8/7/2017 | Flood | 0 | 0 |
| BETHANY BEACH | 8/7/2017 | Flood | 0 | 0 |
| 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 |

| LOCATION | DATE | TYPE | DEATHS | INJURIES |
|-------------------------|------------|---------------|--------|----------|
| DELAWARE BEACHES (ZONE) | 9/10/2018 | Coastal Flood | 0 | 0 |
| INLAND SUSSEX (ZONE) | 9/10/2018 | Coastal Flood | 0 | 0 |
| 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 |
| TOTAL: 59 Events | | | | |

Table 3-10. Sussex County Flood Event History²

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

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

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.

Extent

Impacts of flooding can be expected to cause severe to extensive damage depending on the source/cause of the flood and the duration. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations.

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 3-11. CPRI for Degree of Risk for Flooding

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 3-12*. 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 |
| 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 3-12. Tropical Definitions³

The Saffir-Simpson Hurricane Scale (*Table 3-13*) 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 [Tropical Definitions \(weather.gov\)](https://www.weather.gov)

| CATEGORY | WIND SPEEDS | LIKELY EFFECTS |
|----------|-----------------|---|
| 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. 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 3-13. Saffir-Simpson Hurricane Scale⁴

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 3-14* 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 <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 |
|-------------|------------------------------------|--------------------------------------|--------------------------------|--|
| 4 (Severe) | Severe beach erosion and recession | Severe dune erosion or destruction | On low beaches | Loss of structures at community-scale |
| 5 (Extreme) | Extreme beach erosion | Dunes destroyed over extensive areas | Massive in sheets and channels | Extensive at regional-scale; millions of dollars |

Table 3-14. Dolan-Davis Nor'easter Intensity Scale⁶

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 3-15. Tropical Storms

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

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.

⁷ <https://www.ncei.noaa.gov/access>

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 3-16* below.

Extent

Impacts of hurricanes and tropical storms can be expected to cause severe to extensive regional damage depending on the storm classification, location, and duration. Impacts could be serious and could result in the disruption of services and the need for evacuations.

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 3-16. CPRI for Degree of Risk for Hurricane/Tropical Storms

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.

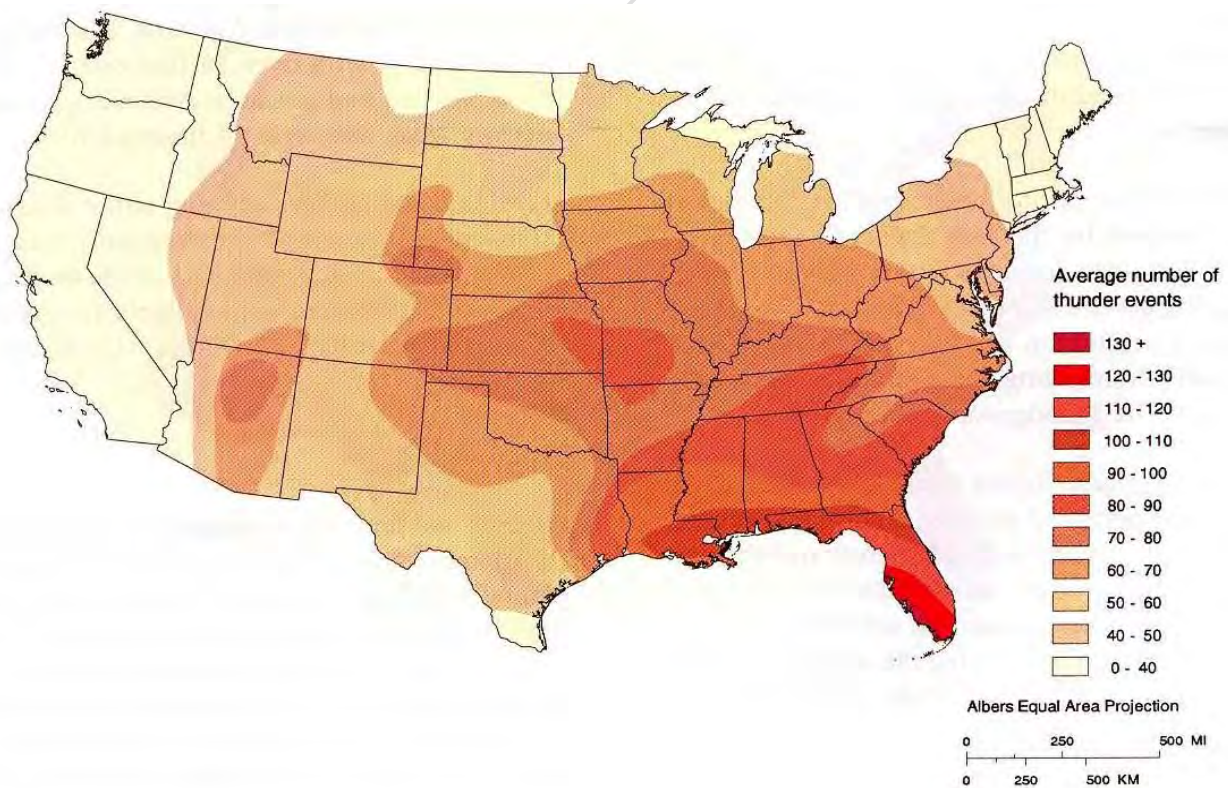


Figure 3-1: Annual Average Number of Thunder Events

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 3-17. Sussex County Thunderstorm Winds Event History

| LOCATION | DATE | EVENTS | TYPE | \$ | INJURIES | DEATHS |
|---------------|-----------|--------|-----------|----------|----------|--------|
| Sussex County | 2016-2022 | 13 | Lightning | \$500.00 | 1 | 0 |

Table 3-18. Sussex County Lightning Event History⁸

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.

Extent

Impacts of severe thunderstorms can be expected to cause moderate to severe localized damage depending on the extent and duration of the storm. Impacts have the potential to disrupt local responders working within the impacted area.

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 3-19. 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 3-20* 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 3-20. Palmer Drought Severity Index⁹

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 through the region. However, there were 201 zones affected, 14 days with an event occurring, two days with property damage occurring, and three days with crop damage occurring.¹⁰

Although Sussex County is vulnerable to drought, estimated potential losses are somewhat difficult to calculate because drought causes little damage to the built environment, mostly affecting crops and farmland. Therefore, it is assumed that all buildings and facilities are exposed to drought but would experience negligible damage in the occurrence of a drought event. The approach used to determine vulnerability within the state of Delaware consisted of several factors: statistical data for the past 100 years from the University of Nebraska, developed based on Palmer Drought and Crop Severity Indices; and the data from the National Climatic Data Center. Drought event frequency/impact was then determined for New Castle County. Drought impact on the non-irrigated agriculture products profile was then determined. 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.

Extent

Impacts of Wildfires can be expected to cause moderate localized damage depending on the extent of the drought and its duration.

CPRI for degree of risk

The generated CPRI for Drought is shown below.

¹⁰ <https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType>

| PROBABILITY | + | MAGNITUDE /SEVERITY | + | WARNING TIME | + | DURATION | = | CPRI |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| 3 x .45 | + | 2 x .30 | + | 1x .15 | + | 4 x .10 | = | 2.05 |

Table 3-21. CPRI for Degree of Risk for Drought

SUSSEX DRAFT HMP 12 MAY

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 3-22* 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.

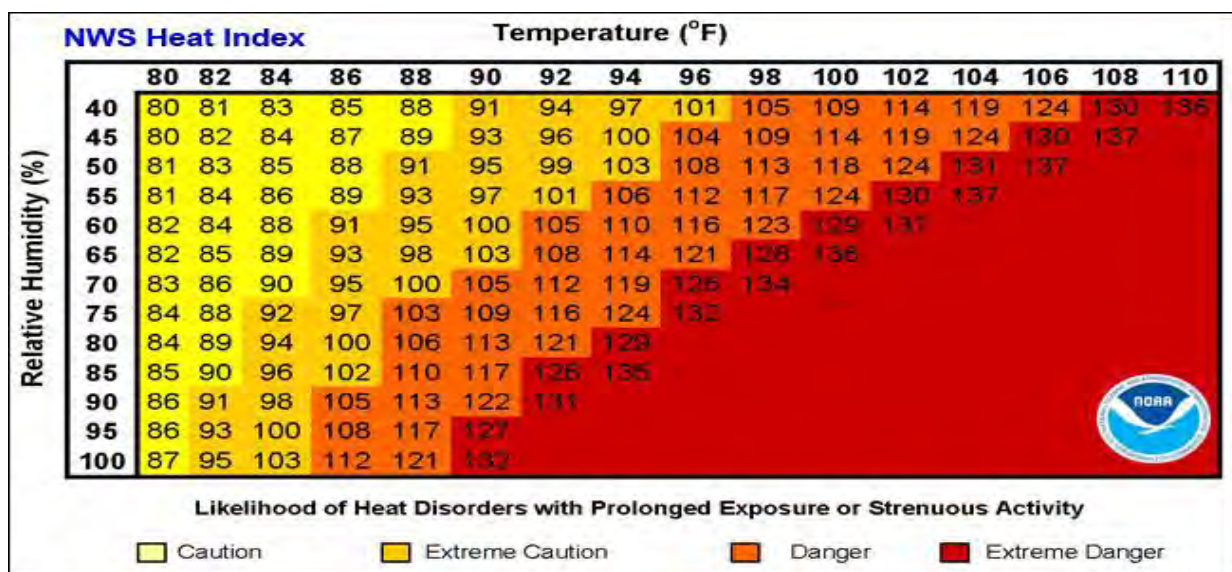


Figure 3-2. NOAA’s National Weather Heat Index¹¹

| LOCATION | COUNTY/ZONE | DATE | TYPE | DEATHS | INJURIES |
|--------------------------------------|----------------------|---------|----------------|--------|----------|
| INLAND SUSSEX (ZONE) | INLAND SUSSEX (ZONE) | 08/2021 | Excessive Heat | 0 | 0 |

Table 3-22. Sussex County Extreme Heat Event History¹²

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.

¹¹ NOAA- <http://w1.weather.gov/glossary/index.php?letter=h>

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

Extent

Impacts of extreme heat/cold situations can be expected to cause moderate to extensive localized damage depending on the extent of the severe weather conditions and the duration. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations.

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 | + | 1x .30 | + | 1 x .15 | + | 3 x .10 | = | 2.1 |

Table 3-23. CPRI for Degree of Risk for Extreme Heat/Cold

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 3-24. Hazardous Materials Incidents in Sussex County

Extent

Impacts of extreme HAZMAT incidents can be expected to cause moderate to extensive localized damage depending on the materials involved, and the duration of the incident. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations of impact area.

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 3-25. 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 NCDRC databases, since 2016, there were eight major winter storm warning events in Sussex County.¹³

| 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 |

¹³ <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 3-26. 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 3-26*, 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.¹⁴

Extent

Impacts of severe winter storms can be expected to cause moderate to extensive localized damage depending on the extent of the storm and its duration. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services.

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 3-27. CPRI for Degree of Risk for Winter Storms

¹⁴ <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.¹⁵ 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 3-28** 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 |

¹⁵ <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 3-28. Enhanced Fujita (EF) Scale for Tornadoes¹⁶

Occurrences and Probability of Tornadoes

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.¹⁷

| 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 3-29. 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:

¹⁶ National Weather Service (NWS). (2022). The enhanced Fujita scale (EF scale). National Weather Service. <https://www.weather.gov/oun/efscale>

¹⁷ <https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE>

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

Extent

Impacts of tornado conditions can be expected to cause moderate to extensive localized damage depending on the extent of the tornado conditions and its duration. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services.

CPRI for degree of risk

The generated CPRI for Tornadoes is shown below.

| PROBABILITY | + | MAGNITUDE/ SEVERITY | + | WARNING TIME | + | DURATION | = | CPRI |
|-------------|---|------------------------|---|--------------|---|----------|---|------|
| 1 x .45 | + | 2 x .30 | + | 4 x .15 | + | 1 x .10 | = | 1.75 |

Table 3-30. CPRI for Degree of Risk for Tornadoes

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.

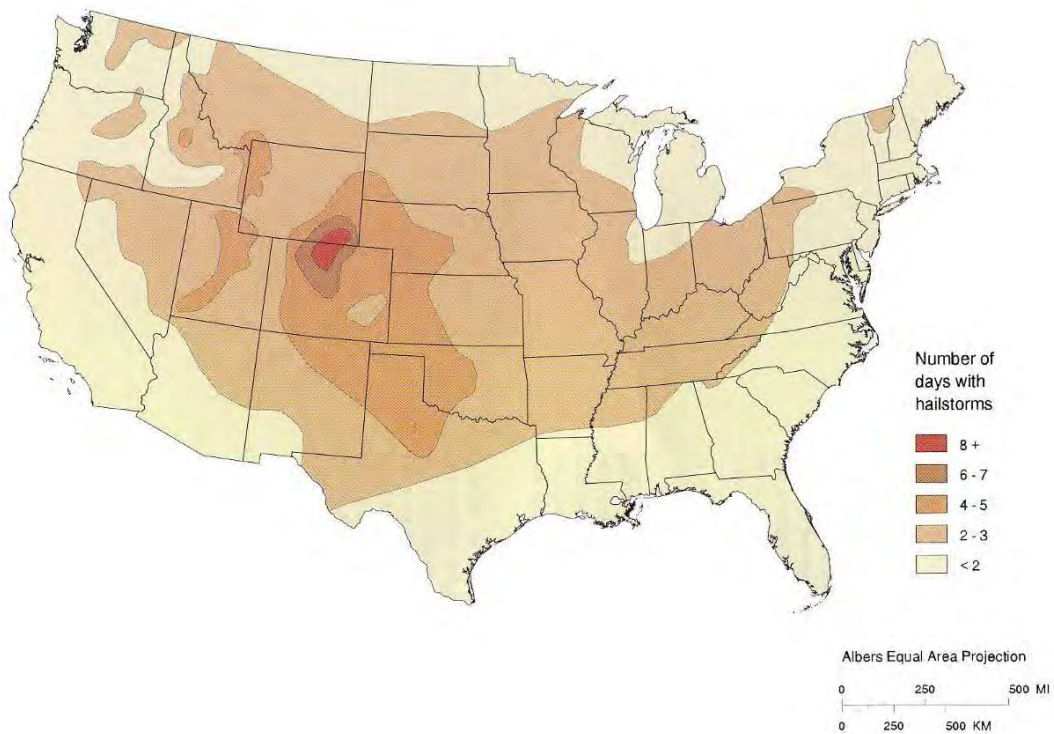


Figure 3-3: Annual Frequency of Hailstorms in the United States¹⁸

¹⁸ 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.¹⁹

| LOCATION | COUNTY/ZONE | DATE | TYPE | MAGNITUDE | DEATHS |
|----------------------|-------------|---------|------|-----------|--------|
| REDDEN | SUSSEX CO. | 05/2016 | Hail | 0.75 in. | 0 |
| DELMAR STATE LINE AR | SUSSEX CO. | 05/2017 | Hail | 0.75 in. | 0 |
| BLADES | SUSSEX CO. | 08/2019 | Hail | 1.00 in. | 0 |
| LAUREL | SUSSEX CO. | 08/2019 | Hail | 0.75 in. | 0 |
| DEWEY BEACH | SUSSEX CO. | 08/2019 | Hail | 1.25 in. | 0 |
| PHILLIPS HILL | SUSSEX CO. | 09/2019 | Hail | 1.00 in. | 0 |
| BLADES | SUSSEX CO. | 04/2021 | Hail | 1.00 in. | 0 |
| BRIDGEVILLE | SUSSEX CO. | 04/2021 | Hail | 1.00 in. | 0 |

Table 3-31. 2016-2021 Historical Occurrences

Extent

Impacts of extreme hailstorm conditions can be expected to cause minor to moderate localized damage depending on the extent of the hailstorm weather conditions and its duration. Hailstorms may impact local responders working within the impacted area. 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 | + | DURATION | = | CPRI |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| 2 x .45 | + | 1 x .30 | + | 3 x .15 | + | 1 x .10 | = | 1.75 |

Table 3-32. CPRI for Degree of Risk for Hail

¹⁹ <https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventTypestatefips=10%2CDELAWARE>

TERRORISM- DOMESTIC (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.²⁰

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.

²⁰ United States Code 18. (2021). <https://www.govinfo.gov/content/pkg/USCODE-2011-title18/pdf/USCODE-2011-title18.pdf>

Occurrences and Probability of a Domestic Terrorism

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 3-33. Arrest for Domestic Terrorism (FBI, 2021)²¹

Prioritization and Rationale of Domestic Terrorism

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.

Extent

Impacts of terrorism events can be expected to cause severe to extensive localized damage depending on the type of the terrorist activity and its duration. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations.

CPRI for degree of risk

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

²¹ Strategic Intelligence Assessment and Data on Domestic Terrorism. (2021, May). www.fbi.gov/file-repository/fbi-dhs-domestic-terrorism-strategic-report

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

Table 3-34. CPRI for Degree of Risk for Terrorism

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.²²

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.

²² 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 Beach/ Soil Erosion

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.

Extent

Impacts of beach/soil erosion situations can be expected to cause low to moderate localized damage depending on the extent of the erosion and the duration.

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 3-35. 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 3-36 identifies the top ten deadliest computer viruses.

| NAME | DATE | DESCRIPTION | DAMAGES |
|----------|------|---|---------------|
| ILOVEYOU | 2001 | <p>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.</p> <p>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.</p> <p>10% of all computers infected.</p> | \$15 Billion |
| Code Red | 2001 | <p>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.</p> <p>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.</p> <p>1.2 million servers affected</p> | \$2.4 Billion |
| Melissa | 1999 | <p>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.</p> <p>This got people curious and when it was downloaded and opened, it would trigger the macro inside and unleash its payload.</p> | \$80 Million |
| Sasser | 2004 | <p>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.</p> <p>More than a million infections taking out critical infrastructures, such as airlines, news agencies, public transportation, hospitals, public transport</p> | \$500 Million |

| NAME | DATE | DESCRIPTION | DAMAGES |
|-----------|------|---|--------------|
| Zeus | 2009 | <p>Zeus is a Trojan horse made to infect Windows computers so that it will perform various criminal tasks.</p> <p>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.</p> <p>One million computers infected (25% from US)</p> <p>Money mules are used to smuggle and transfer cash to the ringleaders in Eastern Europe.</p> | \$3 Billion |
| Conficker | 2009 | <p>The malware was able to infect more than 9 million computers all around the world, affecting governments, businesses, and individuals.</p> <p>It was one of the largest known worm infections to ever surface.</p> | \$9 Billion |
| Stuxnet | | <p>Believed to have been created by the Israeli Defense Force together with the American Government,</p> <p>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.</p> <p>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.</p> | N/A |
| Mydoom | 2004 | <p>Became one of the fastest spreading email worm since ILOVEYOU.</p> <p>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,"</p> <p>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.</p> | \$38 Billion |

| NAME | DATE | DESCRIPTION | DAMAGES |
|---------------|------|--|---------------|
| | | It was believed that the worm was created to disrupt SCO due to conflict over ownership of some Linux code. | |
| Crypto Locker | | Trojan horse ransomware targeted at computers running Windows. It uses methods to spread itself, such as email, and 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 | \$665 Million |
| 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 3-36. Top 10 Deadliest Viruses²³

Extent

Impacts of cyber terrorism events can be expected to cause low to moderate cyber-damage depending on the type and severity of the terrorism activity.

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 3-37. CPRI for Degree of Risk for Cyber Terrorism

²³ 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 3-38*.

| 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 3-38. Dam Hazard Potential Classification System²⁴

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.

²⁴ FEMA

High Hazard Potential Dam: Any dam whose failure or mis-operation will cause *probable* loss of human life²⁵.

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 3-39 and 3-40* 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 3-39. Delaware State Dam Inventory

| SUSSEX COUNTY HIGH & SIGNIFICANT POTENTIAL DAM INVENTORY | | |
|--|--|--|
| High Hazard Potential | <ul style="list-style-type: none"> ▪ City of Laurel Sewage Lagoon (1) ▪ City of Laurel Sewage Lagoon (2) ▪ City of Laurel Sewage Lagoon (3) ▪ Selbyville Wastewater Lagoon ▪ Clendaniel Pond Dam ▪ Abbots Pond Dam | <ul style="list-style-type: none"> ▪ Hearn's 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 |

²⁵ http://www.dnrec.delaware.gov/swc/Documents/SoilPPT/damsafety_files_/frame.htm

| SUSSEX COUNTY HIGH & SIGNIFICANT POTENTIAL DAM INVENTORY | | |
|--|--|---|
| | <ul style="list-style-type: none"> ▪ Betts Pond Main Dam ▪ Betts Pond Route 113 Dam ▪ Burton Pond Dam ▪ Chipman Pond Dam ▪ Concord Pond Dam ▪ Craigs Pond ▪ Cabbage Pond Dam ▪ Fleetwood Pond Dam ▪ Griffith Lake Dam | <ul style="list-style-type: none"> ▪ Shoals Branch Dam ▪ Swiggetts Pond Dam ▪ Trap Pond Dam ▪ Wagamons Pond Dam ▪ Williams Pond Dam ▪ Waples Pond Dam |
| Significant Hazard Potential | <ul style="list-style-type: none"> ▪ Goslee Mill Pond Dam ▪ Morris Millpond Dam ▪ Collins Pond Dam | <ul style="list-style-type: none"> ▪ Davis Pond Dam ▪ Trussams Pond Dam |

Table 3-40. 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. 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.. Sussex County along with state officials will revisit any potential plans to integrate existing plans to HHPD as required in the next plan update.

Extent

Impacts of extreme dam/levee events can be expected to cause severe to extensive localized damage depending on the extent of the failure. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations.

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 3-41. 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.²⁶

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.²⁷

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

²⁷ [General Pipeline FAQs | PHMSA \(dot.gov\)](#)

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.

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.

Extent

Impacts of pipeline failures can be expected to cause low to moderate localized damage depending on the severity of the failure and its duration. Pipeline failure events may impact local responders working in the area and could result in slight disruptions of services and the need for small-scale evacuations.

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 3-42. 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 3-43*). 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 MAGNITUDE | 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 3-43. 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 MONITORING |
|-------|--------------|-------------------------------|--|
| I | Instrumental | Detected only on seismographs | |

| SCALE | INTENSITY | EARTHQUAKE EFFECTS | CORRESPONDING RICHTER SCALE MONITORING |
|-------|-----------------|--|--|
| 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 3-44. 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.

Occurrences 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.²⁸

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.

²⁸ Source: <https://www.dgs.udel.edu/delaware-geology/earthquake-november-30-2017>

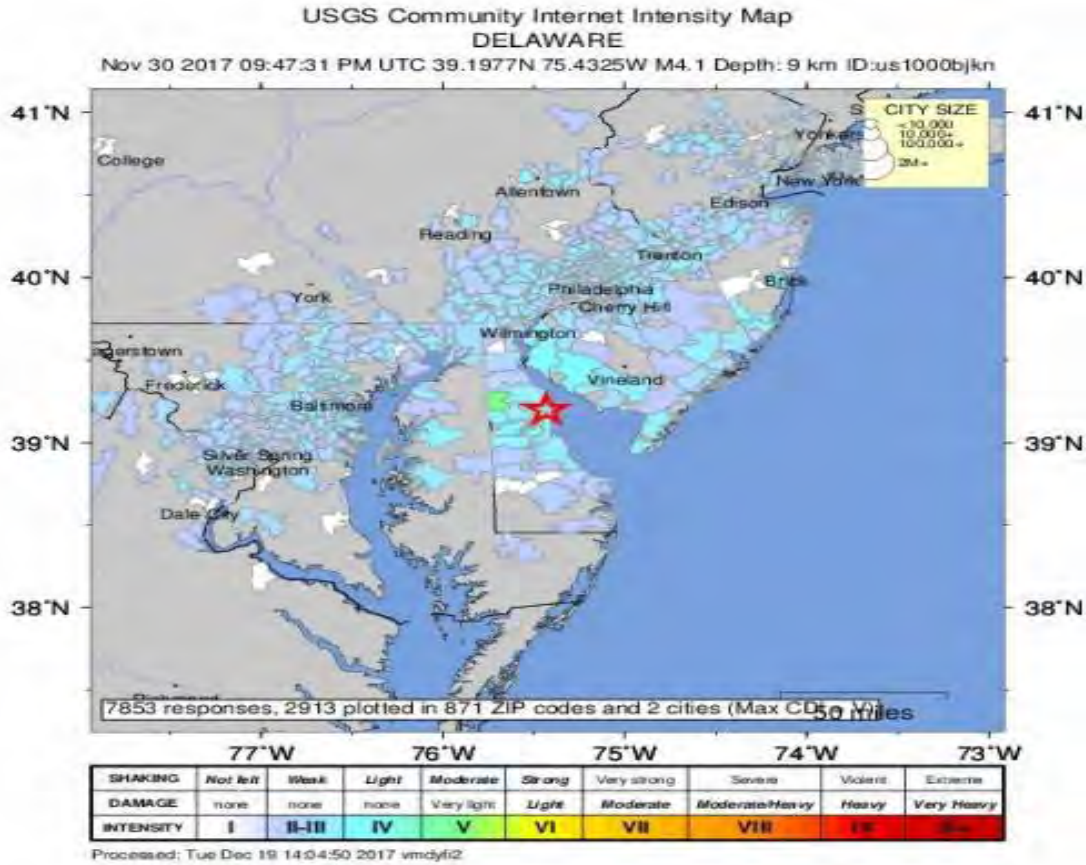


Figure 3-4. Intensity Map of 2017 Earthquake

Extent

Impacts of earthquake events can be expected to cause moderate to extensive localized damage depending on the location, magnitude, or severity of the earthquake. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations.

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 3-45. CPRI for Degree of Risk for Earthquake

WILDFIRE (NON-RATED)

Hazard Description

A wildfire is any fire that burnt 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.

There are three classes of wildland fires:

- Surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees.
- Ground fire or (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor.
- Crown fire spread rapidly by wind and move quickly by jumping along the tops of trees.
- Wildland fires are usually signaled by dense smoke that fills the area for miles around.

Extent

Impacts of Wildfires can be expected to cause severe to extensive localized damage depending on the extent of the fire and the duration. Impacts could be serious for local responders working within the impacted area and could result in the disruption of services and the need for evacuations.

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 3-46. CPRI for Degree of Risk for Wildfire

4. RISK AND VULNERABILITY 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.

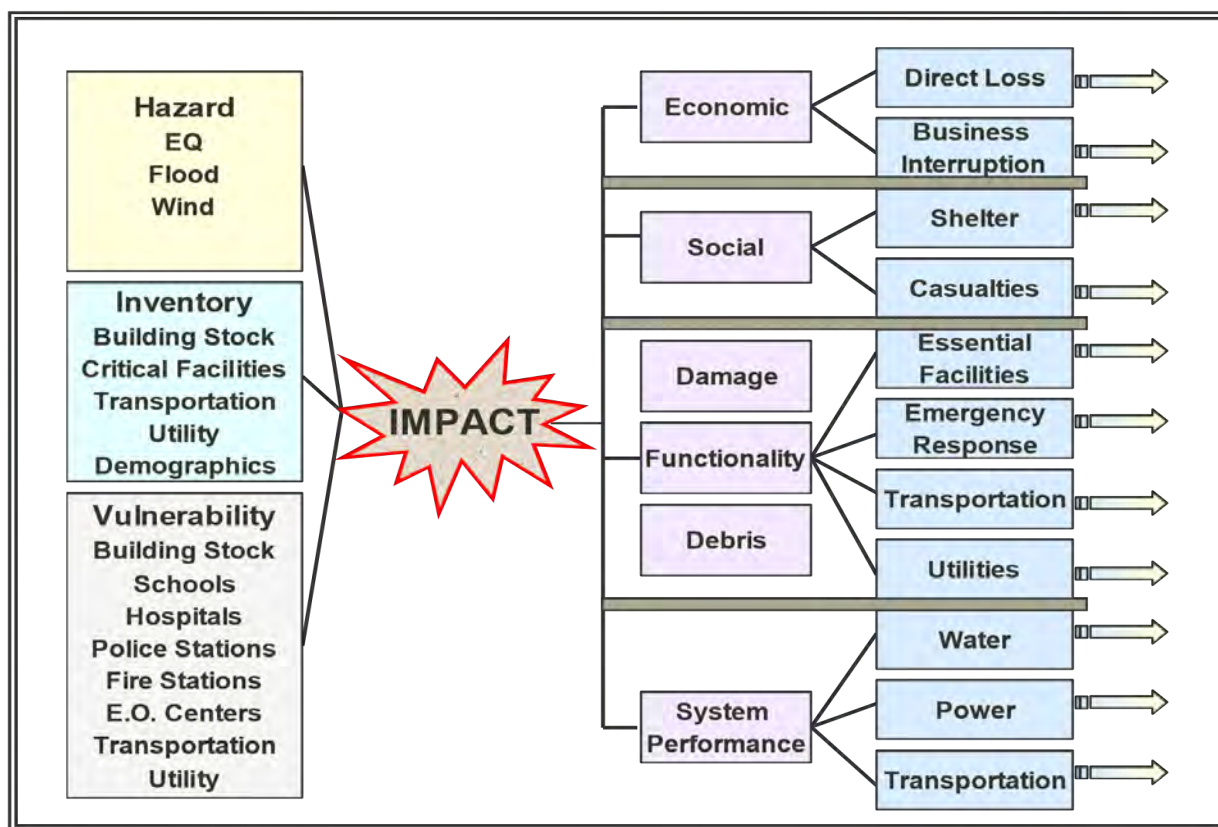


Figure 4-1. Conceptual Model of HAZUS-MH Methodology

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:

$$\text{“ALR} = \text{ANNUALIZED LOSSES} / \text{TOTAL EXPOSURE AT RISK”}$$

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)²⁹

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 subdivisions³⁰ (Figure 4-2). MCDs are recognized by the

²⁹ Sussex County All Hazards Plan

³⁰ 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.”

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.³¹

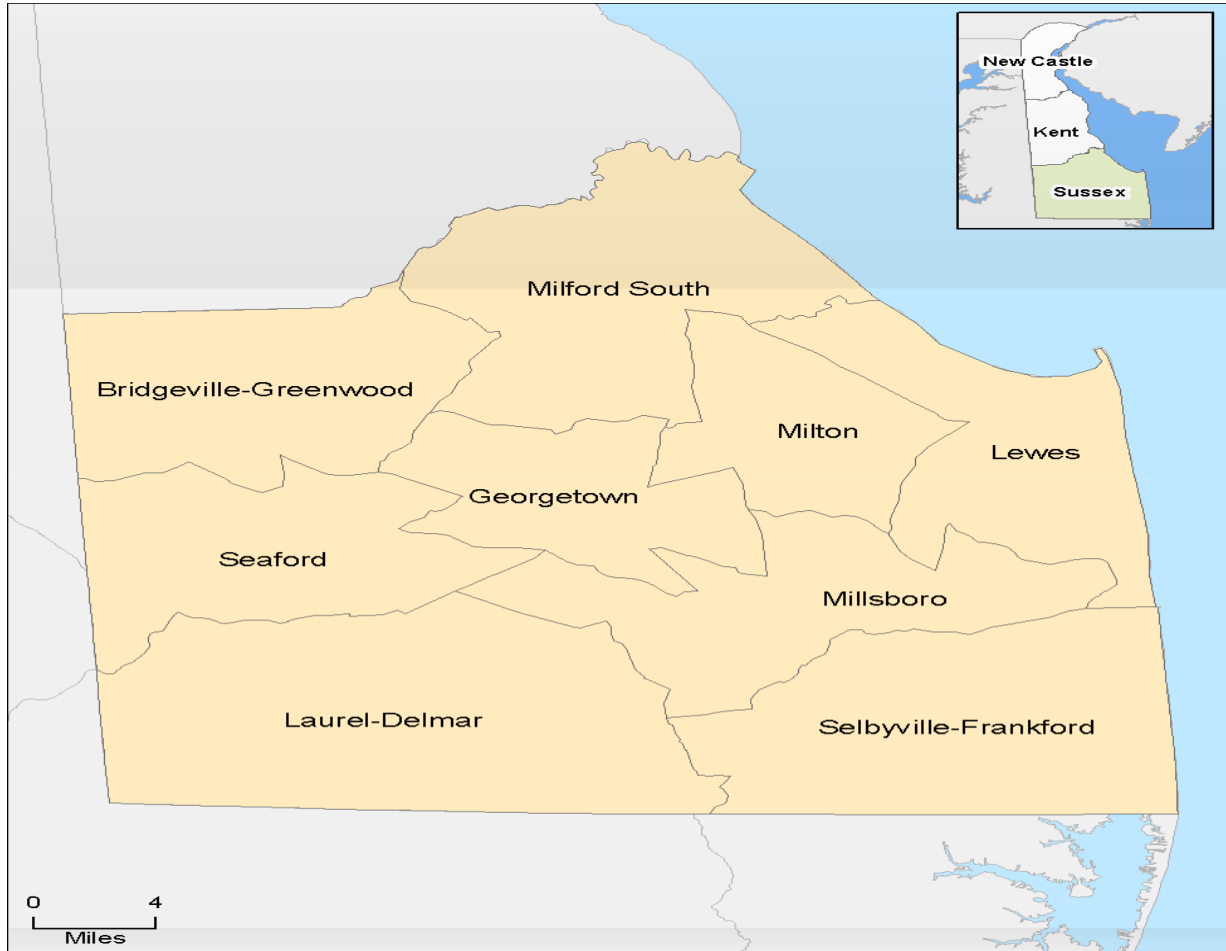


Figure 4-2. Minor Civil Divisions (U.S. Census 2020)

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

SUMMARY OF COMMUNITY VULNERABILITIES

Vulnerable assets and potential losses are more than a list of the population's total exposure, structures, and critical community facilities. Because this Plan includes many jurisdictions and the available data is not very

³¹ 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

detailed, it is not practical to complete vulnerability assessments on the many individual assets, operations, and populations in respective jurisdictions. The HMSC and HMWG, along with feedback from interviews, determined that their greatest vulnerability and threats are very similar to each jurisdiction:

- Flooding (Riverine and Coastal)
- Hurricane/Tropical Storms
- Winter Storms
- Extreme weather (Heat/Freezing Temperatures)
- Powerline failure
- Stormwater damage due to improper infrastructure
- Possible drinking water issues (well water containing a high level of benzene)
- AE 9 Flood zones (retail and business flooding)
- Tidal flooding in downtown business/retail district

However, it is appropriate for participating municipalities to embark on a program to address these data deficiencies over the next five years in anticipation of the following Plan update.

SUSSEX COUNTY OVERVIEW

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 2020 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.

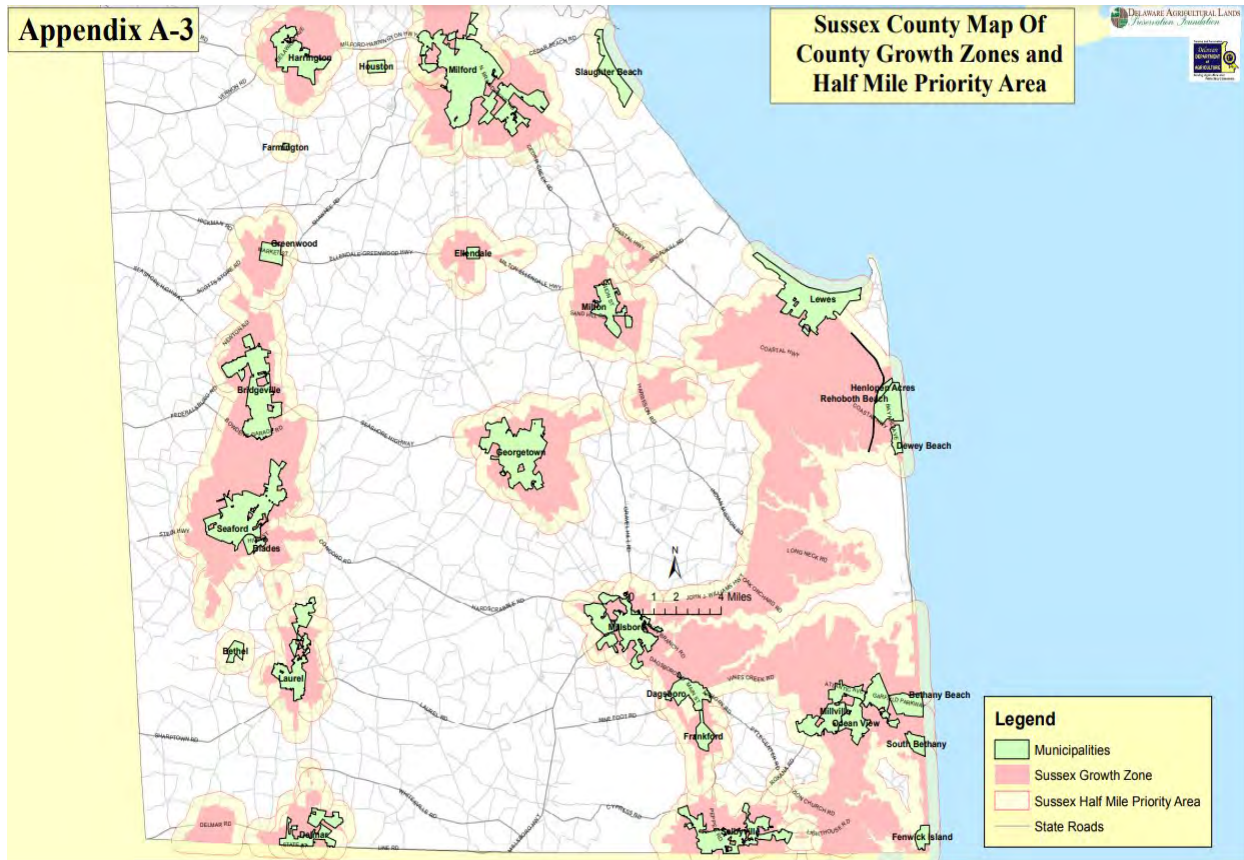


Figure 4-2.1. Sussex County Growth Zone

NATIONAL RISK INDEX³²

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.

³² <https://hazards.fema.gov/nri/>

| 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:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Social Vulnerability} \div \text{Community Resilience}$$

| TYPE | RATING | SCORE |
|-------------------|---------------------|-------|
| Coastal Flooding | Relatively High | 38.37 |
| Drought | Relatively Moderate | 13.53 |
| Earthquake | Relatively Low | 4.50 |
| Hail | Relatively Low | 8.07 |
| 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 |

| TYPE | RATING | SCORE |
|----------------|-----------------|-------|
| Winter Weather | Relatively High | 33.76 |

Table 4-2. Hazard Risk Index

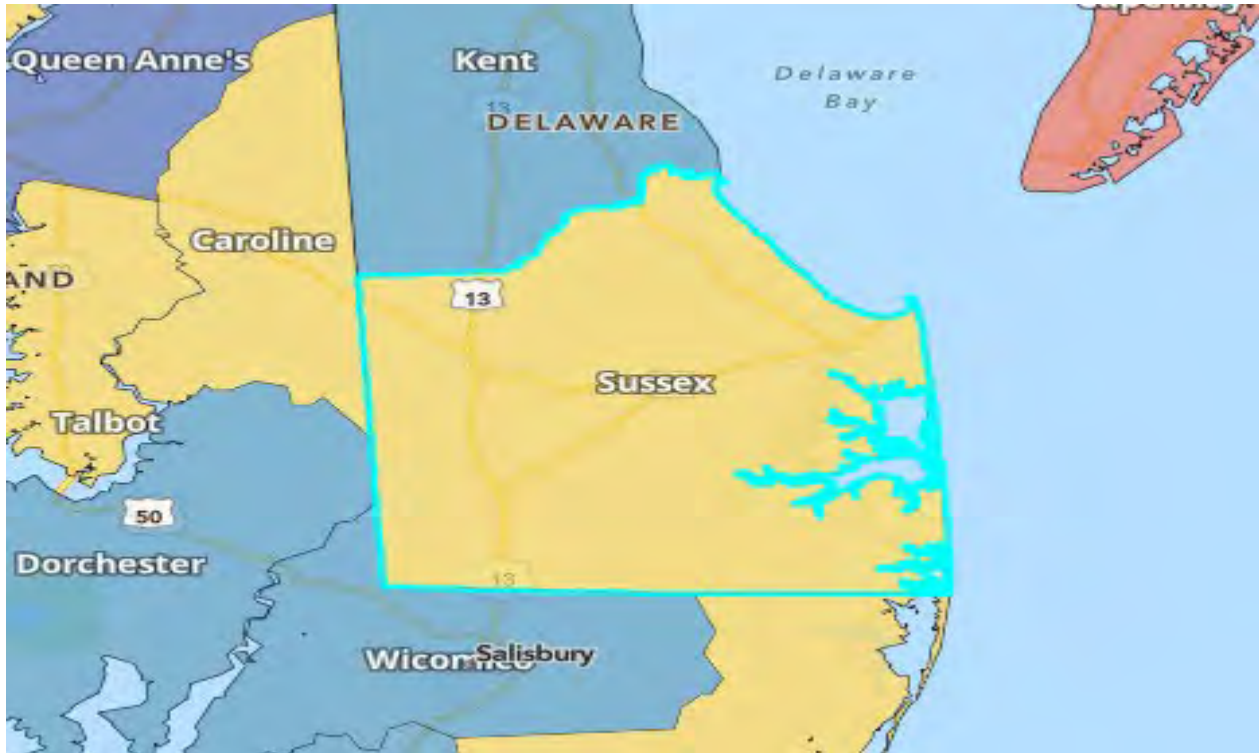


Figure 4-3. Map of Risk Index

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:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

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 EQUIVALENCE | 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 |

| TYPE | TOTAL | BUILDING VALUE | POPULATION EQUIVALENCE | POPULATION | AGRICULTURE VALUE |
|-------------------|-----------|----------------|------------------------|------------|-------------------|
| 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 EQUIVALENCE | 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 |
| 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 |

| TYPE | TOTAL | BUILDING VALUE | POPULATION EQUIVALENCE | POPULATION | AGRICULTURE VALUE |
|----------------|--------------|----------------|------------------------|------------|-------------------|
| 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) |
| 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 |
| 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

SOCIAL VULNERABILITY

The Social Vulnerability Index uses U.S. Census data to determine the relative social vulnerability of every census tract. The SVI ranks each tract on 14 social factors and groups them into four related themes. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking. The SVI can help emergency response planners and public health officials identify and map the communities that will most likely need support before, during, and after a hazardous event³³

33

https://svi.cdc.gov/Documents/Publications/CDC_ATSDR_SVI_Materials/SVI_Poster_07032014_FIN_AL.pdf

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.

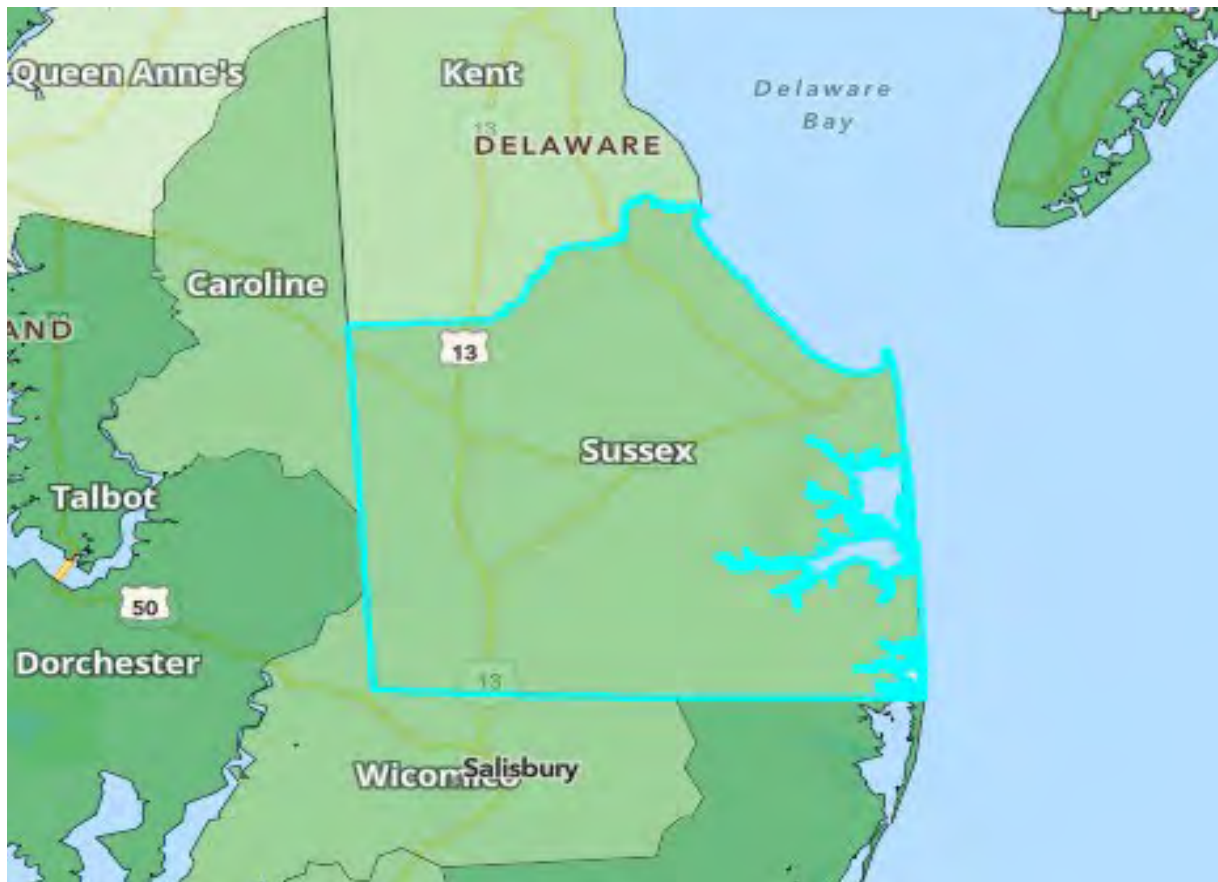


Figure 4-5. Social Vulnerability Index

■ Relatively Moderate 44.15

COMMUNITY RESILIENCE

Community resilience is the capacity of individuals and households to absorb, endure, and recover from the health, social, and economic impacts of a disaster such as a hurricane or pandemic. When disasters occur, recovery depends on the community's ability to withstand the effects of the event. To facilitate disaster preparedness, the Census Bureau has developed small new area estimates, identifying communities where

resources and information may effectively mitigate the impact of disasters³⁴

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.

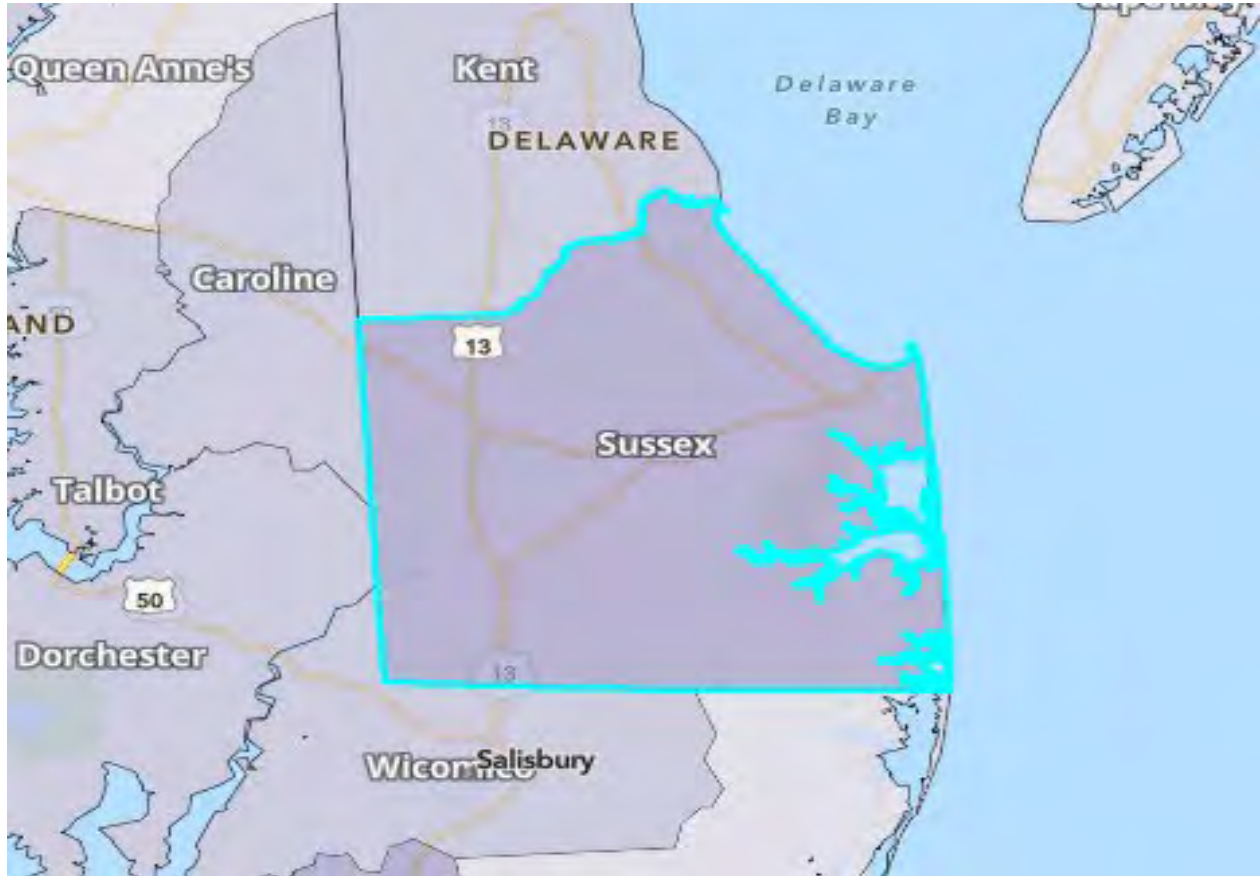


Figure 4-6. Community Resilience

■ Relatively Moderate: 55.10

POPULATION, DEMOGRAPHICS, AND TRENDS

The resident population of the State of Delaware is projected to increase from 197,145 in 2010 to approximately 247,276 by 2030 (U.S. Census Bureau and Delaware Population Consortium). Delaware's rate of population change, at 25.43 percent, ranks as the 17th largest in the Nation. The percent change in housing units in the State is estimated to have been 10.6 percent from 2010 to 2020, These trends

³⁴ <https://experience.arcgis.com/experience/b0341fa9b237456c9a9f1758c15cde8d/>

demonstrate that Delaware's population is increasing, and consequently, the number of residential structures and the associated exposure of residential buildings will also increase. Assuming a multiplier of 1.008³⁵, the total residential exposure of Sussex County could reach an estimated dollar value of nearly \$22 billion by 2025. This estimate does not consider many other development factors, such as available land for new residential construction.

Demographics

In 1960, the population of Sussex County was 49,255. The population increased by 57.40% by 1970, 49.78% in the following decade, and 12.77% from 1980 to 1990. According to the 2000 Census data, Sussex saw an increase from 1990 to 2000 of 10.10%, for a total population of 156,638. Between 2000 and 2010, the County underwent a 25.86% growth and continued to increase by 26.64%. The population growth by jurisdiction can be found in **Table 4-9** on the following page and map showing the growth zone.

| Jurisdiction | 1990 Population | 2000 Population | 2010 Population | 2020 Population | % Change from 2010-2020 |
|------------------------|-----------------|-----------------|-----------------|-----------------|-------------------------|
| Sussex County | 113,229 | 156,638 | 197,145 | 248,733 | 26.16 |
| Town of Bethany Beach | 315 | 905 | 1,060 | 1,317 | 24.24 |
| Town of Bethel | 157 | 184 | 171 | 253 | 47.95 |
| Town of Blades | 1079 | 1100 | 1,241 | 1,538 | 23.93 |
| Town of Bridgeville | 1361 | 1546 | 2,048 | 2,504 | 22.26 |
| Town of Dagsboro | 488 | 520 | 805 | 1,026 | 27.45 |
| Town of Delmar | 1,292 | 1,443 | 1,597 | 1,927 | 20.66 |
| Dewey Beach | 208 | 300 | 341 | 424 | 24.34 |
| Town of Ellendale | 334 | 336 | 381 | 487 | 27.82 |
| Town of Fenwick Island | 178 | 343 | 379 | 472 | 24.53 |
| Town of Frankford | 536 | 716 | 847 | 1,041 | 22.90 |
| Town of Georgetown | 3,983 | 4,789 | 6,422 | 7,200 | 12.11 |

³⁵ Based on the percent change in housing units for a two-year period and weighted for Sussex County

| Jurisdiction | 1990 Population | 2000 Population | 2010 Population | 2020 Population | % Change from 2010-2020 |
|-------------------------|--------------------|--------------------|--------------------|--------------------|----------------------------|
| Town of Greenwood | 587 | 844 | 973 | 990 | 1.74 |
| Town of Henlopen Acres | 108 | 133 | 122 | 153 | 25.43 |
| Town of Laurel | 3,431 | 3,746 | 3,708 | 4,608 | 24.27 |
| City of Lewes | 2,343 | 2,923 | 2,747 | 3,303 | 20.24 |
| Town of Millsboro | 1,688 | 2,497 | 3,877 | 6,863 | 77.01 |
| Town of Millville | 189 | 255 | 544 | 662 | 21.69 |
| Town of Milton | 1,703 | 1,719 | 2,576 | 3,189 | 23.79 |
| Town of Ocean View | 770 | 1,044 | 1,882 | 2,636 | 4.01 |
| City of Rehoboth Beach | 1,335 | 1,500 | 1,327 | 1,400 | 5.5 |
| City of Seaford | 5,703 | 6,786 | 6,928 | 8,457 | 22.06 |
| Town of Selbyville | 1,482 | 1,723 | 2,167 | 2,634 | 21.55 |
| Town of Slaughter Beach | 100 | 198 | 207 | 253 | 22.22 |
| Town of South Bethany | 146 | 493 | 449 | 563 | 25.38 |

Table 4-9. Population Trends

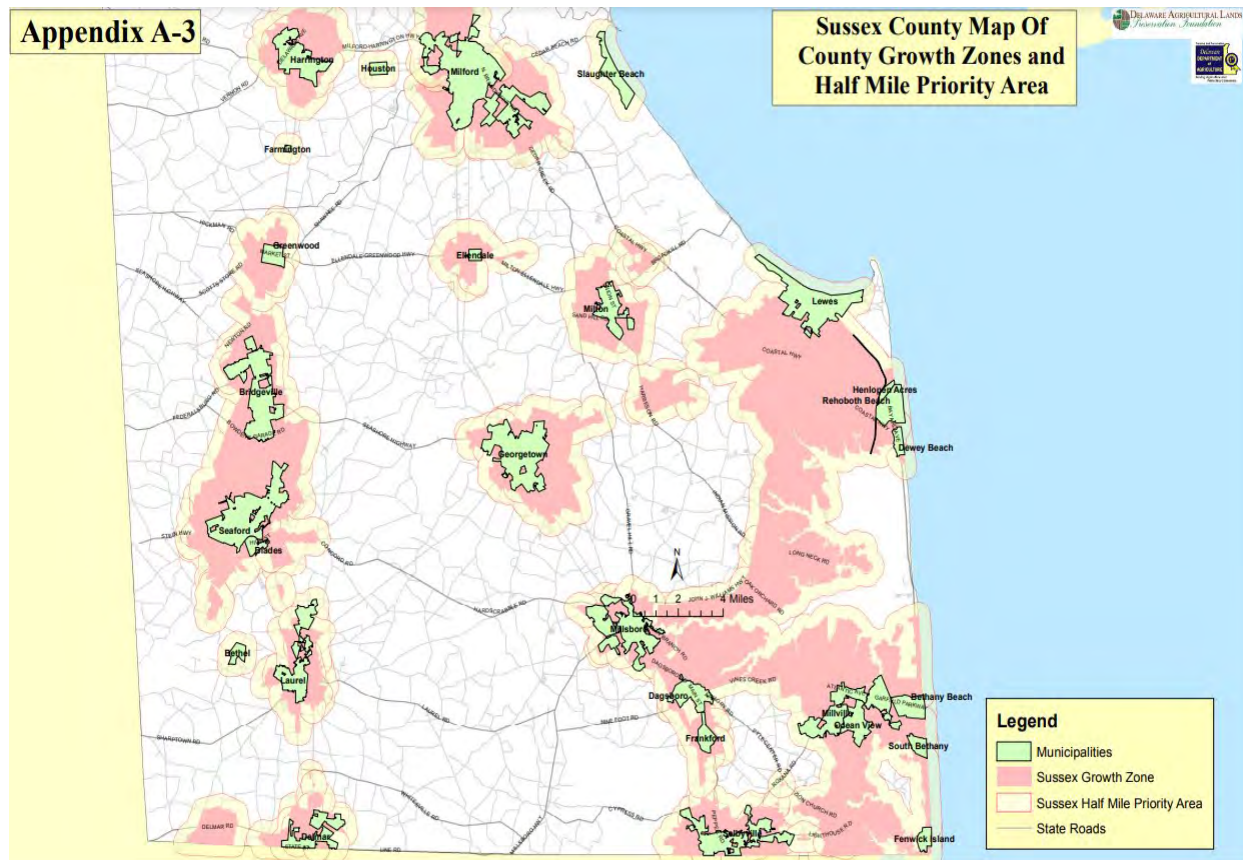


Table 4-6.a. Sussex County Growth Zone

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.

| OCCUPANCY | EXPOSURE | % OF TOTAL BUILDING INVENTORY |
|-------------|--------------|-------------------------------|
| Residential | \$27,520,983 | 85.34% |
| Commercial | \$3,042,603 | 9.43% |
| Industrial | \$871,675 | 2.70% |

| OCCUPANCY | EXPOSURE | % OF TOTAL BUILDING INVENTORY |
|--------------|--------------|-------------------------------|
| Agricultural | \$156,447 | 0.49% |
| Religious | \$324,358 | 1.01% |
| Government | \$144,928 | 0.45% |
| Education | \$188,634 | 0.58% |
| Total | \$32,249,628 | 100.00% |

Table 4-10. Building Exposure³⁶

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 |

³⁶ HAZUS-MH Analysis completed June 2016.

| FACILITY CLASS | TYPE OF FACILITY | OCCUPANCY CLASS | DESCRIPTION |
|----------------|-------------------|---------------------------|--|
| 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 |
| 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 Definitions³⁷

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 |

³⁷ HAZUS-MH Analysis completed June 2022.

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|---------------------------------------|----------------|----------------|
| 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 |
| 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 |

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|---------------------------------------|----------------|----------------|
| 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 |
| 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 Facilities³⁸

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 |

³⁸ HAZUS-MH, DRBC, and local data sources

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|----------------------------------|----------------|----------------|
| 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 |
| 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 Facilities³⁹

³⁹ HAZUS-MH, DRBC, and local data sources

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 Facilities⁴⁰

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 |
| WOODBIDGE 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 |

⁴⁰ HAZUS-MH, DRBC, and local data sources

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|--|--------------|----------------|
| 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 |
| DELMARVA CHRISTIAN HIGH SCHOOL | GEORGETOWN | EFS1 |
| JESUS IS LORD CHRISTIAN ACADEMY | GEORGETOWN | EFS1 |
| SUSSEX CENTRAL HIGH SCHOOL | GEORGETOWN | EFS1 |
| WOODBRIIDGE EARLY CHILDHOOD EDUCATION | GREENWOOD | EFS1 |
| WOODBRIIDGE 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 |

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|--|----------------|----------------|
| 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 |
| 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 |

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|--|----------------|----------------|
| 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 |
| SHOWELL (PHILLIP C.) ELEMENTARY SCHOOL | SELBYVILLE | EFS1 |

Table 4-15. Educational Facilities⁴¹

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 |

⁴¹ HAZUS-MH, DRBC, and local data sources

| FACILITY NAME | JURISDICTION | FACILITY CLASS |
|---------------|----------------|----------------|
| 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 |
| 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 Facilities⁴²

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.

⁴² HAZUS-MH, DRBC, and local data sources

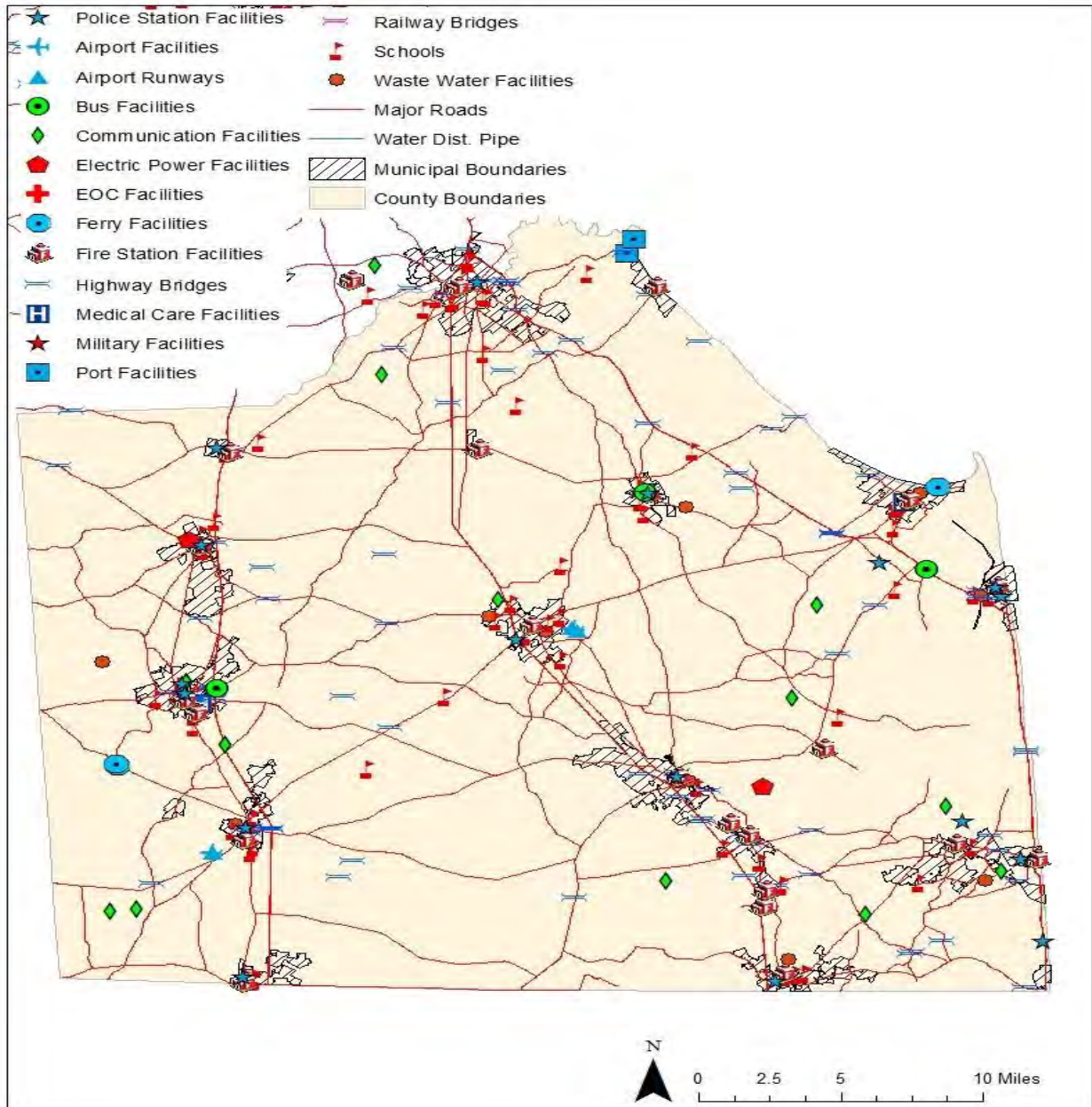


Figure 4-7. Essential Facilities in Sussex County⁴³

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.

⁴³ 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.

Flood Zone Designation

Flood Zones are the land area that could be covered by the floodwaters. The Federal Emergency Management Agency has placed more than 20,000 communities in the United States into a category of flood zones.⁴⁴

- High Risk Flood Zones

In high-risk areas, there is at least a 1 in 4 chance of flooding during a 30-year mortgage. All home and business owners in these areas with mortgages from federally regulated or insured lenders are required to buy flood insurance. They are shown on the flood maps as zones labeled with the letters A or V.

⁴⁴ <https://floodpartners.com/flood-zones/>

- Moderate to Low Risk Flood Zones

In moderate-to-low risk areas, the risk of being flooded is reduced but not completely removed. These areas submit over 20% of NFIP claims and receive one-third of disaster assistance for flooding. Flood insurance isn't federally required in moderate-to-low areas, but it is recommended for all property owners and renters. They are shown on flood maps as zones labeled with the letters B, C or X (or a shaded X).

- Undetermined Flood Zones

No flood-hazard analysis has been conducted in these areas, but a flood risk still exists. Flood insurance rates reflect the uncertainty of the flood risk. These areas are labeled with the letter D on the flood maps.

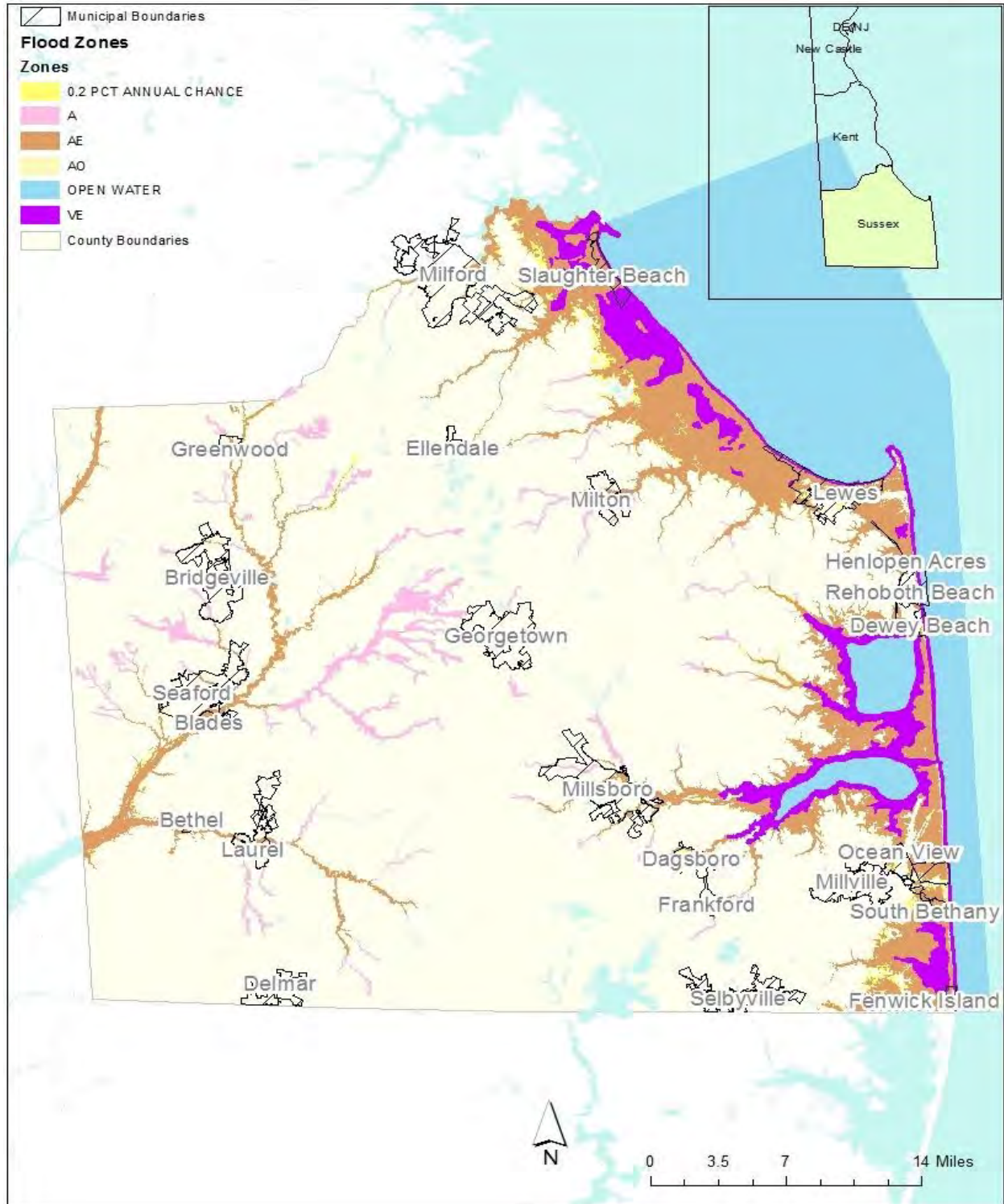


Figure 4-8. Flooding Extent (USACE)

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.

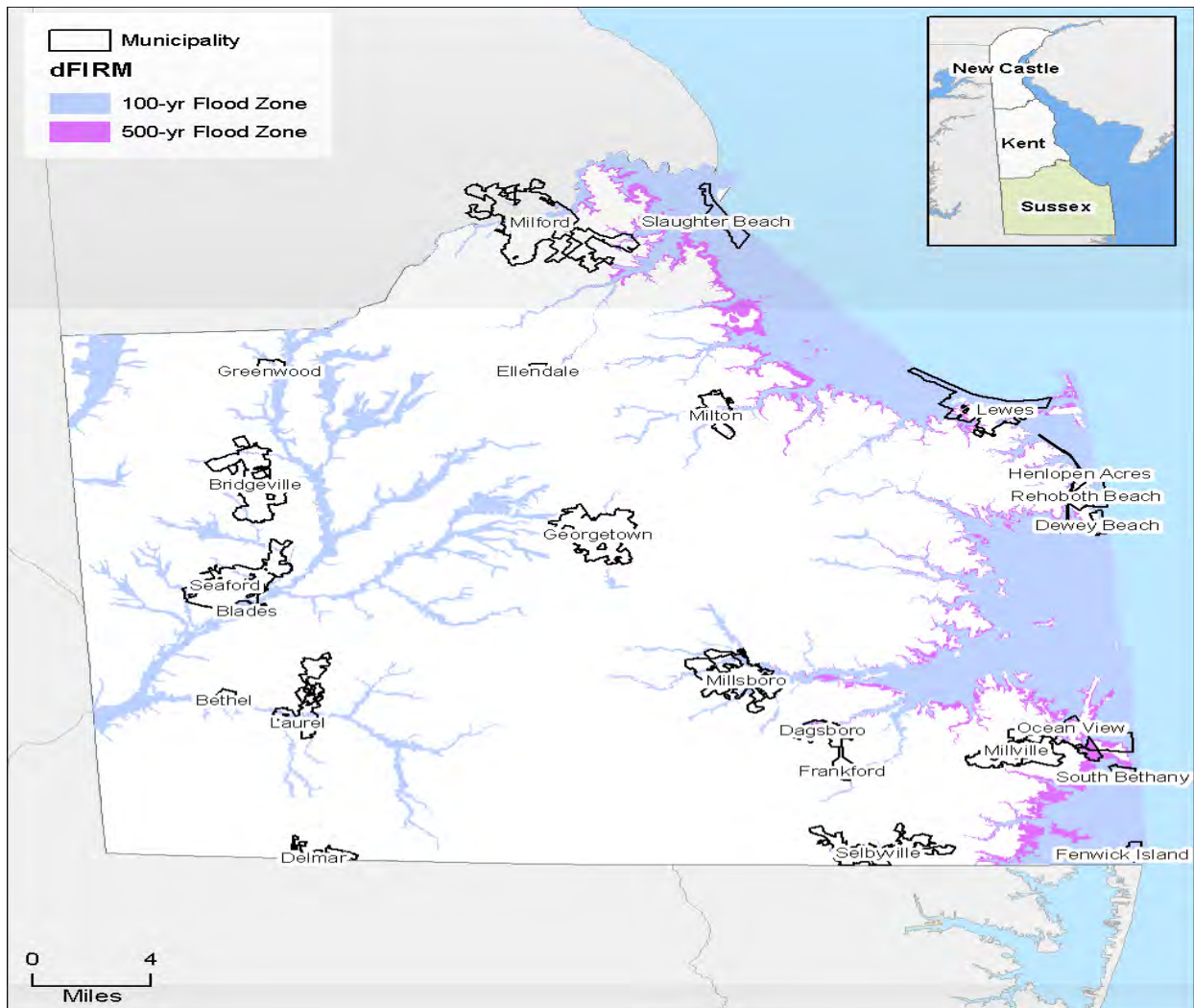


Figure 4-9. 100-year and 500-year Floodplains⁴⁵

⁴⁵ HAZUS-MH, DRBC, and local data sources.

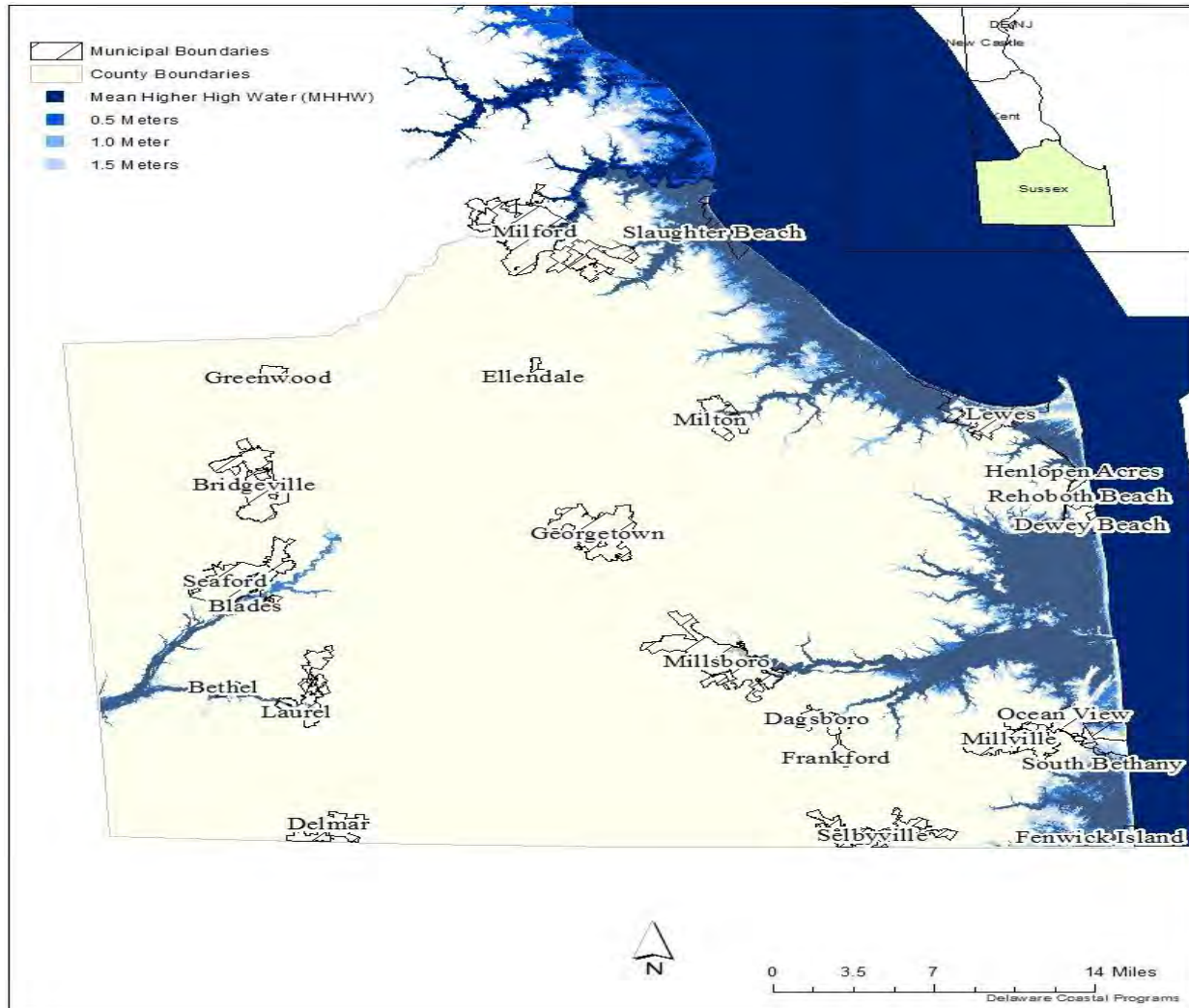


Figure 4-10. Modeled 100-year Flood Depth⁴⁶

| JURISDICTION | ESTIMATED LOSSES |
|---------------|------------------|
| Bethany Beach | \$8,221,887 |
| Bethel | \$76,408 |
| Blades | \$115,000 |
| Bridgeville | Negligible |

⁴⁶ HAZUS-MH, DRBC, and local data sources.

| JURISDICTION | ESTIMATED LOSSES |
|---------------------------|------------------|
| Dagsboro | Negligible |
| Delmar | Negligible |
| 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 |

| JURISDICTION | ESTIMATED LOSSES |
|-----------------|----------------------|
| Millville | \$124,808 |
| Milton | \$338,142 |
| 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.

Types of Damage

The definitions used for types of damage are:

- Negligible: less than 1 percent damage
- Slight: 1 to 5 percent damage
- Moderate: 5 to 30 percent damage
- Extensive: 30 to 60 percent damage

| 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 |
| 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 |

| 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 Milford South | 121 | 0 | 121 | 0 | 19 | 102 | 0 |
| 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

Repetitive loss properties are those for which two or more losses of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978.⁴⁷

A repetitive loss property is a structure covered by a contract for flood insurance made available under the NFIP that:

(a) Has incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event and

(b) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.⁴⁸

Severe repetitive loss properties are residential properties that have at least four NFIP payments over \$5,000 each and the cumulative amount of such claims exceeds \$20,000, or at least two separate claims payments with the cumulative amount exceeding the market value of the building.⁴⁹

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.⁵⁰

NFIP repetitive loss properties by type is listed in the table below. Currently there are no severe repetitive loss properties in Sussex County and this information is current as of September 2022.

| JURISDICTION | REPETITIVE LOSS | SINGLE FAMILY | TWO-FOUR FAMILY | NON-RESIDENTIAL BUSINESS | OTHER RESIDENTIAL | OTHER NON-RESIDENTIAL |
|---------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Sussex County | 145 | 126 | 6 | 0 | 8 | 5 |
| Lewes | 15 | 10 | 2 | 1 | 1 | 1 |
| Milford | 4 | 4 | 0 | 0 | 0 | 0 |
| Millsboro | 1 | 1 | 0 | 0 | 0 | 0 |
| Milton | 1 | 0 | 0 | 1 | 0 | 0 |
| Ocean View | 1 | 1 | 0 | 0 | 0 | 0 |

⁴⁷ 2011 Local Mitigation Plan Review Tool, page 21

⁴⁸ 2015 Hazard Mitigation Assistance Guidance, page 116

⁴⁹ 2011 Local Mitigation Plan Review Tool, page 21

⁵⁰ Sussex County Flood Mitigation Plan maintained by DNREC, last updated in 1999

| JURISDICTION | REPETITIVE LOSS | SINGLE FAMILY | TWO-FOUR FAMILY | NON-RESIDENTIAL BUSINESS | OTHER RESIDENTIAL | OTHER NON-RESIDENTIAL |
|-----------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Seaford | 1 | 1 | 0 | 0 | 0 | 0 |
| Slaughter Beach | 1 | 1 | 0 | 0 | 0 | 0 |
| South Bethany | 44 | 43 | 1 | 0 | 0 | 0 |
| Dewey Beach | 31 | 14 | 4 | 0 | 11 | 2 |
| Bethany Beach | 52 | 28 | 19 | 0 | 3 | 2 |
| Fenwick Island | 18 | 17 | 1 | 0 | 0 | 0 |
| Rehoboth Beach | 8 | 4 | 0 | 0 | 2 | 2 |
| Unknown | 1 | 1 | 0 | 0 | 0 | 0 |

Table 4-19. Repetitive Loss Properties

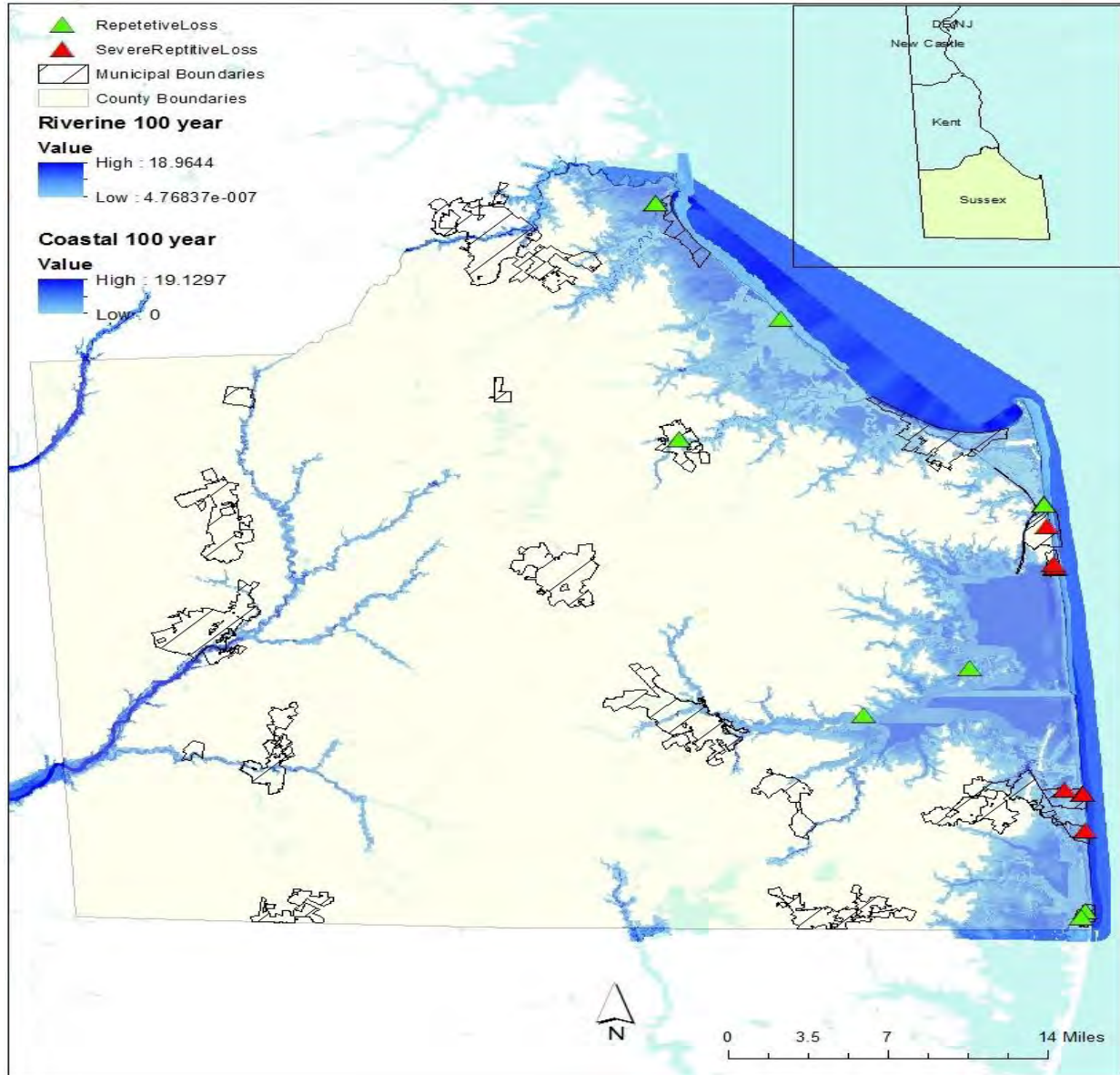


Figure 4-11. Repetitive Loss Properties

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 100-year wind event. The total potential annualized losses equal \$1,926,244.

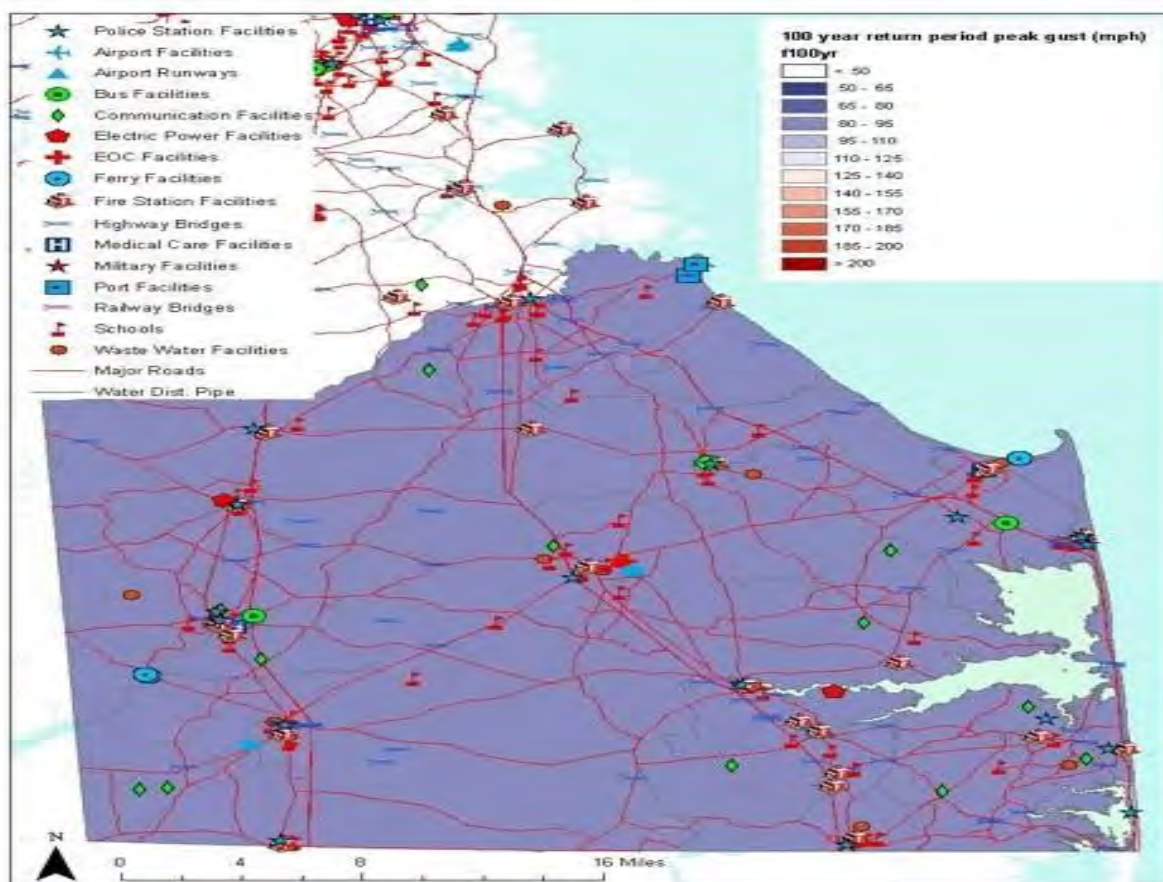


Figure 4-12. Potential Hurricane Winds for 100-year Wind Events

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 |
| MCD Laurel-Delmar | 172 | 67 | 46 | 59 | 2 | 97 | 70 | 3 |
| MCD Lewes | 175 | 136 | 36 | 3 | 127 | 31 | 14 | 3 |

| 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 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 |
| 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 |
| 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 |

| JURISDICTION | ESTIMATED LOSSES |
|--------------------------|------------------|
| 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 |
| 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 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 | AVERAGE MAGNITUDE | PROPERTY DAMAGE | DEATHS | INJURIES |
|-----------------------|--------------|-------------------|-----------------|--------|----------|
| Sussex County, DE | 94 | 53 kts. MG | 0 | 0 | 0 |
| Kent County, DE | 73 | 56 kts. EG | 0 | 0 | 0 |
| Caroline County, MD | 45 | 50 kts. EG | 0 | 0 | 0 |
| Dorchester County, MD | 30 | 51 kts. MG | \$158,000 | 0 | 0 |
| Wicomico County, MD | 24 | 51 kts. EG | \$63,000 | 0 | 0 |
| Worcester County, MD | 19 | 53 kts. MG | \$249,000 | 0 | 0 |
| Average | 48 | 52.3 kts. EG | \$94,000 | 0 | 0 |

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

| JURISDICTION | ESTIMATED LOSSES |
|---------------|------------------|
| Bethany Beach | Negligible |

| JURISDICTION | ESTIMATED LOSSES |
|---------------------------|------------------|
| 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 |
| MCD Seaford | \$15,314 |

| JURISDICTION | ESTIMATED LOSSES |
|--------------------------|------------------|
| 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)

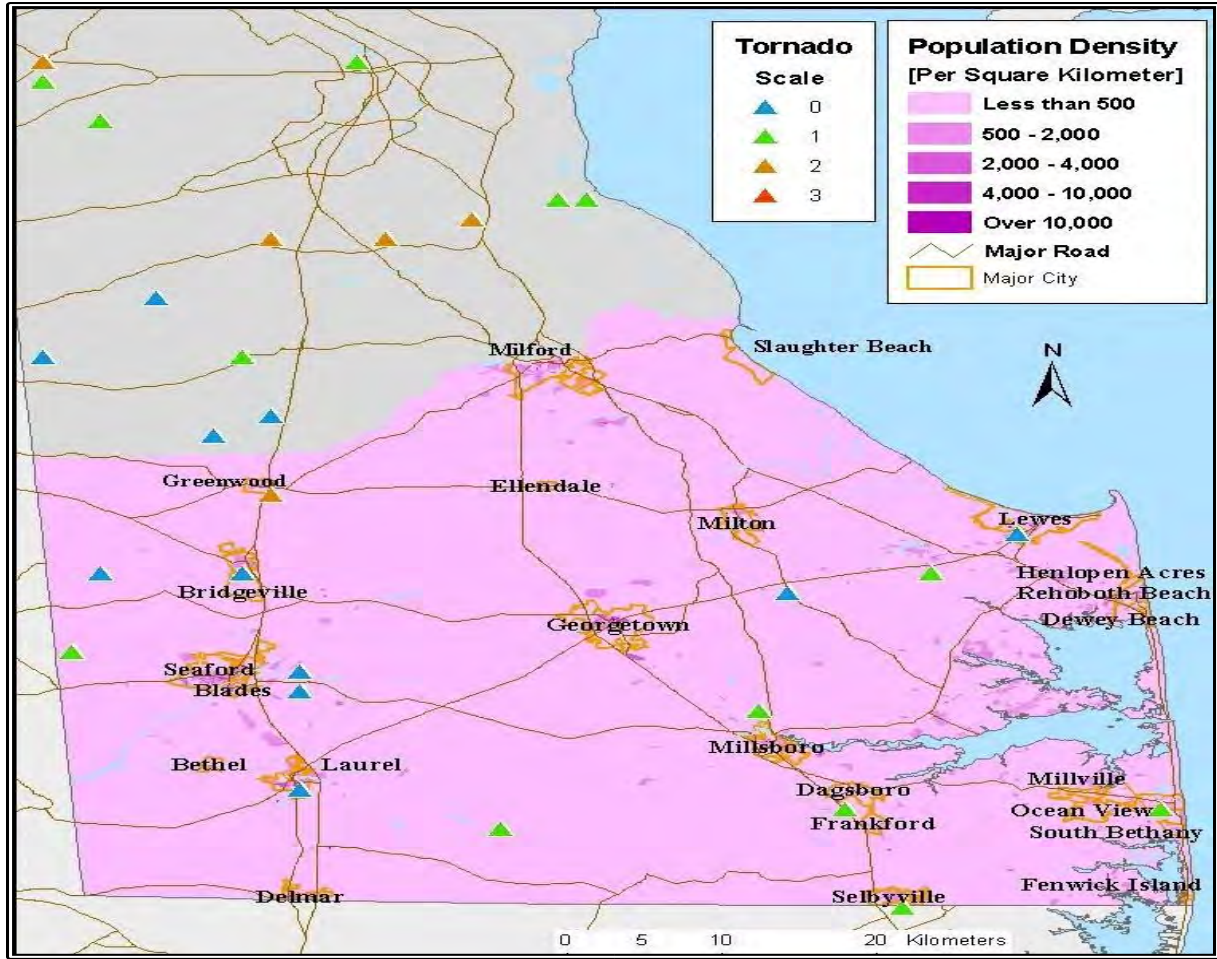


Figure 4-13. Location and Magnitude of Past Tornado Events (NOAA)

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.⁵¹

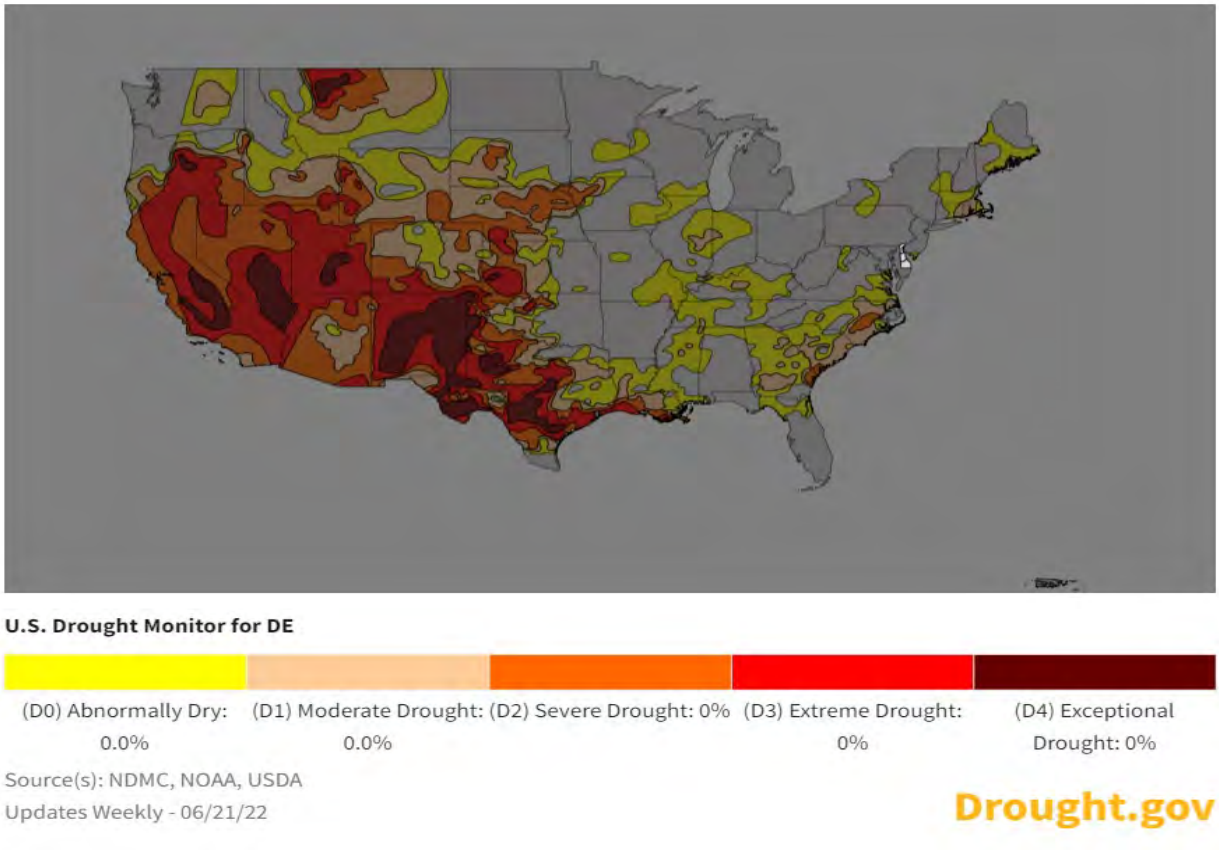


Figure 4-14. U.S. Drought Monitor

⁵¹ <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.

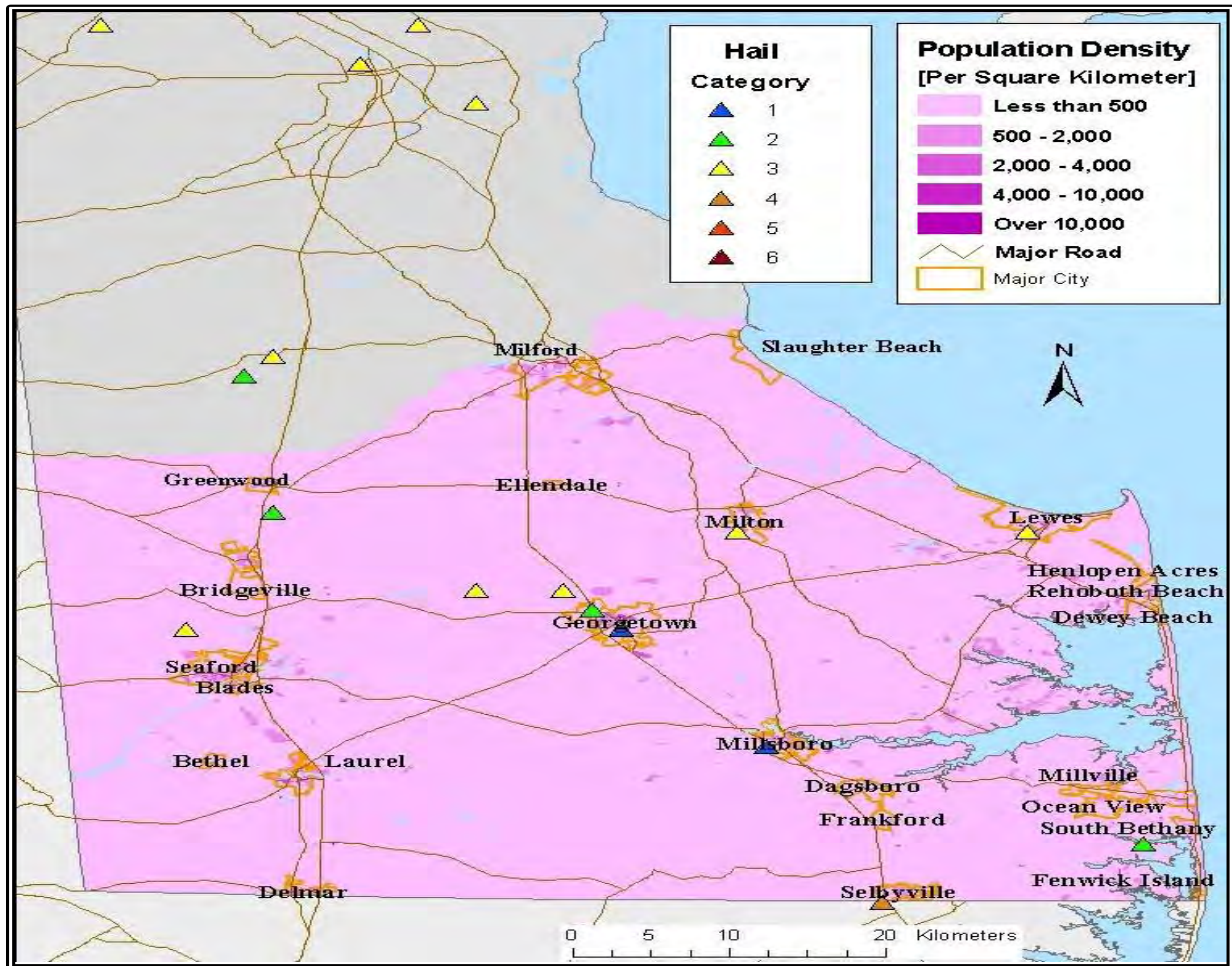


Figure 4-15. Recorded Hail Activity

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 being a 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).

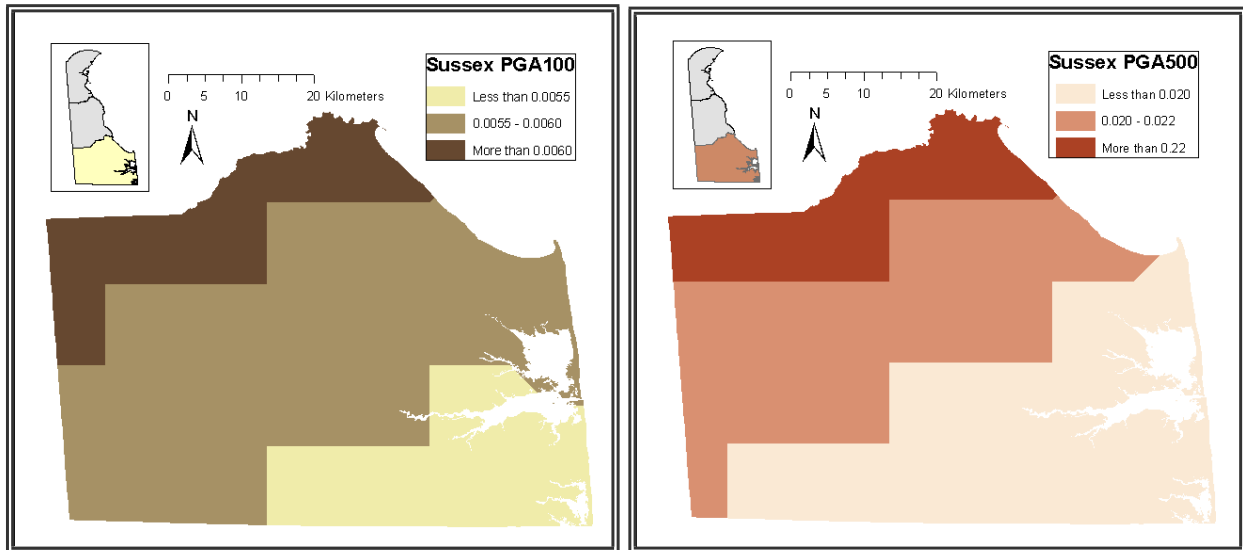


Figure 4-16. Peak Ground Acceleration (Ground Motion) for 100- and 500-Year Events
 100-Year Ground Motion 500-Year Ground Motion

| 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 earthquake events 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 |
| Fenwick Island | 5 | 0 | 0 | 5 | 0 | 0 | 5 |
| Frankford | 8 | 0 | 0 | 8 | 0 | 0 | 8 |

| JURISDICTION | TOTAL NUMBER OF CRITICAL FACILITIES | 100-YEAR EARTHQUAKE | | | 500-YEAR EARTHQUAKE | | |
|---------------------------|-------------------------------------|---------------------|---------------|-------------------|---------------------|---------------|-------------------|
| | | MODERATE DAMAGE | SLIGHT DAMAGE | NEGLIGIBLE DAMAGE | MODERATE DAMAGE | SLIGHT DAMAGE | NEGLIGIBLE DAMAGE |
| 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 |
| 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 |

| JURISDICTION | TOTAL NUMBER OF CRITICAL FACILITIES | 100-YEAR EARTHQUAKE | | | 500-YEAR EARTHQUAKE | | |
|-----------------|-------------------------------------|---------------------|---------------|-------------------|---------------------|---------------|-------------------|
| | | MODERATE DAMAGE | SLIGHT DAMAGE | NEGLIGIBLE DAMAGE | MODERATE DAMAGE | SLIGHT DAMAGE | NEGLIGIBLE DAMAGE |
| 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)⁵² 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.⁵³ 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 | DeIDOT; DNREC DFW | High |
| Betts Pond Main Dam | Shoals Branch | DeIDOT | High |
| Betts Pond Route 113 Dam | Shoals Branch | DeIDOT | High |
| Burton Pond Dam | Chapel Branch | DeIDOT | High |
| Chipman Pond Dam | Elliot Pond Branch | DeIDOT; DNREC DFW | High |
| Collins Pond Dam | Gravelly Branch | DeIDOT | Significant |
| Concord Pond Dam | Deep Creek | DeIDOT; DNREC DFW | High |
| Cabbage Pond Dam | Cedar Creek | DeIDOT | High |
| Davis/Racoon Pond Dam | Raccoon Prong | DeIDOT; DNREC DFW | Significant |
| Fleetwood Pond Dam | Tyndall Branch | DeIDOT | High |
| Griffith Lake Dam | DE00043 | Sussex | Misphillion River |
| Hearns Pond Dam | DE00060 | Sussex | Clear Brook |
| Horseys Pond Dam | DE00022 | Sussex | Little Creek |

⁵² 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).

⁵³ 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 |
|-----------------------|-----------------|--------|-------------------|
| Ingram Pond Dam | DE00020 | Sussex | Shoals Branch |
| 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 Potential⁵⁴

⁵⁴ <https://dnrec.alpha.delaware.gov/watershed-stewardship/waterways/dam-safety/>

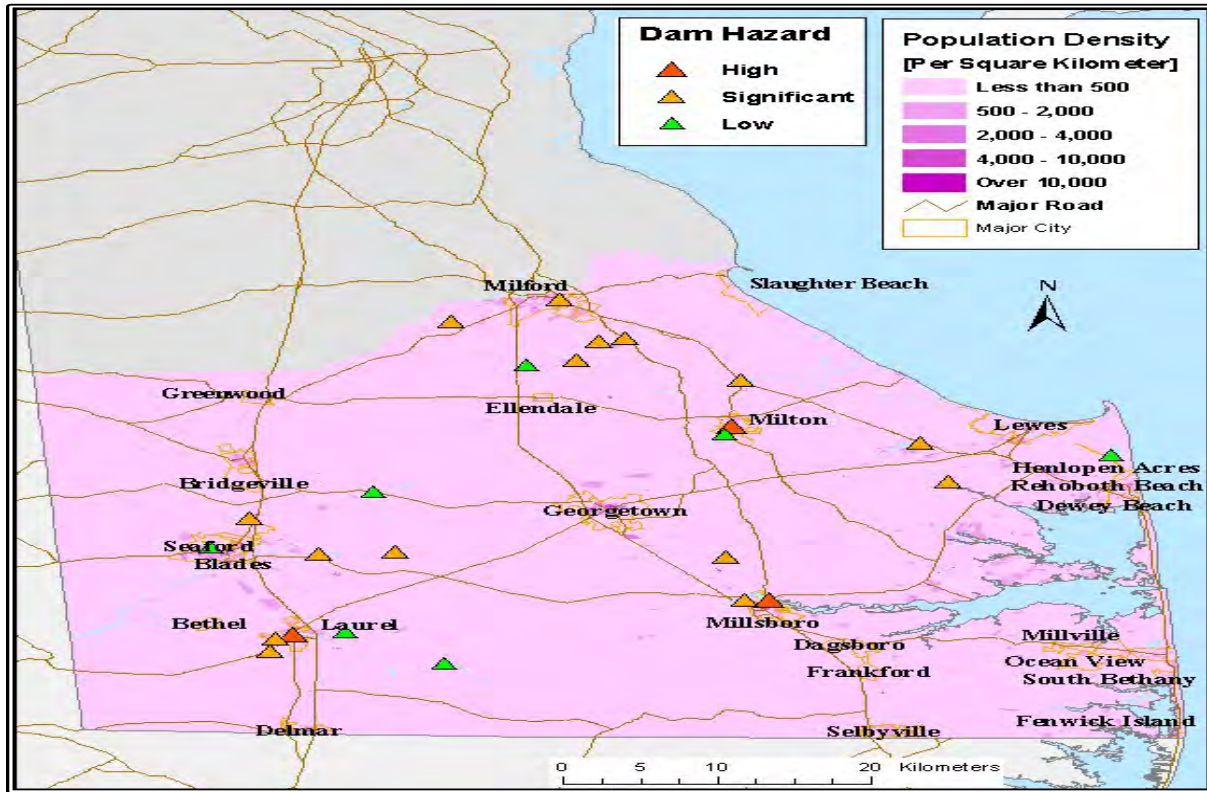


Figure 4-17 Location of Dams

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.

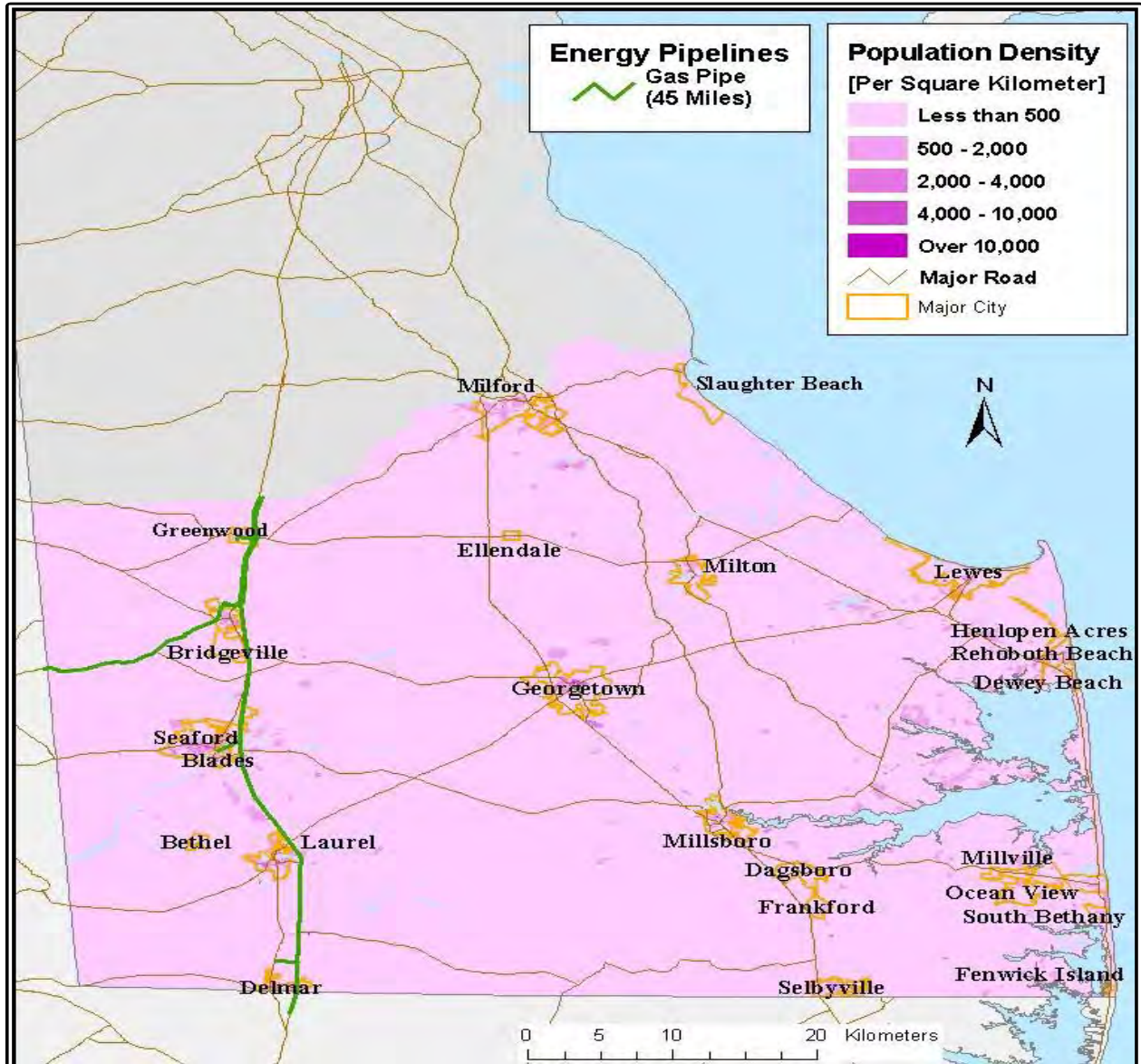


Figure 4-18. Energy Pipelines

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.⁵⁵

High consequence events were then selected, (high material toxicity and population density), and ALOHA⁵⁶ 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 |

⁵⁵ 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.

⁵⁶ 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.

Table 4-32. Risk Potential

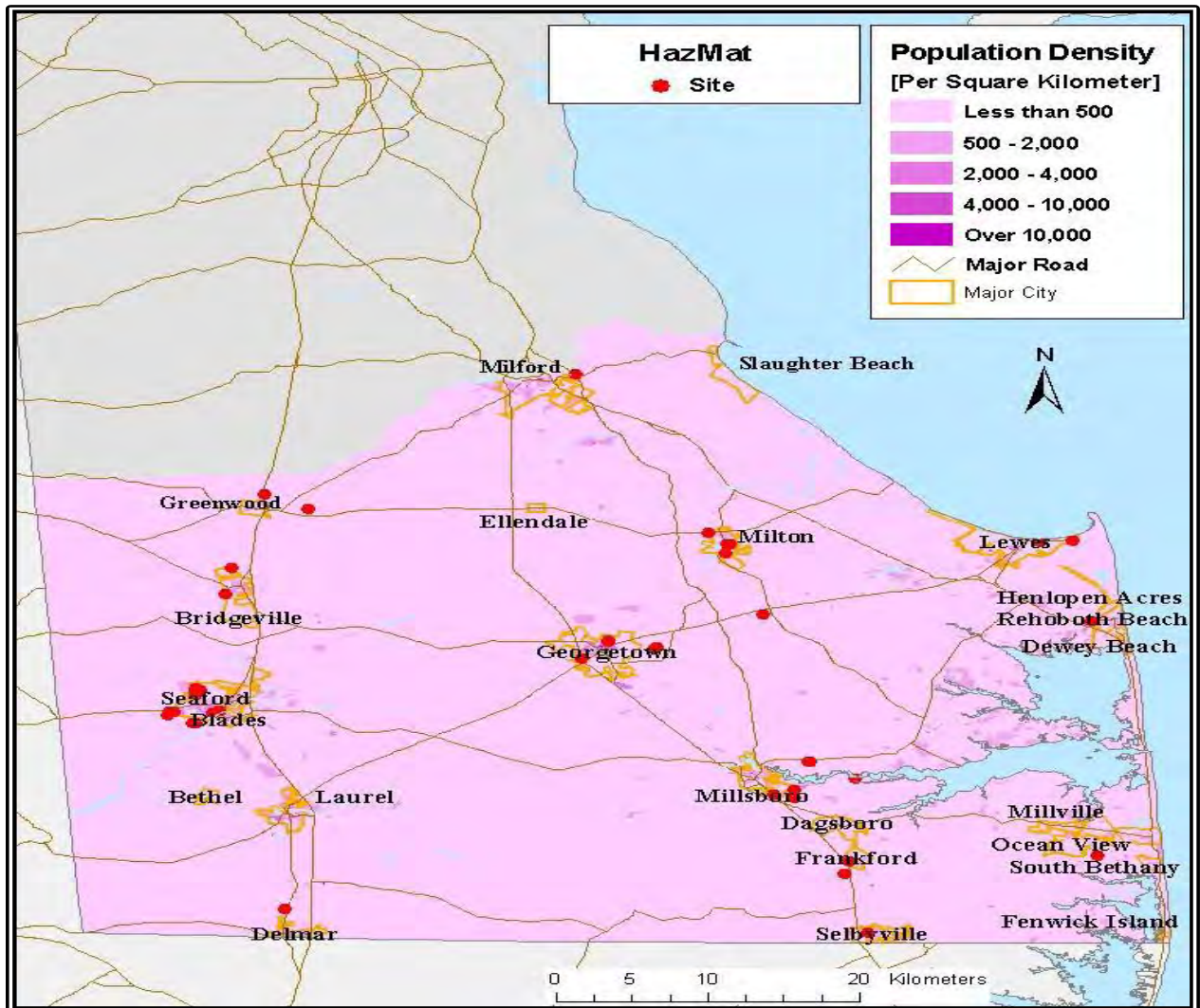


Figure 4-19. Location of Hazardous Materials Facilities in Relation to Population Density

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 | | | | Sussex |
| 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. 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) | | PROTECTIVE ACTION ZONE (PAZ) | |
|-----------------------------|---------|-------------------------------|-----------|------------------------------|-----------|
| | | 8 MILES FROM EACH HOSPITAL | | 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) | | PROTECTIVE ACTION ZONE (PAZ) | |
|-------------------------------------|-----------|-------------------------------|-----------|------------------------------|-----------|
| | | 8 MILES FROM EACH HOSPITAL | | 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.⁵⁷ 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.

| JURISDICTION | FLOOD | TROPICAL STORM/ WIND | 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 |

⁵⁷ 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 is any percentage over 20.

| JURISDICTION | FLOOD | TROPICAL STORM/ WIND | THUNDER-STORM' S | TORNADO | DROUGHT | HAIL | WINTER STORMS | EARTHQUAKE |
|------------------------------|-------------|----------------------|------------------|---------|-----------|------|---------------|------------|
| 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 | 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 | N | \$62,510 | \$14,884 |
| MCD Lewes | \$19,357 | \$367,759 | \$14,471 | N | \$1,261 | N | \$29,303 | \$40,144 |
| MCD Milford South | \$1,912,048 | \$48,034 | \$20,936 | N | \$1,824 | N | \$42,395 | \$16,310 |
| MCD Millsboro | \$36,640 | \$616,112 | \$16,369 | N | \$1,426 | 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 | N | \$31,011 | \$21,886 |
| MCD Selbyville-Frankford | \$43,167 | \$451,242 | \$21,801 | N | \$1,900 | 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 |

| JURISDICTION | FLOOD | TROPICAL STORM/ WIND | THUNDER-STORM' S | TORNADO | DROUGHT | HAIL | WINTER STORMS | EARTHQUAKE |
|-----------------|-------------|----------------------|------------------|----------|----------|---------|---------------|------------|
| 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 |
| Sussex County | \$129,520 | \$1,926,244 | \$168,211 | \$11,000 | \$14,659 | \$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 projects⁵⁸. 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

⁵⁸ 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)).

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. 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.

HAZARD MITIGATION PLAN

CAPABILITY ASSESSMENT

| | 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 |
| Blades | | | X | | | X | | | X | | | | | X | X | X | X | | X |
| Bridgeville | X | | X | X | | X | X | X | X | X | X | X | X | X | X | X | X | | X |
| 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 |
| 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 |
| Ocean View | X | | X | | X | X | X | | X | 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 |
|-----------------|-----|-----|------|-----|-----|-----|------|-----|------|-------|-----|--------|-----|----|----|------|------|-----|----|
| 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** - DeIDOT
- **@** - 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 reducing 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 has increased to 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. The remainder of the jurisdictions currently has adopted Sussex County's plan.

Fifteen jurisdictions in Sussex County report completing a Floodplain Management Plan or Flood Mitigation Plan. In addition, ten 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 an increase of four jurisdictions since the 2016 Plan.

Sussex County has an EOP that 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

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.⁵⁹

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.

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.

⁵⁹ <https://sussexcountyde.gov/comprehensive-plan>

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.⁶⁰

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 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.

⁶⁰ 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.

| 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)⁶¹. 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 flood hazards. Local governments voluntarily participate in the NFIP, but FEMA, DNREC, 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.

⁶¹ Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated.

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 Class⁶²

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. ⁶³ 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.

⁶² FEMA- http://www.fema.gov/media-library-data/1458756801023http://www.fema.gov/media-library-data/1458756801023-311019d76271533f6b21ce505df7bd3c/20_crs_508_apr2016.pdf

⁶³ <https://dnrec.alpha.delaware.gov/watershed-stewardship/waterways/floodplains/mapping/>

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 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 | BCEGS GRADE | DATE OF NFIP | CRS DATE | CRS CLASS | TECHNICAL CAPABILITY (L, M, H) | FISCAL CAPABILITY (L, M, H) | ADMINISTRATIVE CAPABILITY (L, M, H) |
|---------------|------------------------|-------------|--------------|----------|-----------|-----------------------------------|--------------------------------|--|
| SussexCounty | 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 | | | | | |

| JURISDICTION | COMPREHENSIVE LAND USE | BCEGS GRADE | DATE OF NFIP | CRS DATE | CRS CLASS | TECHNICAL CAPABILITY (L, M, H) | FISCAL CAPABILITY (L, M, H) | ADMINISTRATIVE CAPABILITY (L, M, H) |
|----------------|-----------------------------------|-------------|--------------|----------|-----------|-----------------------------------|--------------------------------|--|
| 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 |
| 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 |

| JURISDICTION | COMPREHENSIVE LAND USE | BCEGS GRADE | DATE OF NFIP | CRS DATE | CRS CLASS | TECHNICAL CAPABILITY (L, M, H) | FISCAL CAPABILITY (L, M, H) | ADMINISTRATIVE CAPABILITY (L, M, H) |
|-----------------|------------------------|-------------|--------------|----------|-----------|-----------------------------------|--------------------------------|--|
| 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 |
| 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) | 8 | 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 2020 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.

Community Outreach

Community outreach efforts are designed to inform residents and businesses of the risk faced by threats and hazards. 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.

Sussex County and all the jurisdictions supports numerous outreach programs throughout the year to include:

- Educating community members through PrepareDe.org in planning, building a kit, and staying informed.
- FEMA's grassroots strategy bringing stakeholders together through their Citizen Corps.
- Feature "Prevention Power" workshops on how to reduce disaster damage.
- Participating in activities during Hurricane Preparedness Week occurring May 1-7, 2022.
- Presentations to local City Council meetings promoting NFIP and the benefits it offers residents.
- Bi-monthly Local Emergency Planning Committee (LEPC) meetings and seminars.

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 Steering Committee reviewed the goals and objectives as part of the regular plan review process with input of local hazard mitigation plans. This step ensured that county and local hazard mitigation plans complement each and demonstrates working together to accomplish the mitigation goals. Additionally, proposed mitigation projects will be reviewed to determine how mitigation projects help Sussex County and local governments meet established goals and objectives. It was determined that the goals and objectives for this plan did not change since the previous update and 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 Infrastructure and Key Resources 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.

Mitigation Action Prioritization

The Hazard Mitigation Planning Committee and Local Planning Teams used the STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria to select and prioritize the most appropriate mitigation and adaptation alternatives (**Table 6.1**). This methodology requires that social, technical, administrative, political, legal, economic, and environmental elements be considered when reviewing potential actions for Sussex County to undertake. This process was used to help ensure that the most equitable and feasible actions would be undertaken based on Sussex County's capabilities.

| STAPLE/E | CONSIDERATIONS |
|-----------|--|
| Social | <ul style="list-style-type: none"> ▪ is the proposed action socially acceptable to the community(s)? ▪ Are there equity issues involved that would mean that one segment of a community is treated unfairly? ▪ Will the action cause social disruption? |
| Technical | <ul style="list-style-type: none"> ▪ Will the proposed action work? ▪ Will it create more problems than it solves? |

| STAPLE/E | CONSIDERATIONS |
|----------------|--|
| | <ul style="list-style-type: none"> ▪ Does it solve a problem or only a symptom? ▪ Is it the most useful action considering other community(s) goals? |
| Administrative | <ul style="list-style-type: none"> ▪ Can the community(s) implement the action? ▪ Is there someone to coordinate and lead the effort? ▪ Is there sufficient funding, staff, and technical support available? ▪ Are there ongoing administrative requirements that need to be met? |
| Political | <ul style="list-style-type: none"> ▪ Is the action politically acceptable? ▪ Is there public support both to implement and to maintain the project? |
| Legal | <ul style="list-style-type: none"> ▪ Is the community(s) authorized to implement the proposed action? ▪ Is there a clear legal basis or precedent for this activity? ▪ Are there legal side effects? ▪ Could the activity be construed as a taking? ▪ Is the proposed action allowed by a comprehensive plan, or must a comprehensive plan be amended to allow the proposed action ▪ Will the community(s) be liable for action or lack of action? ▪ Will the activity be challenged? |
| Economic | <ul style="list-style-type: none"> ▪ What are the costs and benefits of this action? ▪ Do the benefits exceed the costs? ▪ Are initial, maintenance, and administrative costs considered? ▪ Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)? ▪ How will this action affect the fiscal capability of the community(s)? ▪ What burden will this action place on the tax base or local economy? ▪ What are the budget and revenue effects of this activity? ▪ Does the action contribute to other community goals, such as capital improvements or economic development? |
| Environmental | <ul style="list-style-type: none"> ▪ How will the action affect the environment? ▪ Will the action need environmental regulatory approvals? ▪ Will it meet local and state regulatory requirements? ▪ Are endangered or threatened species likely to be affected? |

Table 6.1 STAPLE/E Prioritization Criteria

A priority level of high, medium, or low was assigned to each action based on the STAPLE/E assessment (see **Appendix A**). This prioritization method was selected because the Hazard Mitigation Planning Committee believed it would foster a realistic expectation of what could be accomplished in the next five years.

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 Mitigation Administrative 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.

Delaware does not have or adopt statewide building codes. Delaware only enforces at the state level 2018 codes for IPC, IFGC, IMC, and IECC. Building codes themselves rely solely on the counties. 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 copy of effective FIRM (flood insurance rate map) maps and FIS (flood insurance study) that is accessible to the public? | 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? | Adopted | Y | January 2015 |
| Does the County support request for map updates? | No Action | N | Map changes, revisions, and amendments are reviewed by the 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 in map revisions within 6 months of creation or identification of new data? | No Action | N | Sussex County has not conducted any studies that have included new data for map revisions. Suggestions and ideas for certain areas have been offered. |
| Does the County aid with local floodplain determinations? | When requested | 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? | Document Storage | 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 a compliant 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? | When requested | Y | The Department of Planning and Zoning 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 Elevation and floodway data, and require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres? | When requested | Y | The Sussex County Department of Planning and Zoning requires this for 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 Flood Elevation, including anchoring, using flood resistant materials, designing, or locating utilities and service facilities to prevent water damage? | When required | Y | Inspection and enforcement done 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? | Document storage | Y | Files on record and maintained by the Sussex County Department of Planning and Zoning. |

| REQUIREMENT | ACTION | Y/N | COUNTY ACTION |
|--|-------------------------|-----|---|
| b. If a compliant floodplain ordinance was adopted, does the County enforce the ordinance by monitoring compliance and taking remedial action to correct violations? | When requested/required | Y | Sussex County Planning and Zoning coordinates with DNREC and FEMA for community assessments; identifies properties in 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? | Public Education | N | Sussex County focuses primarily on proposed development and construction requirements within the floodplain. The flood insurance issues are directed to DNREC. |
| b. Does the County inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates? | When changes are made | Y | The public is notified when the maps are updated and prior to Sussex County adoption of the maps. |
| c. Does the County provide general assistance to community members relating to insurance issues? | When requested | 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

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. 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

[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 initiate a 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 federal and 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, the Hazard Mitigation plan will be presented to and adopted by local Elected leadership in accordance with their municipal protocols. In addition, we anticipate that a resolution to adopt this Hazard Mitigation Plan will be utilized and incorporate the threats and risks identified as appropriate, when updating municipal Comprehensive Plans, per guidance from the Delaware Office of Statewide Planning.

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

Future Recommendations

- Following this Plan's adoption and approval, Sussex County can submit a written and signed request to FEMA, through DEMA, to amend their HMP to include information that addresses the HHPD required and recommended revisions below.
- **C1:** Elaborate on the political climate within Sussex County and its jurisdictions. Address how the rating referenced was determined.
- **C1-a:** More detailed information regarding each jurisdiction's staffing totals, position titles, vacancies, strengths, and gaps relating to each jurisdiction's technical, financial, and administrative capability.
- **C3-a:** Include more action-oriented objectives associated with each HMP goal.

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 be taken 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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 |
|---------------|-----|-----|------|-----|-----|-----|------|-----|------|-------|-----|--------|-----|----|----|------|------|-----|----|
| 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 |

NEIP Registered Repetitive Loss Properties

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Sussex County | 145 | 126 | 6 | 0 | 8 | 5 |

| Project Description | Hazard(s) Addressed | 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. | All Hazards | 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). | Flooding (Riverine and Coastal) | Yes | High | Ongoing | Ongoing | Pending study | FMA, HMGP, PDM |
| Work with homeowners to identify ways to elevate flood-prone structures. | Flooding (Riverine and Coastal) | Yes | High | Ongoing | Ongoing | Pending study | FMA, HMGP, PDM |

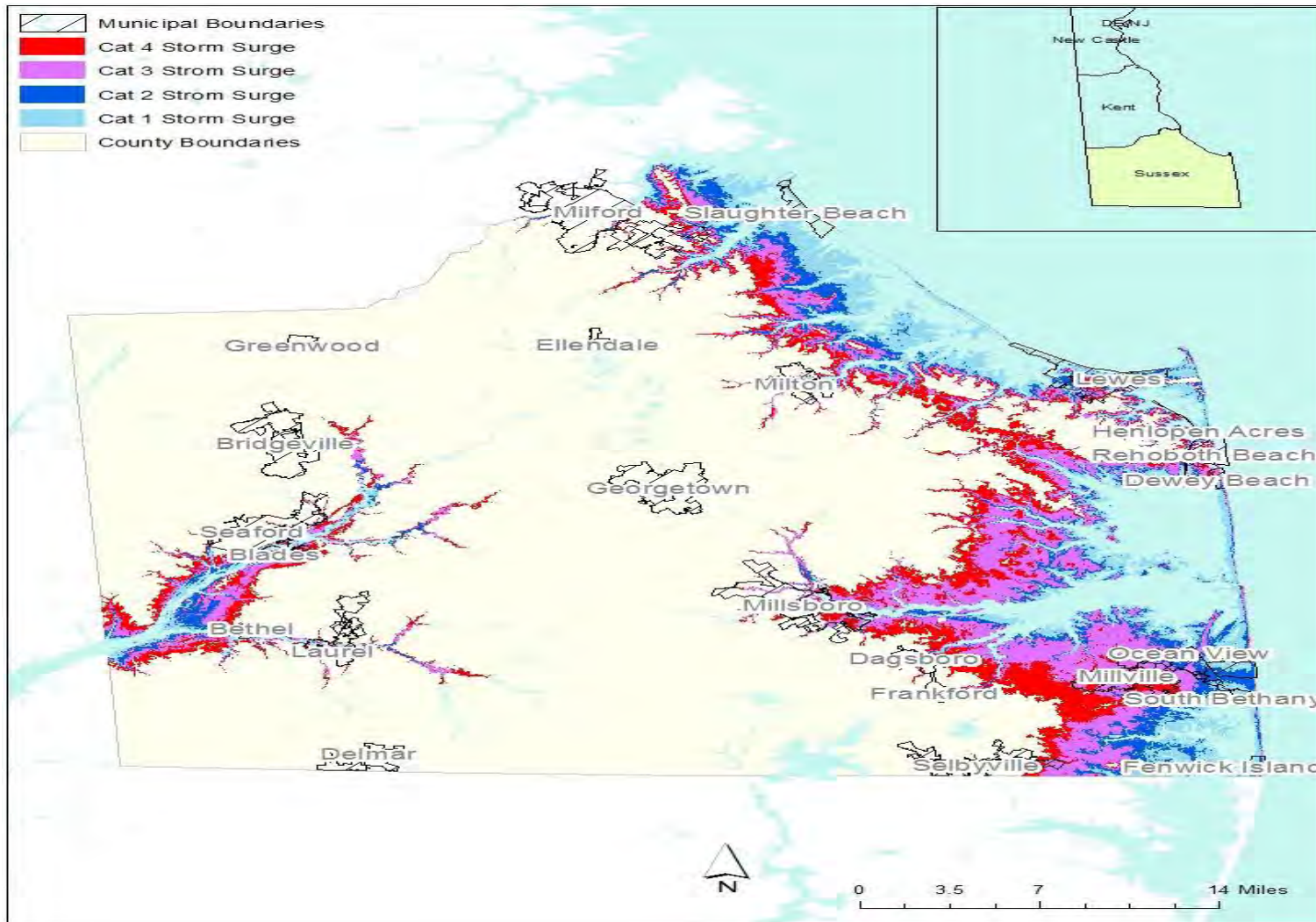
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|----------------|----------------|--------------------------|
| Improve educational awareness through better notifications, training, and properly marked flood evacuation routes. | Flooding (Riverine and Coastal) | Yes | High | Short-term | Ongoing | Pending study | FMA, HMGP, PDM |
| Distribute disaster preparedness and hazard mitigation-related information using brochures and website link. | All Hazards | Yes | Moderate | Ongoing | Ongoing | \$1200.00 | FMA, HMGP, PDM, CDBG |
| Work with DeIDOT to install storm drain of culvert on 1100 Block of South Bayshore Drive in Broadkill Beach. | Flooding (Riverine and Coastal)/ Hurricane/ Tropical Storms | Yes | High | Short-term | Not started | Pending study | FMA, HMGP, PDM |
| Work with DNREC and DeIDOT 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. | Flooding (Riverine and Coastal) | No | Moderate | Ongoing | Ongoing | Pending study | FMA, HMGP, PDM, PS |
| Conduct a study to identify stormwater management systems that need to be retrofitted and | Flooding (Riverine and Coastal)/ | No | Moderate | Short-term | Pending County | Pending study | FMA, HMGP, PDM |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------------------|---------|----------|------------|--------------------|----------------|--------------------------|
| channels that need to be improved to reduce flooding throughout the County. | Hurricane/ Tropical Storms | | | | property inventory | | |
| Work with DelDOT to identify possible elevation alternatives for the rebuilding of SR 38 (Prime Hook Road). | Flooding (Riverine and Coastal) | 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. | All Hazards | 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 | All Hazards | Yes | High | Ongoing | Ongoing | \$300,000 | HMGP |

| Project Description | Hazard(s) Addressed | 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. | Flooding (Riverine and Coastal) | No | High | Short term | Pending grant funding | \$2M | FMA, HMGP, PDM |
| Building inventory data (Assessment) | All Hazards | No | Medium | Ongoing | | Pending study | Local |
| Develop CRS rating strategy to increase participation at jurisdictional level | Flooding | No | High | Ongoing | Pending grant study | Pending study | Local |

MALLARD Study completed but not eligible for grant funding.



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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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 |
|---------------|-----|-----|------|-----|-----|-----|------|-----|------|-------|-----|--------|-----|----|----|------|------|-----|----|
| Bethany Beach | X | X | X | X | X | X | X | X | X | | X | X | X | X | X | X | X | X | X |

Building Codes

- IRC/IBC 2021
- 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 | 8 | | |
| 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

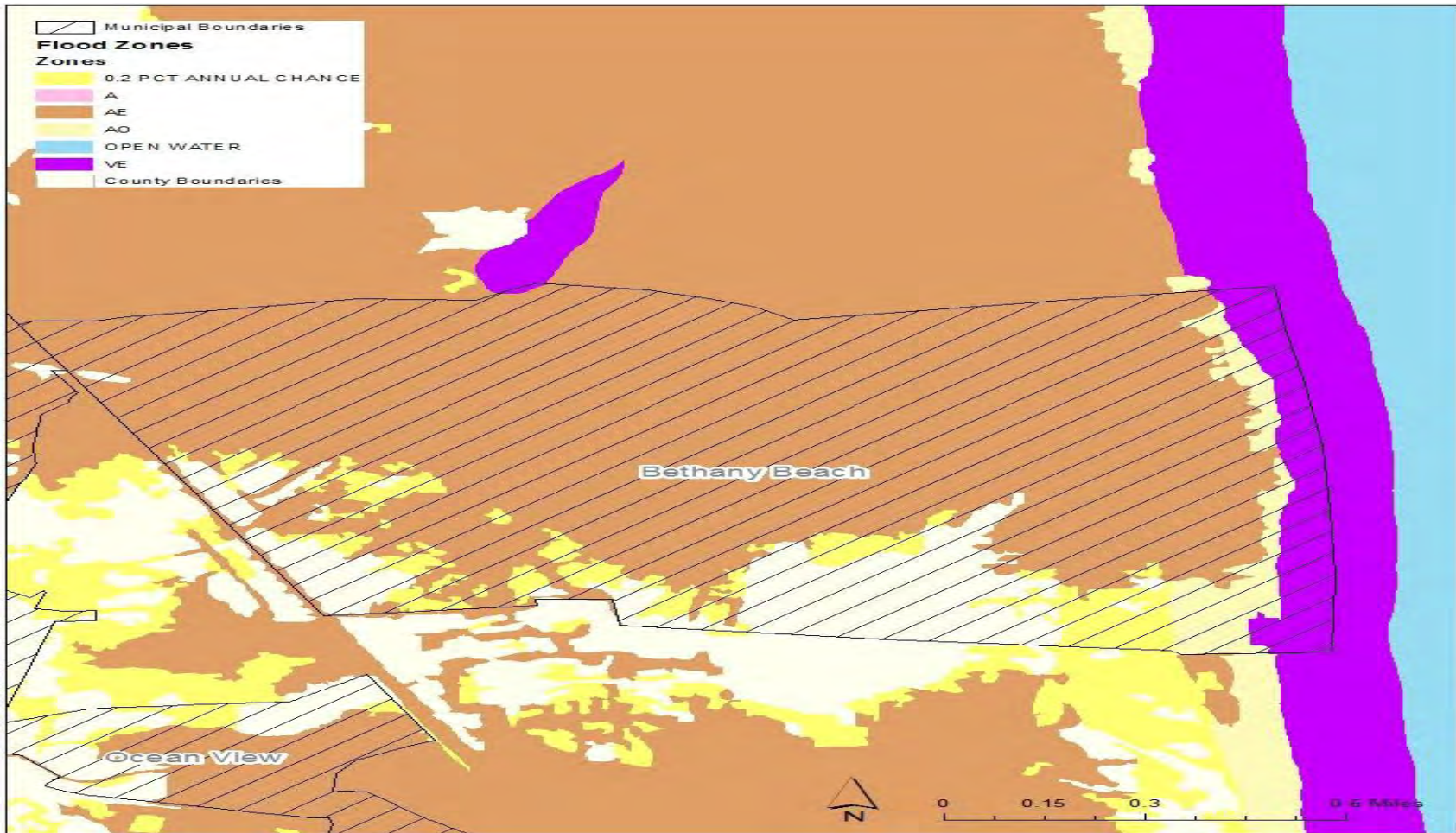
| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Bethany Beach | 52 | 28 | 19 | 0 | 3 | 2 |

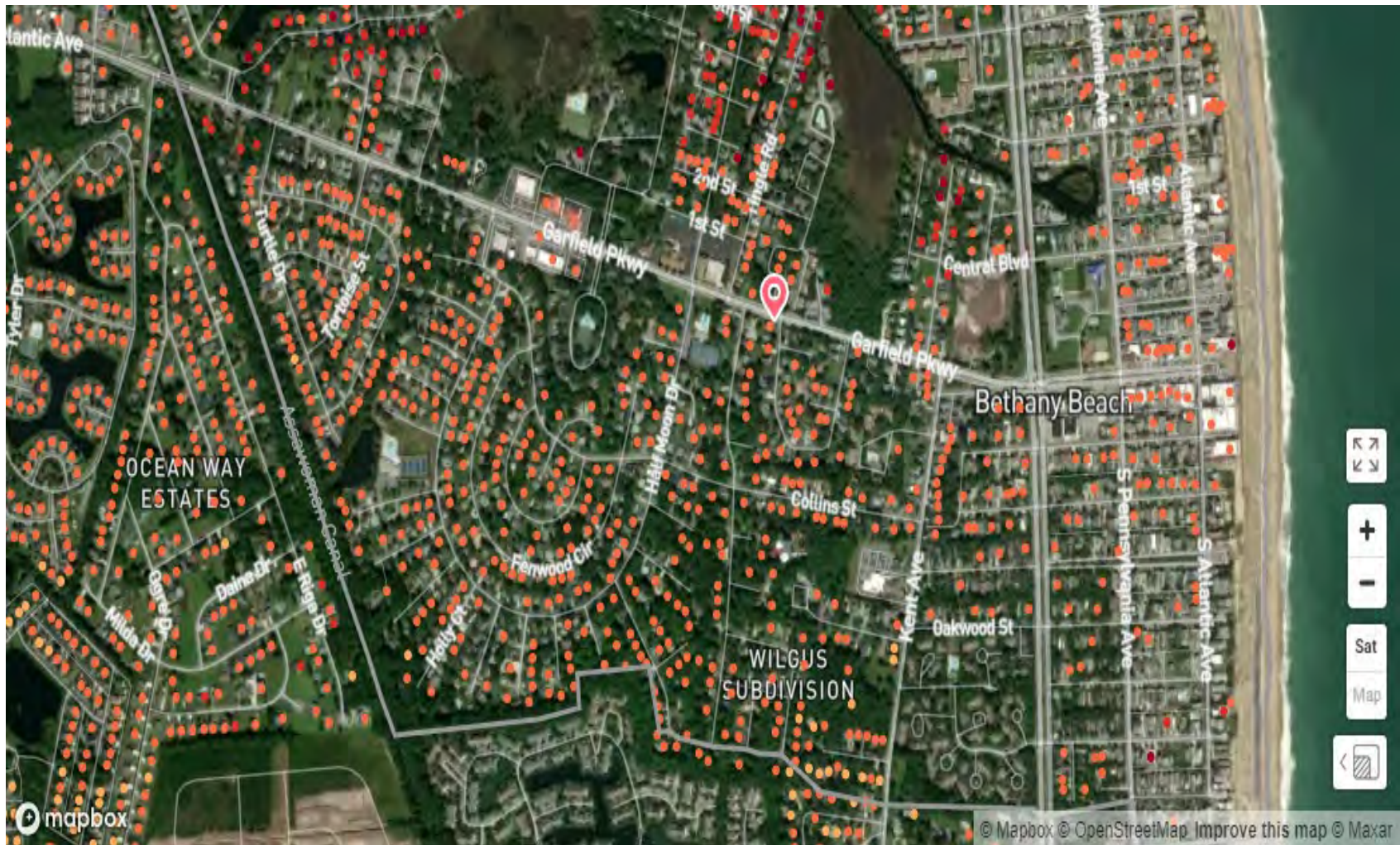
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------------------|---------|----------|-----------|---------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Improve existing drainage system throughout the town, particularly east of Route 1 and include a plan maintenance schedule. | Flooding (Riverine and Coastal) | 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. | All Hazards | Yes | High | Shortterm | Ongoing | \$1000,000 | HMGP, FMA, PDM, PS, CDBG |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal)/ Hurricane/Tropical Storms | No | High | Shortterm | Pending funding source | \$250,000 | HMGP |
| Storm water management at 8 th Street and Evans Ave | Flooding (Riverine and Coastal)/ Hurricane/Tropical Storms | No | High | Shortterm | Pending funding source | \$250,000 | MGP |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|-----------|-------------------------|----------------|--------------------------|
| Create 2 new outfalls leading from large ditch that runs from Route 26 behind Lake Bethany to the marsh and install flap gates. | Flooding (Riverine and Coastal) | No | High | Shortterm | Pending funding source | Pending study | HMGP, FMA, PDM, 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 | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | 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. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Shortterm | Pending Funding source | Pending study | HMGP, FMA, PDM, PS |
| Consider installing steel dam for Loop and Assawoman Canal to protect against | Flooding (Riverine and Coastal) | Yes | High | Shortterm | Delayed due to funding. | Pending study | HMGP, FMA, BRIC, PS |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|-----------|------------------------|----------------|--------------------------|
| incoming tide waters. | | | | | | | |
| GIS Mapping of hazards and critical infrastructure. E.g., Stormwater Drainage systems and flows. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Long Term | Pending Funding Source | Pending study | DNREC |





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. Hurricane/Tropical Storms
- b. Flooding (Riverine and Coastal)
- 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 | 8 |

| | | | | | |
|---------------------------|-----------------|----|------------|----|--|
| 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|----------------|----------------------|----------------------|----------------------|--------------------------|----------------------|-----------------------|
| Town of Blades | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|-----------------------------|---------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Upgrade stormwater drainage systems with existing underground pipes and outfall areas to help prevent future flooding. | Flooding (Riverine and Coastal), Hurricane/Tropical | Yes | High | When funds become available | Delayed | Pending study | HMGP, FMA, BRIC, DNREC |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|-----------------------------|---------|----------------|--------------------------|
| | Storms | | | | | | |
| Install new storm drains in strategic areas to allow removal of standing water during storms. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | When funds become available | Delayed | \$2M | HMGP, FMA, BRIC, DNREC |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | Short term | N/A | Completed | N/A |

| Project Description | Hazard(s) Addressed | 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) | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | High | Short term | Pending funding source | \$75,000 | HMGP, FMA, BRIC, DNREC |
| Storm water management upgrade: East 2nd St - East 3rd street -culvert expansion and upgrade (150ft) | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | 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) | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | High | Short term | Completed | Pending study | Fire Company |
| Storm water management upgrade: Market Street Stormwater system upgrade | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | High | Short term | Pending funding source | Pending study | HMGP, FMA, BRIC, DNREC |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|------------------------|----------------|--------------------------|
| | Coastal), Hurricane/ Tropical Storms | | | | | | |
| Blades storm water Management Project: Phase I - upgrade to culvert along Holloway Street and West 2nd Street, West High Street | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | 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 | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Short term | Pending funding source | Pending study | HMGP, FMA, BRIC, DNREC |
| Comprehensive stormwater management study | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Short Term | Pending | Pending study | HMGP, BRIC, DNREC |





Blades Flood Risk ⓘ

Residential **Moderate Risk**

82 out of 425 homes ⓘ

Road **Minor Risk**

3 out of 10 miles of roads ⓘ

Commercial **Major Risk**

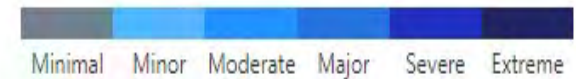
15 out of 32 commercial properties ⓘ

Critical Infrastructure **Minimal Risk**

0 out of 2 infrastructure facilities ⓘ

Social Facilities **Minor Risk**

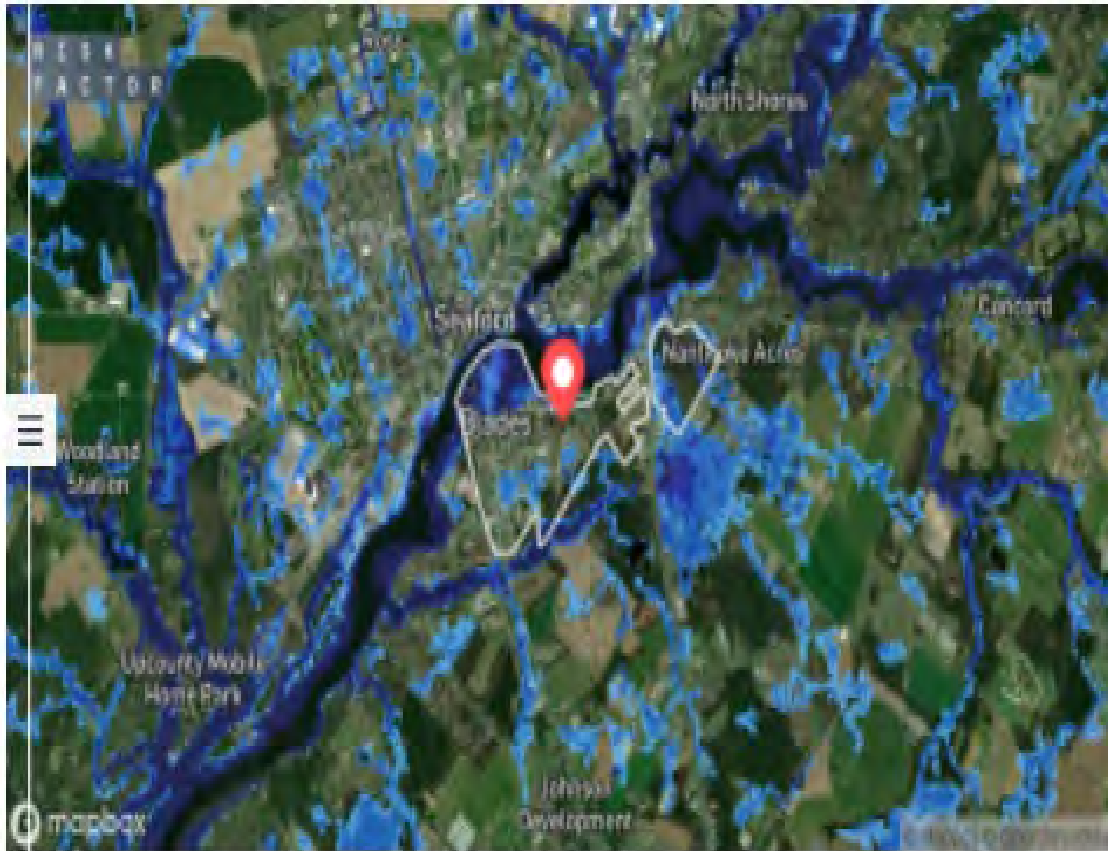
1 out of 2 social facilities ⓘ



View additional community impacts with Risk Factor Pro™.



This year ←————→ In 30 years



Properties at risk

112

Today ⓘ

112

In 30 years ⓘ



Depth of flooding (ft.)

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 Scapple Festival
- c. Major Economy: Agricultural, Manufacturing, large retirement community (2000 homes when completed), and home-based businesses

Top Hazards

- a. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|----------------------|----------------------|----------------------|--------------------------|----------------------|-----------------------|
| Town of Bridgeville | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | 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/ | Terrorism | No | High | Short term | Grant Awarded | \$33,000 | HSGP |
| Construction of new police department building next to current Town Hall | Terrorism | Yes | High | Short term | Completed 2019 | Pending study | CDBG |
| Security fence at well-house and lift station (wastewater County took over) Heritage Shores | Terrorism | No | High | Short term | Completed | \$50,000 | HSGP |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|-----------------|----------------|--------------------------|
| Potential / New Mitigation Actions For Consideration | | | | | | | |
| Storm water management plan development with replacement timeline | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Short term | Pending funding | \$150,000 | HMGP, FMA, PDM |



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. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Town of Delmar | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|----------------------------|----------------|-----------------|-----------------|---------------|-----------------------|---------------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |

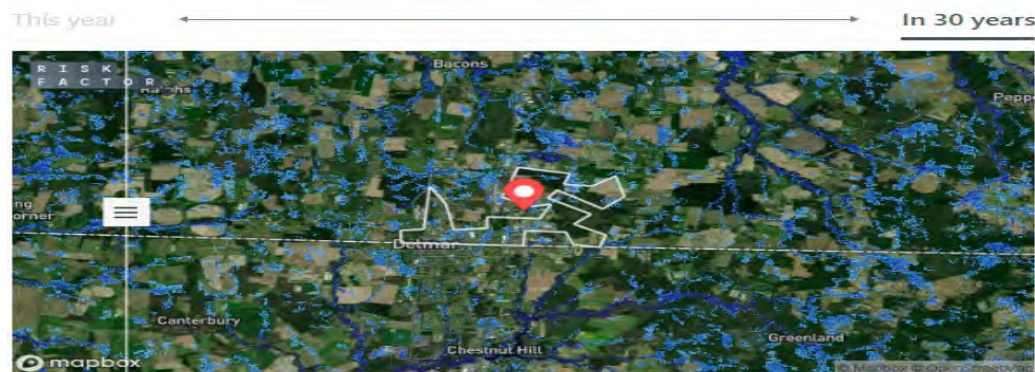
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|--------------|-----------|----------------|--------------------------|
| Conduct a vulnerability assessment of wastewater and stormwater management systems throughout the town. | Flooding (Riverine and Coastal), Hurricane/ MTropical Storms | MH | High | 3-5 years | Completed | \$10,000 | N/A |
| Develop an Emergency Operations Plan to include identifying additional local hazards. | All Hazards | Yes | High | 12-24 months | Completed | \$2,000 | N/A |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|----------------------------------|---------|----------|------------|-----------------|----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Develop a disaster recovery plan | All Hazards | No | Medium | Short term | Pending Funding | \$2,000 | CDBG, HSGP |
| Community outreach program development to include web-based preparedness. | All Hazards | | Medium | Short term | Ongoing | \$2,500 | HMGP, FMA, PDM, CDBG |
| GPS tracking for snow removal vehicles | Winter Storms | No | Low | Short term | Pending Funding | \$3.500 | CDBG, HSGP, PS |
| Stormwater management efforts to mitigate overland flooding along roadways which mitigates inundation in | Flooding (Riverine and Coastal), | No | Low | Long term | Pending Funding | \$1.3M | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------------|---------|----------|----------|--------|----------------|--------------------------|
| residential E. Jewel, and E. Grove Streets from N. 6 th | Hurricane/Tropical Storms | | | | | | |

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.





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 ⓘ



View additional community impacts with Risk Factor Pro™.



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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Dewey Beach | 31 | 14 | 4 | 0 | 11 | 2 |

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?

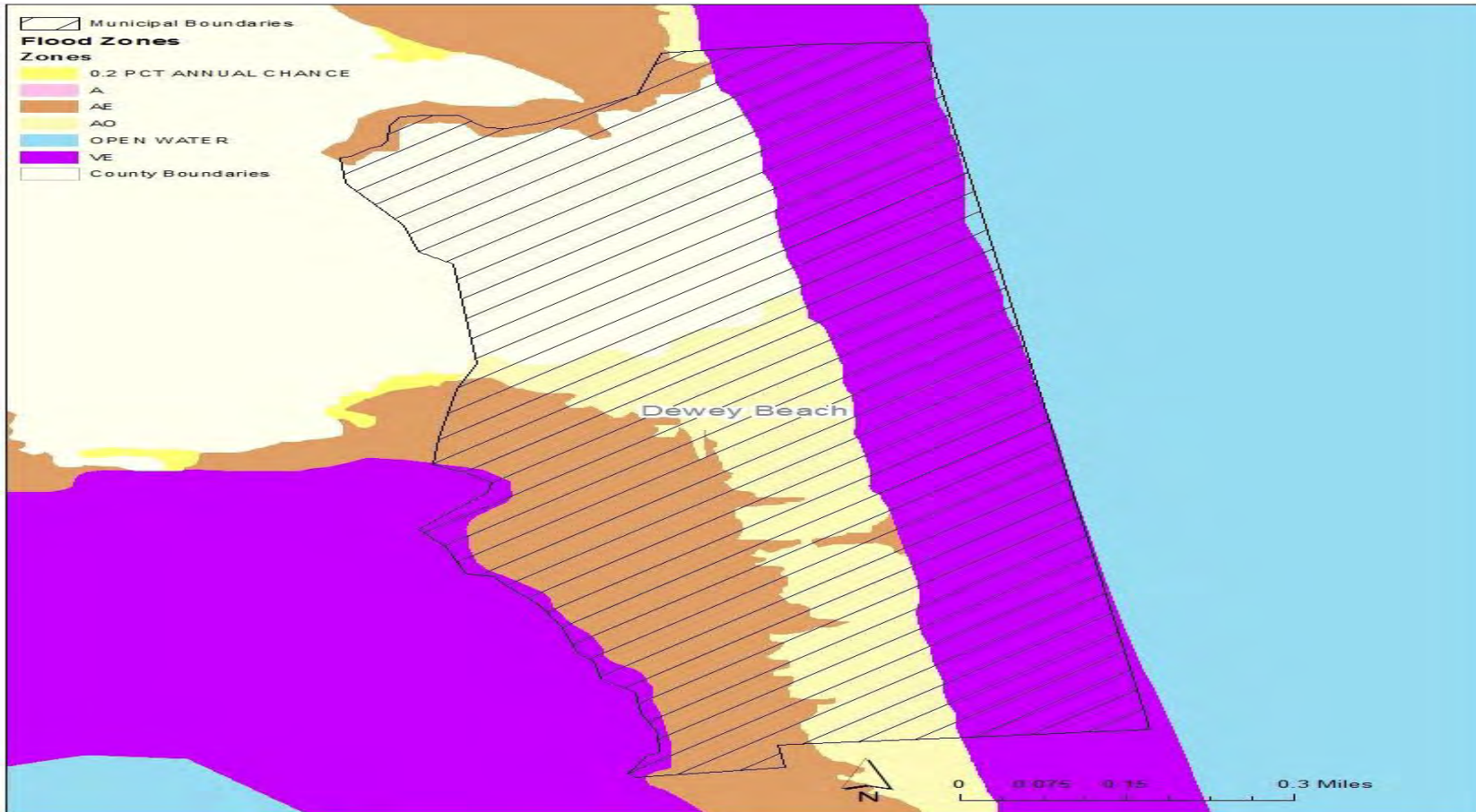
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|------------|-----------------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Develop a Disaster Warning System to notify the community of an impending disaster. | All Hazards | 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 | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | Moderate | Short term | Not started | \$1M | HMGP, FMA, PDM, USACE |
| Prepare and stock handouts of what to do in case of a disaster. | All Hazards | No | High | Short term | Not started | \$1,500 | HMGP, FMA, PDM, CDBG |
| Prepare an update to the Town's Emergency Operation Plan. | All Hazards | No | High | Short term | Not started | \$25,000 | CDBG, HSGP |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|----------|-----------|--------------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Pump station instillation Byard and Belview. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | High | Completed | 1M+ | Town |
| Enter for Inland Bays Street Beach land Restoration. New outfall Reed Street, relining, upgraded duckbill valves | Flooding (Riverine and Coastal) | No | | | Ongoing | \$480,000 approved | ARPA, EDA |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------------------|---------|----------|----------|--------------------------|--------------------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Residential Elevation Program | Flooding (Riverine and Coastal) | | | | 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



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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|-------------------|----------------------|----------------------|----------------------|--------------------------|----------------------|-----------------------|
| Town of Ellendale | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

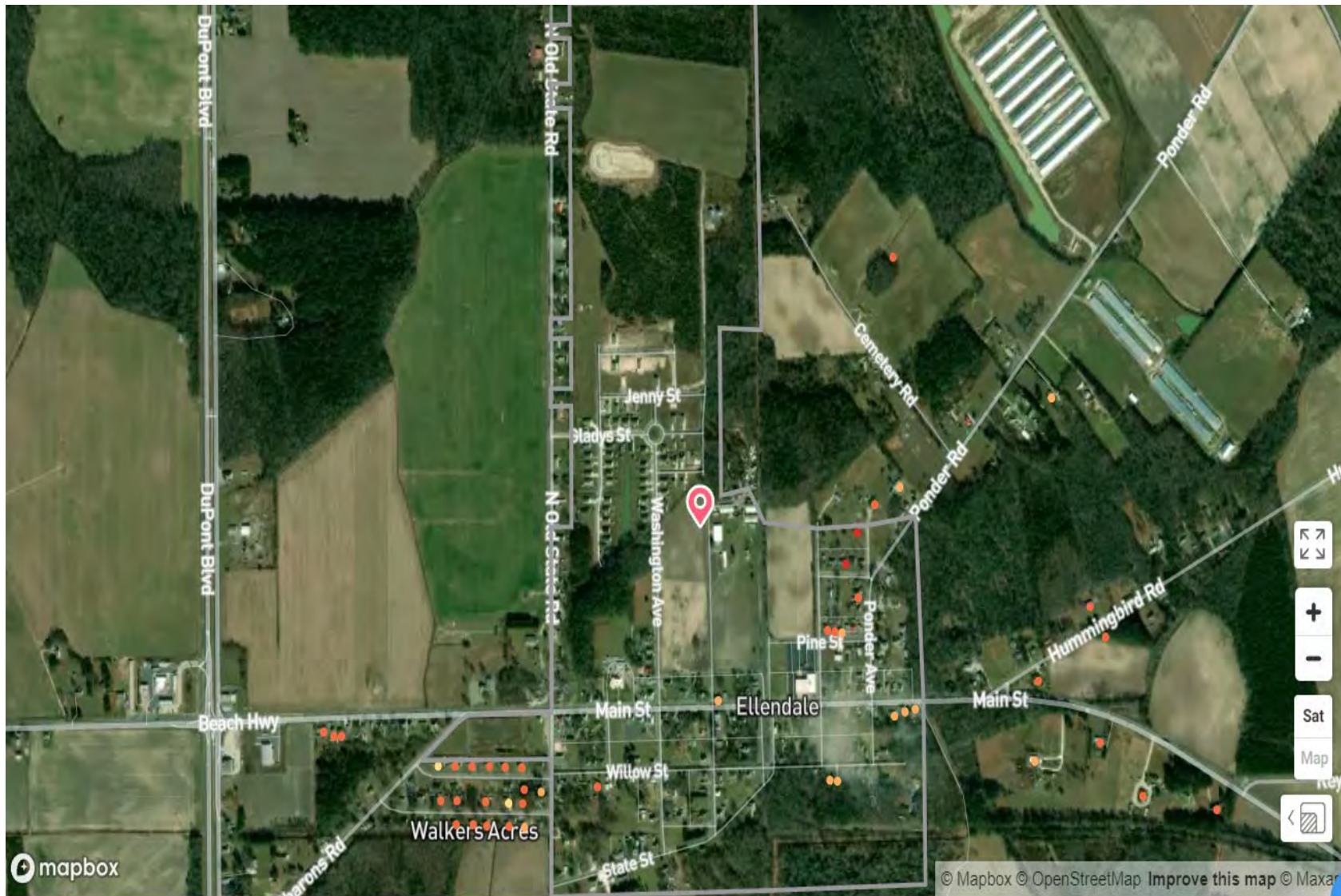
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|--|---------|----------|------------|------------------------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Evaluate the Town's storm drainage systems to identify problem areas. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | 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. | All Hazards | No | High | Ongoing | Not started | \$1,000 | Self-funding |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------|---------|----------|----------|--------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| | | | | | | | |

| Project Description | Hazard(s) Addressed | 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 benzene, etc. | Pipeline Failure. | No | High | Long Term | Pending Funding | Unknown | PS, HMEPG DNREC, Rural USDA |
| Curbs/streetscape to assist with stormwater flow away from residential structures | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Long Term | Pending Funding | Unknown | DeIDOT, HMGP, |

Issues

- a. Well Water documented to contain contaminants such as benzene, etc.



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 which resembles 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|------------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Town of Fenwick Island | 18 | 17 | 1 | 0 | 0 | 0 |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|------------|--------------------------------------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Continue retrofitting drainage system and back water valves. | Flooding (Riverine and Coastal) | 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. | Flooding (Riverine and Coastal) | Yes | Moderate | Ongoing | Continuing | Administrative | N/A |
| Adopt a stormwater management ordinance that regulates private property water runoff. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | 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. | Flooding (Riverine and Coastal) | No | Moderate | Short term | Completed | \$55,000 | HMGP, FMA, PDM |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | N/A | Completed | \$130,000 | N/A |
| North Schultz Road upgrade and improvement of stormwater management culverts - 40 ft | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | N/A | Completed | \$50,000 | N/A |
| Bay Street upgrade and improvement of stormwater management culverts - 500 ft | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | N/A | Completed | \$65,000 | N/A |
| 1 NFIP House Elevations | Flooding (Riverine and Coastal) | Yes | High | N/A | COMPLETED | \$120,000 | N/A |

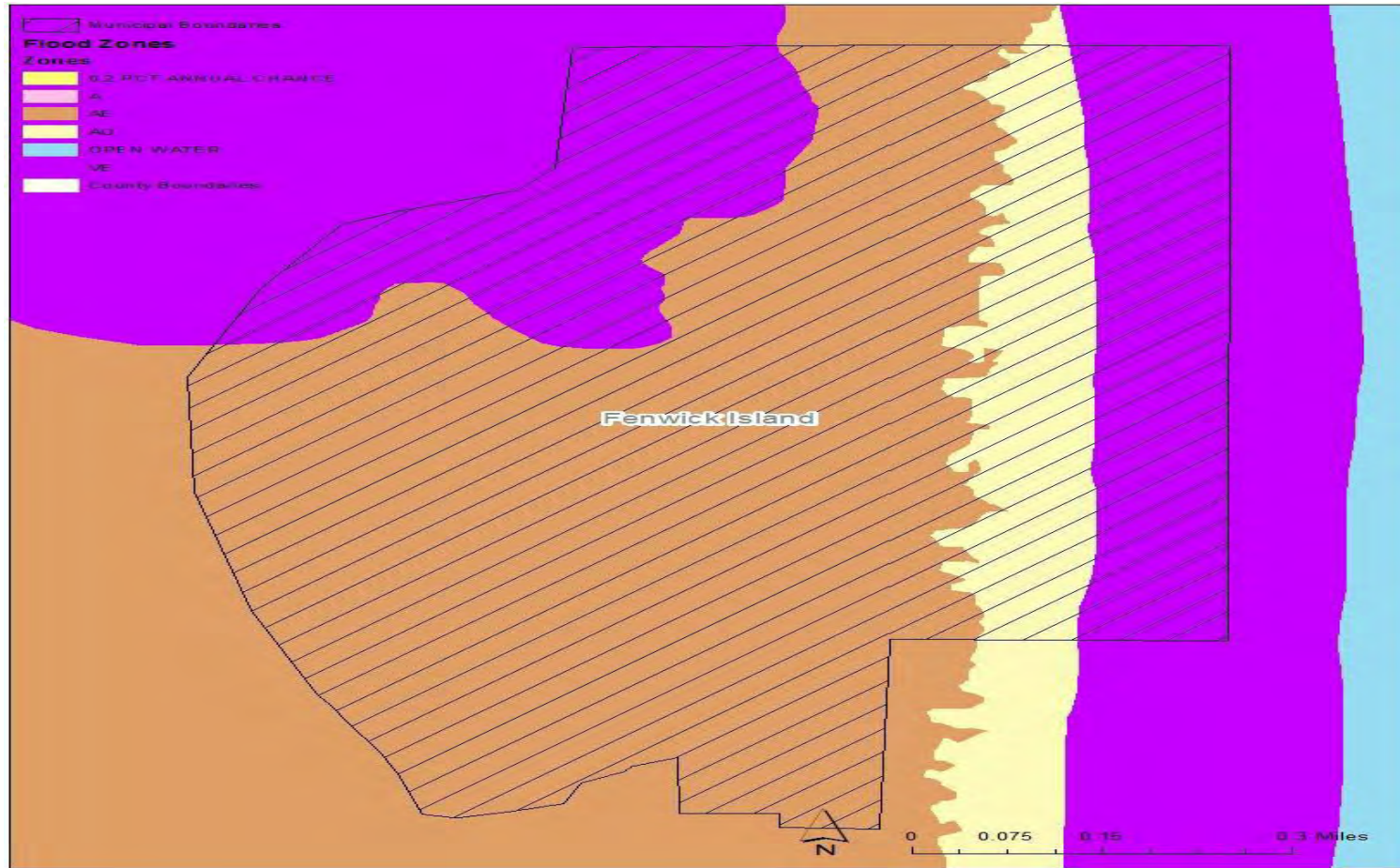
| | | | | | | | |
|---|---------------------------------|-----|------|-----|-----------|--------------|-----|
| Implemented freeboard into zoning ordinance | Flooding (Riverine and Coastal) | Yes | High | N/A | Completed | Self-funding | N/A |
|---|---------------------------------|-----|------|-----|-----------|--------------|-----|

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|------------|----------|----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Upgrade Bayside area ROW drainage and run off | Flooding (Riverine and Coastal) | Yes | High | Short term | Ongoing | Unknown | Self-funded |
| Develop disaster preparedness outreach program | All Hazards | 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 | Flooding (Riverine and Coastal), Pipeline Failure | Yes | High | Ongoing | Pending | \$55,000 | Town Resources |
| Stormwater draining project: North Schultz Road | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | Moderate | Short term | Underway | Admin | N/A |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------------------|---------|----------|------------|---------------------------|----------------|--------------------------|
| 1 NFIP House Elevations W. Jane Street | Flooding (Riverine and Coastal) | Yes | High | N/A | Completed | \$120,000 | N/A HMGP |
| Resiliency strategy implementation | All Hazards | 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



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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Town of Frankford | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | 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. | Flooding (Riverine and Coastal) | Yes | High | Short term | In process | \$50,000 | DNREC, Soils Conservation District |
| Conduct stormwater drainage assessment for the town. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | 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." | All Hazards | 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. | All Hazards | Yes | Moderate | As funds become available | Not started | Administrative costs | N/A |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | Moderate | Ongoing | Pending | Unknown | DNREC, Soils Conservation District |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|----------|-------------|----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Stormwater management inventory and analysis | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | Low | Pending | Not Started | \$50,000 | DNREC, Town |



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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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 implement mitigation 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Georgetown | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

Issues

- a. Needs updated information from DEMA

| Project Description | Hazard(s) Addressed | 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). | Terrorism, Flooding (Riverine and Coastal), Hurricane/ Tropical Storms, Winter Storms, Severe Thunderstorms, Cyber Terrorism, Earthquake | 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. | All Hazards | 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. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms, Tornado, Winter Storms, Wildfire, Terrorism | 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 | \$45 Mil plus | FHA & State Del DOT |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|----------|-------------------------------|----------------|--------------------------|
| | | | | | 18/404 Separated Intersection | | |
| Tree cutback/trimming to clear power lines to protect against wind related tree impacts to said power lines | Hurricane/ Tropical Storms, Severe Thunderstorm, Tornado, Winder Storm. | Yes | High | N/A | Complete | N/A | DELMARVA |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------|---------|----------|------------|---------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Georgetown East Gateway Improvements | Terrorism | Yes | High | Short Term | Awarded | \$8.5M | DeIDOT |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|---------|----------------|--------------------------|
| Potential / New Mitigation Actions For Consideration | | | | | | | |
| Hurricane Info outreach education program (multi-lingual) (Spanish) | Hurricane/ Tropical Storms | No | High | Short term | Pending | 2500 | HMGP, FMA, (ARPA) |
| Hazard related warning system | All Hazards | No | High | Short term | Pending | 15,000 | HMGP, FMA (ARPA) |
| Pump Upgrade | Pipeline Failure | Yes | High | Short term | Pending | \$1 M | ARPA |
| Upgrade wastewater Treatment | Flooding (Riverine and Coastal), Pipeline Failure | Yes | High | Short term | Pending | \$.5 M | ARPA |
| Elevated water tower to enhance water pressure | Drought | Yes | High | Short term | Pending | \$1 M | ARPA |
| Pallet temporary housing (Homeless Coordination) | All Hazards | Pending | High | Short term | Pending | \$6 M | ARPA |
| Park Avenue Relocation, | All Hazards | Yes | Med | Long Term | Pending | \$16M | DeIDOT |
| US 113 @ SR 18/SR 404 (Georgetown) Grade Separated Intersection | All Hazards | Yes | High | Long Term | Pending | \$54K | DeIDOT |

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 DeIDOT 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>)



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 the southeast 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. Hurricane/Tropical Storms
- b. Flooding (Riverine and Coastal)

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 implement mitigation 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

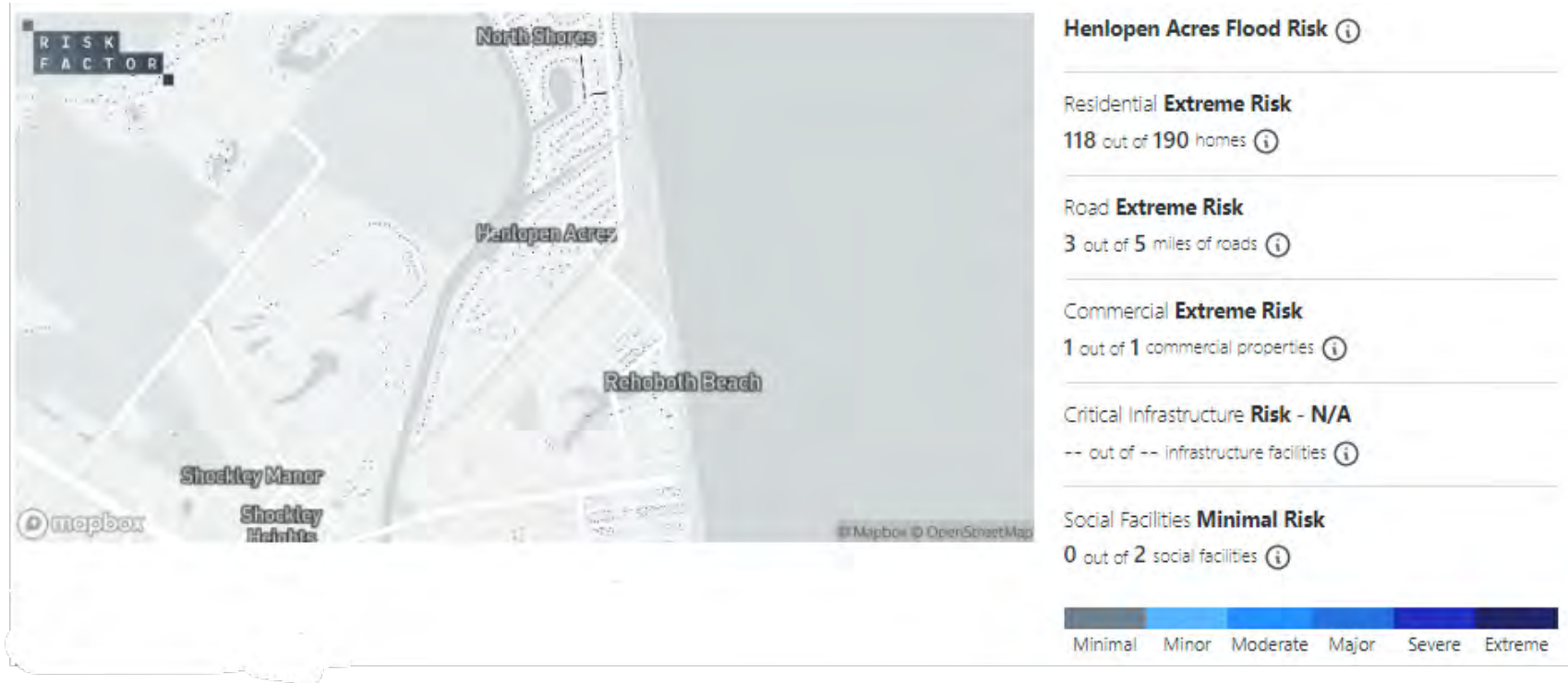
| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Henlopen Acres | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|----------|---------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Maintain beach dune system. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | Moderate | Ongoing | Ongoing | | HMGP, FMA, PDM |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|-----------|-----------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Develop a marine plan for the town. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | Ongoing | Completed | \$1K | N/A |
| Develop an Emergency Management Plan for the town. | All Hazards | Yes | Moderate | Ongoing | Completed | \$3K | N/A |
| Risk and Vulnerability Assessment of town hall | All Hazards | No | Moderate | Completed | Completed | \$3K | |
| Instillation of backflow valves on storm watermanagement system | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | High | Completed | Completed | \$10K | HMGP,FM,PDM, CDBG |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|--|---------|----------|------------|-----------------|-----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Back-up generator for town hall (Active) | Terrorism, Flooding (Riverine and Coastal), Hurricane/ Tropical Storms, Winter Storms, Severe Thunderstorms, Cyber Terrorism, Earthquake | No | Moderate | Short term | Pending funding | \$145K | HMGP, HSGP |
| Debris Management Plan | Terrorism, Flooding (Riverine and Coastal), Hurricane/ Tropical Storms, Winter Storms, Severe Thunderstorms, Earthquake | Yes | Moderate | Short Term | Pending funding | Ongoing | |
| North Shore Canal jetty/seawall – Provide structural management to | Flooding (Riverine and | No | Moderate | Long term | Pending funding | \$1M to \$1.25M | HMGP, BRIC, CDBG |

| | | | | | | | |
|---|--|--|--|--|--|--|--|
| mitigate water flow into area from Canal. | Coastal), Hurricane/ Tropical Storms | | | | | | |
|---|--|--|--|--|--|--|--|



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. Hurricane/Tropical Storms
- b. Flooding (Riverine and Coastal)
- c. Winter Storms
- d. 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| City of Lewes | 15 | 10 | 2 | 1 | 1 | 1 |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|----------------------------|----------------|-----------------|-----------------|---------------|-----------------------|---------------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|---------|----------------|--------------------------|
| Review and update evacuation and notification procedures for the city. | All Hazards | Yes | High | Ongoing | Ongoing | Staff costs | City Resources |
| Improve stormwater management throughout the city. Study of Lewes Beach for retrofit | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | Moderate | Short term | Pending | Unknown | ARPA, City |
| Increase participation in the National Flood Insurance Program. Annual report underway. | All Hazards | Yes | Moderate | Short term | Unknown | Staff costs | |
| Minimize damages from high wind events. (Wind part of Severe Coastal Storm, Beach Erosion). | Tornado, Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | Moderate | Ongoing | Ongoing | \$25,000 | HMGP, FMA, PDM |
| Implement Continue application and improvement of hazard mitigation education community outreach program. | All Hazards | Yes | Moderate | Ongoing | Ongoing | \$5000 | City, FEMA, DEMA |
| Reduce vulnerability to wildfires. MARSH issue | Wildfire | Yes | Moderate | Short | Ongoing | Unknown | State |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------|---------|----------|------------|------------------------|----------------|-------------------------------------|
| with invasive species of Phragmites. (Controlled burns, spraying etc. | | | | term | | W/State | Forestry |
| Continue data acquisition and enhancements to the GIS. | All Hazards | 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 | All Hazards | No | High | Ongoing | Pending funding source | \$2,000 | HMGP, FMA, PDM |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|------------------------|---------|----------|----------|-----------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| New Road study. DeIDOT Causeway | All Hazards | Yes | High | N/A | Ongoing | Unknown | DeIDOT |
| Adoption of International Building Codes (2021 IBC/ICC update) | All Hazards | Yes | High | N/A | Pending | No cost | N/A |
| Completing W. Cedar Street Flood study. | Flooding (Riverine and | Yes | High | | Completed | \$118,000 | BRIC |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---------------------|---|---------|----------|----------|--------|----------------|--------------------------|
| | Coastal), Hurricane/ Tropical Storms | | | | | | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|----------|-----------------|----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Implementation and construction of Tidewater floodgate | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | | Pending funding | \$3M | HMGP |
| Development of Resiliency Fund | All Hazards | No | Moderate | | Unknown | \$500,000 | City |
| Real Estate disclosure of flood and sea level rise concerns | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | No | Low | | | Pending study | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------|---------|----------|----------|--------|----------------|--------------------------|
| Establishment and maintenance of Resiliency Committee | All Hazards | No | Low | | | Pending study | |

https://floodfactor.com/city/lewes-delaware/1041830_fsid

Lewes Web

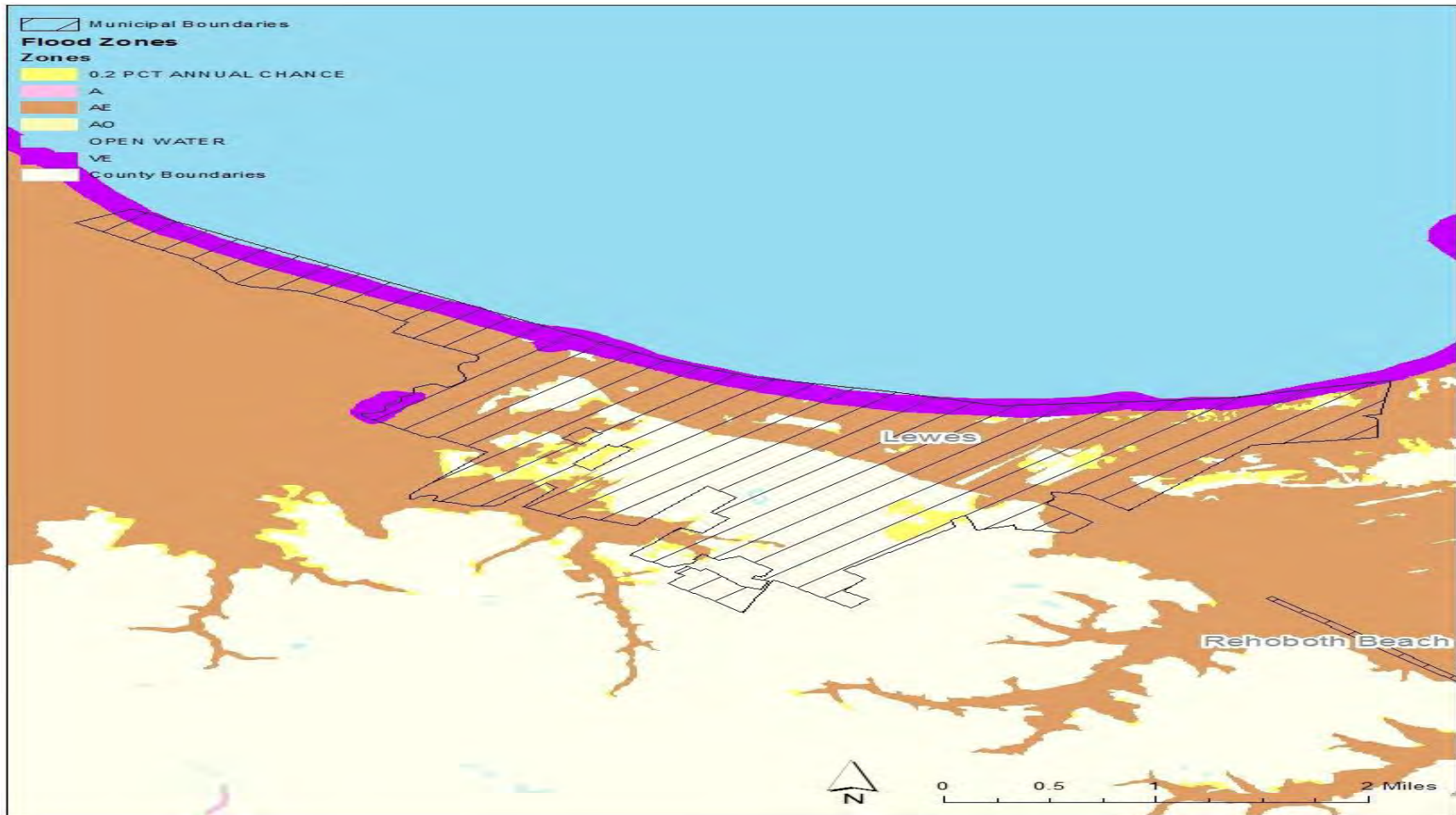
<https://www.ci.lewes.de.us/DocumentCenter/View/1279/Flooding-in-Lewes-PDF?bidId=>

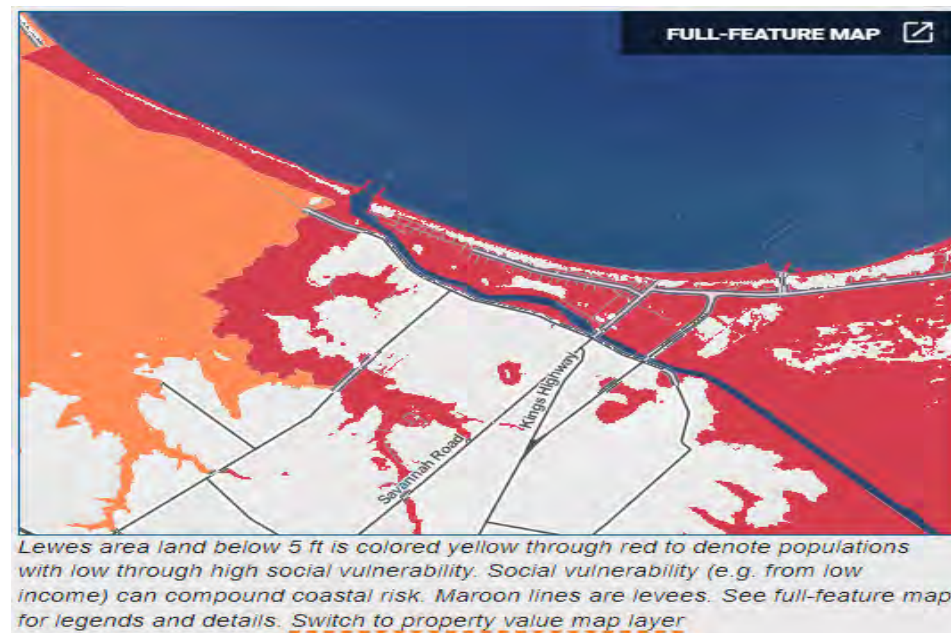
Surge Sea Level Rise

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>





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 (Riverine and Coastal)
- b. Hurricane/Tropical 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|----------------|----------------------|----------------------|----------------------|--------------------------|----------------------|-----------------------|
| Town of Laurel | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal) | 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. | All Hazards | Yes | High | Short term | Delayed due to funding. | \$1M | HMGP, FMA, BRIC |
| Relocate the Town Hall, Public Works, and Police Departments. | All Hazards | Yes | Low | Short term | Partial (PD) Pending funding | \$1M | HMGP, FMA, BRIC |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|--|---------|----------|------------|-----------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Segregate stormwater system from sanitary system. | Flooding (Riverine and Coastal), Hurricane/ Tropical | Yes | High | Short term | Completed | \$1M | State Revolving Funds |

| | | | | | | | |
|--|---|-----|----------|---------|-----------|----------|-----------|
| | Storms | | | | | | |
| Closing the well at 10th & Deshields Street Replace waterlines on 10th Street. | Flooding (Riverine and Coastal), Pipeline Failure | Yes | Moderate | Ongoing | Completed | \$15,000 | Own Funds |



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 Broad kill 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 (Riverine and Coastal)
 - i. Retail in AE 9 Flood Zone
- b. Hurricane/Tropical Storms
- 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 | INFIP | 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 |

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

NFIP Registered Repetitive Loss Properties

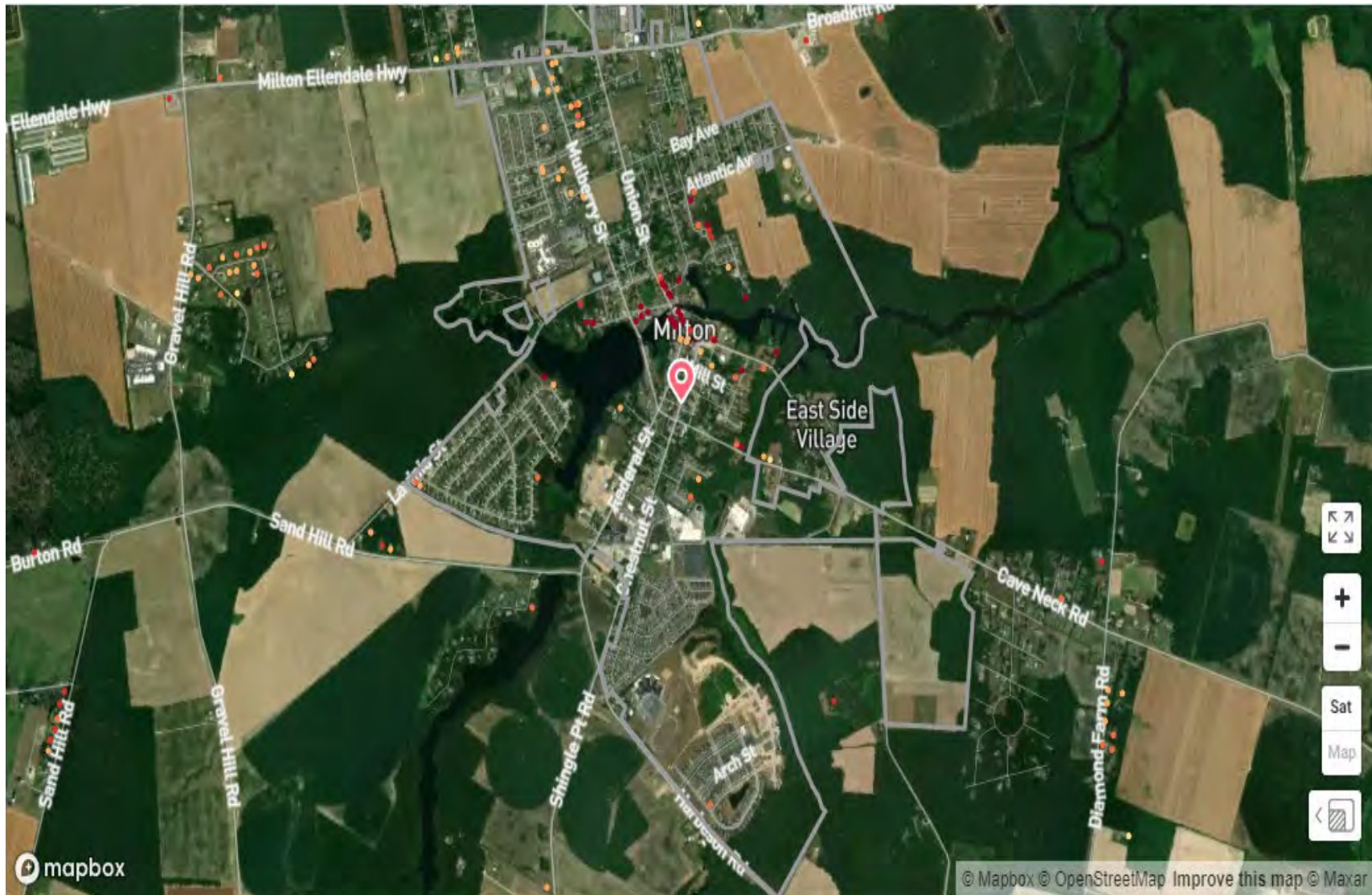
| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|----------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Town of Milton | 1 | 0 | 0 | 1 | 0 | 0 |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|-------------------------|----------------------|--|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Promote emergency preparedness information. Community Outreach | All Hazards | 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. | Drought, Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | Moderate | Short term | Completed | \$35,000 | DEMA |
| Join the Community Rating System. | All Hazards | Yes | Moderate | Short term | Delayed due to staffing | Administrative Costs | N/A |
| Conduct a study to identify measures to mitigate flooding in downtown | Flooding (Riverine and Coastal) | No | High | Short term | Pending | Unknown | HMGP, FMA, PDM, CDBG |
| Develop a riparian buffer standard for building setbacks along the Broad kill River and other waterways. Phase 1: Study and plan development | Flooding (Riverine and Coastal) | 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 | Flooding (Riverine and Coastal) | Yes | Moderate | Short term | Pending funding source | Study dependent | FMA, HMGP, Del Open Space Program, Del Coastal Management |
|--|---------------------------------|-----|----------|------------|------------------------|-----------------|---|

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|--|---------|----------|----------|-----------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Route 5 stormwater management strategy study | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | | N/A | Completed | \$30,000 | Coastal Management Grant |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|------------|---------------------|-------------------------------|--------------------------|
| Potential / New Mitigation Actions For Consideration | | | | | | | |
| Modify floodplain management plan to include critical infrastructure protection strategies for police and fire facilities. Relocation of police department to new building | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | High | Short term | Pending Acquisition | Unknown | HMGP, FMA, CDBG |
| Sea Level Rise Awareness Outreach | Flooding (Riverine and Coastal) | 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 | Flooding (Riverine and Coastal) | Yes | High | Short term | Ongoing | \$63,000 Improvements Pending | Self-funding |
| Retrofit of Repetitive Loss property Flood doors installed | Flooding (Riverine and Coastal) | Yes | High | Short Term | Completed | Unknown | Property Owner |
| Magnolia St Bulkhead & Drainage | Flooding (Riverine and Coastal) | yes | High | Short term | ongoing | \$1M | Bill funding/DNREC |



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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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= DeIDOT

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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|-------------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Town of Millsboro | 1 | 1 | 0 | 0 | 0 | 0 |

| Project Description | Hazard(s) Addressed | 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) | Hurricane/ Tropical Storms, Flooding (Riverine and Coastal) | 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. | Flooding (Riverine and Coastal) | Yes | Moderate | Short term | Completed | \$100,000 | HMGP, FMA, PDM |
| Retrofit one pump station. Move second pump station to new location | Flooding (Riverine and Coastal), Pipeline Failure | Yes | Moderate | Short term | Ongoing | \$3M relocation \$750,000 | |

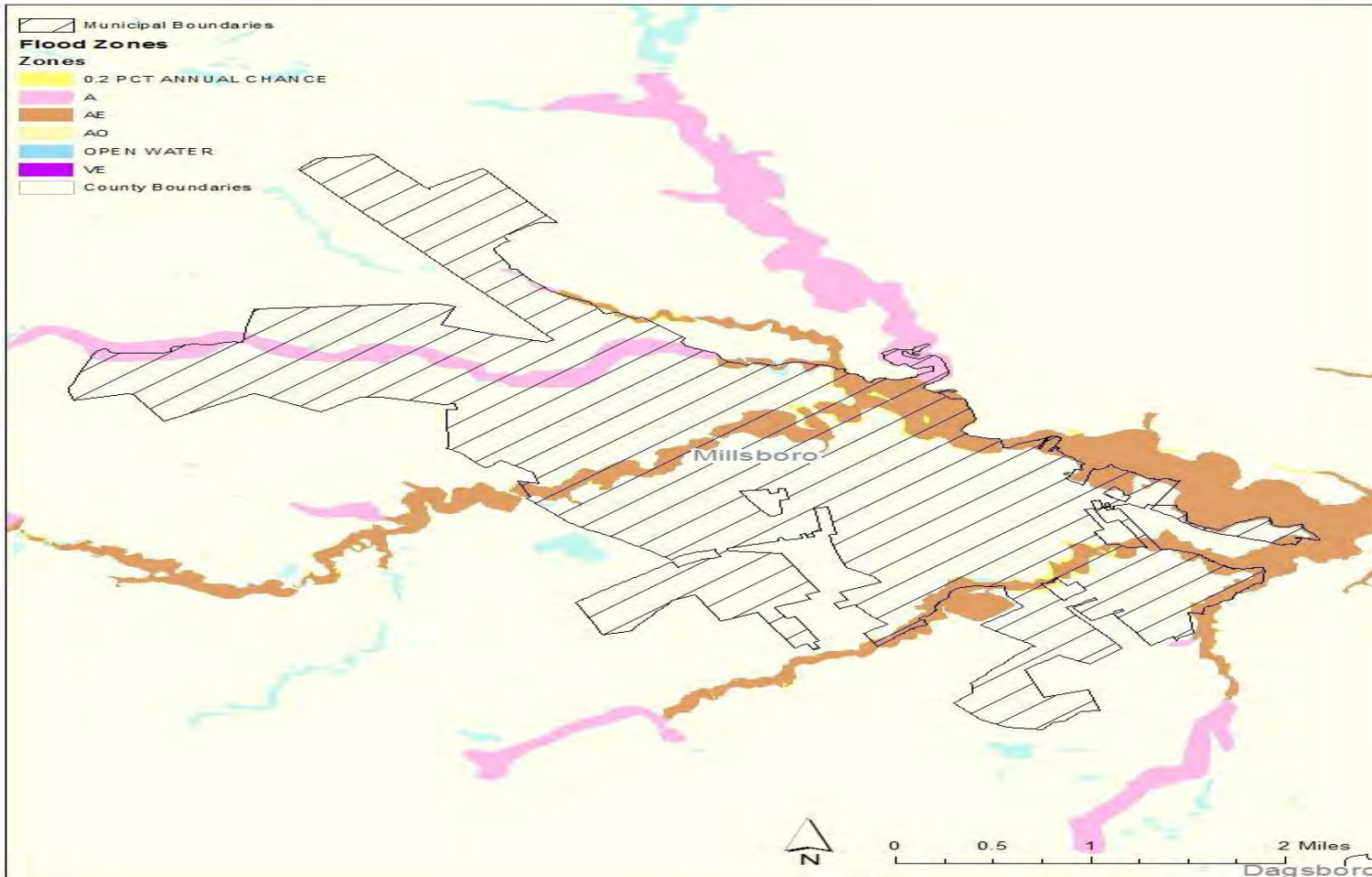
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|-----------|-------------------------------|---|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Improve storm-water drainage within town limits. (Wilson Highway and Progress) Town Center Area | Hurricane/ Tropical Storms, Flooding (Riverine and Coastal) | Yes | High | Short term | Completed | \$200,000 + | HMGP, FMA, PDM |
| Retrofit one pump station. Move second pump station to new location | Flooding (Riverine and Coastal), Pipeline Failure | Yes | Moderate | Short term | Ongoing | \$3 M relocation \$750,000 | State Revolving Funds Cupula Park, Town Funds. |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal) | No | High | Ongoing | Pending funding source | \$100,000 | developer |
| Develop storm-water management plan, Structure inventory underway. | Hurricane/ Tropical Storms, Flooding | No | High | Ongoing | Ongoing | \$120,000 | DNREC, Town Funds |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------------------|---------|----------|------------|-----------------|----------------|--|
| | (Riverine and Coastal) | | | | | | |
| Cupola Park (Indian River) bulkhead upgrade | Flooding (Riverine and Coastal) | No | High | Ongoing | Pending study | \$5M | HMGP, FMA, BRIC |
| Inventory of high hazard areas within developments | All Hazards | Yes | Moderate | Long Term | Ongoing | Administrative | Town Resources |
| Tiger Branch shoreline stabilization and sediment removal | Flooding (Riverine and Coastal) | Yes | Moderate | Short Term | Ongoing | Unknown | Town Resource, Pending |
| Public Safety Campus Relocation | All Hazards | Yes | High | Short-Term | Ongoing | \$7M | Town Funds/ BRIC / USDA Rural Development Loan |
| Tiger Branch (Indian River) Wastewater Treatment Relocation out of floodplain area | Flooding (Riverine and Coastal) | 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|-------------------|----------------------|----------------------|----------------------|--------------------------|----------------------|-----------------------|
| Town of Millville | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding |
|---------------------|---------------------|---------|----------|----------|--------|----------------|-------------------|
|---------------------|---------------------|---------|----------|----------|--------|----------------|-------------------|

| | | | | | | | Source |
|---|--|--|--|--|--|---------------|--------|
| Previous Plan Mitigation Actions Review | | | | | | | |
| N/A | | | | | | Pending study | |

| Project Description | Hazard(s) Addressed | 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. | Hurricane/ Tropical Storms, Severe Thunderstorm, Tornado, Winder Storm. | 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. | All Hazards | Yes | Moderate | Short term | Completed by DeIDOT | N/A | N/A |

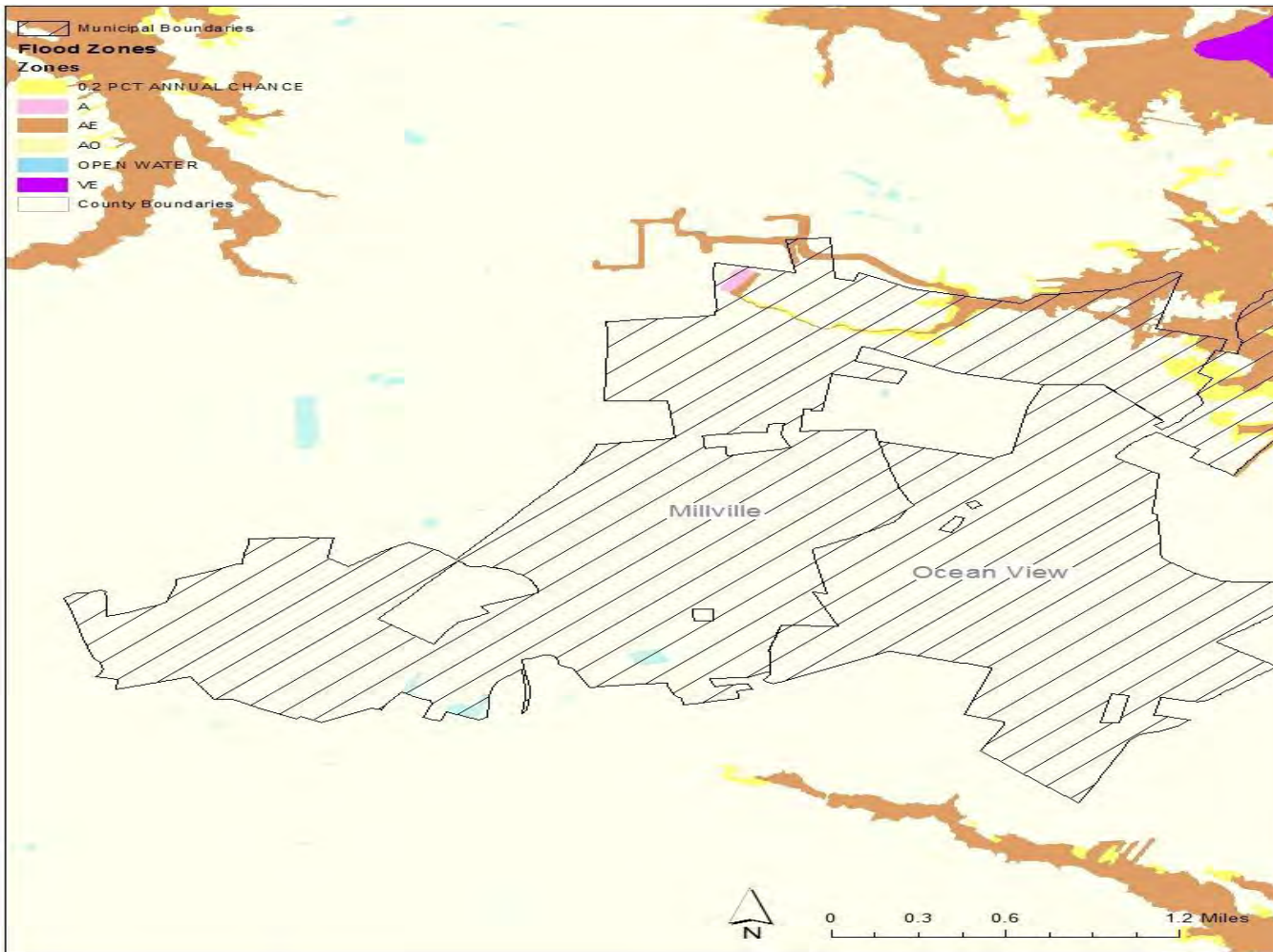
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|------------------------------------|---------|----------|------------|------------------------|----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Develop mitigation (wind loads) outreach program specifically targeting Millville by the Sea development | Hurricane/ Tropical Storms, Severe | No | Moderate | Short term | Pending funding source | \$2,000 | HMGP, FMA, BRIC, CDBG |

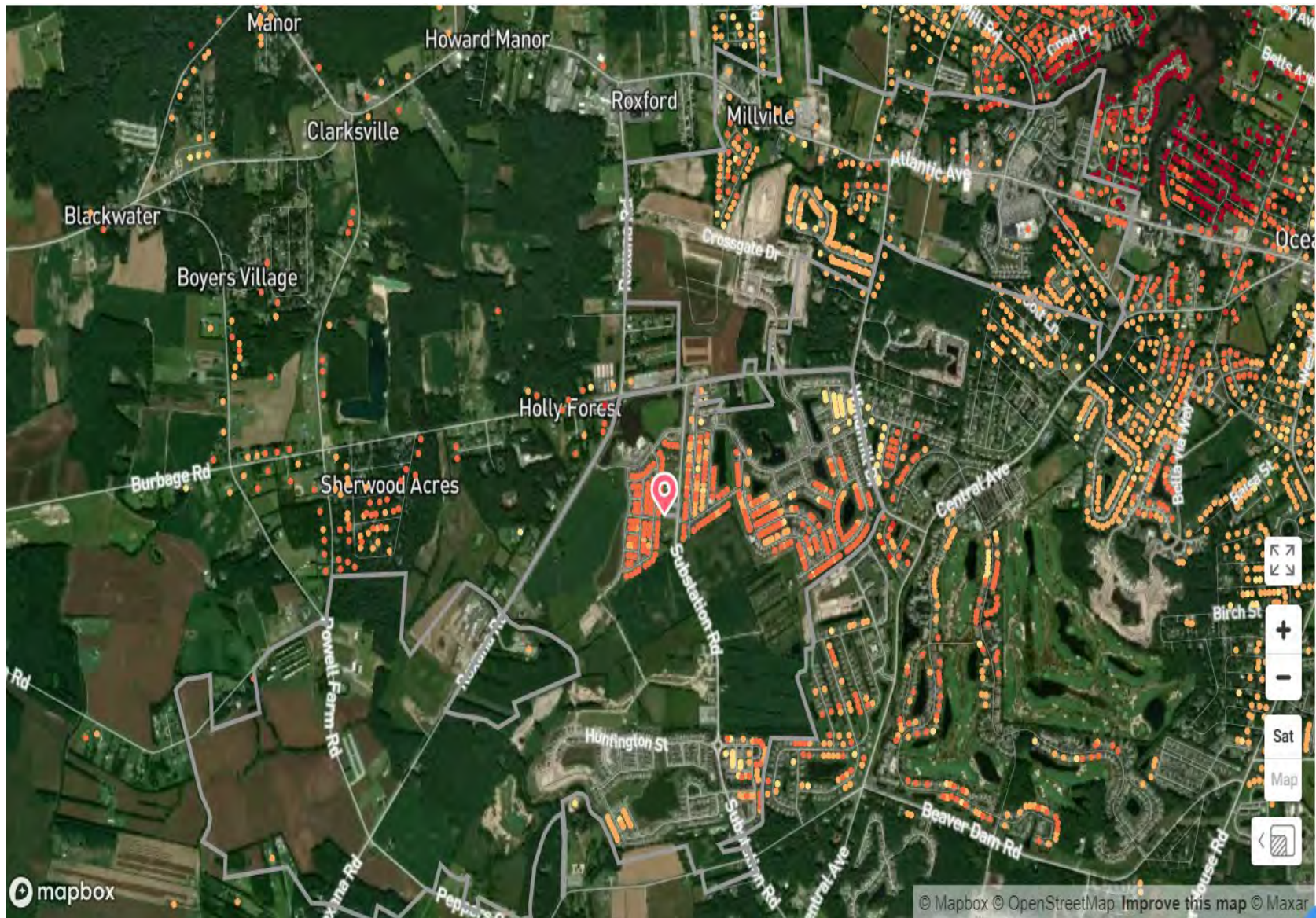
Issues

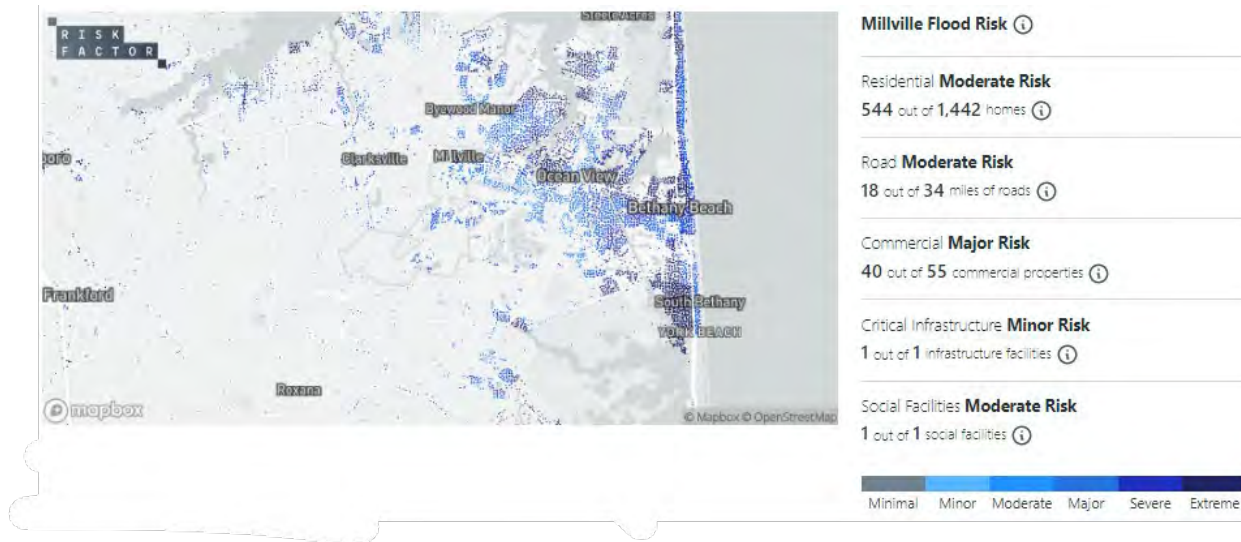
- a. Town has no road ownership. Each development must have a stormwater management plan and system.

<https://floodplanning.dnrec.delaware.gov/#pills-summary>

https://floodfactor.com/city/millville-delaware/1048200_fsld







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 unincorporated sections 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- c. 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|--------------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Town of Ocean View | 1 | 1 | 0 | 0 | 0 | 0 |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------|---------|----------|----------|--------|----------------|--------------------------|
| Previous Plan Mitigation Actions Review | | | | | | | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|------------|-----------------|----------------|---|--|---------------------------------------|
| <p>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 Cottages on 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.</p> | <p>Flooding (Riverine and Coastal), Hurricane/ Tropical Storms</p> | <p>Yes</p> | <p>High</p> | <p>Ongoing</p> | <p>In Progress Partially complete</p> | <ul style="list-style-type: none"> ▪ \$750,000 done ▪ \$3M outstanding | <p>HMGP, FMS, PDM, CDBG, PG</p> |
| <p>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.</p> | <p>All Hazards</p> | <p>Yes</p> | <p>Moderate</p> | <p>Ongoing</p> | <p>In Progress</p> | <p>\$5,000</p> | <p>Town Regional Approach</p> |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------|---------|----------|------------|-----------------|----------------|--------------------------|
| Local Television Outreach Website | | | | | | | |
| Purchase and install GIS to map hazardous areas and events. | All Hazards | Yes | Low | Short term | Completed | \$1000 | Self-funded |
| Adopt a building code ordinance for the Town. | All Hazards | Yes | Low | Short term | County Enforces | N/A | N/A |

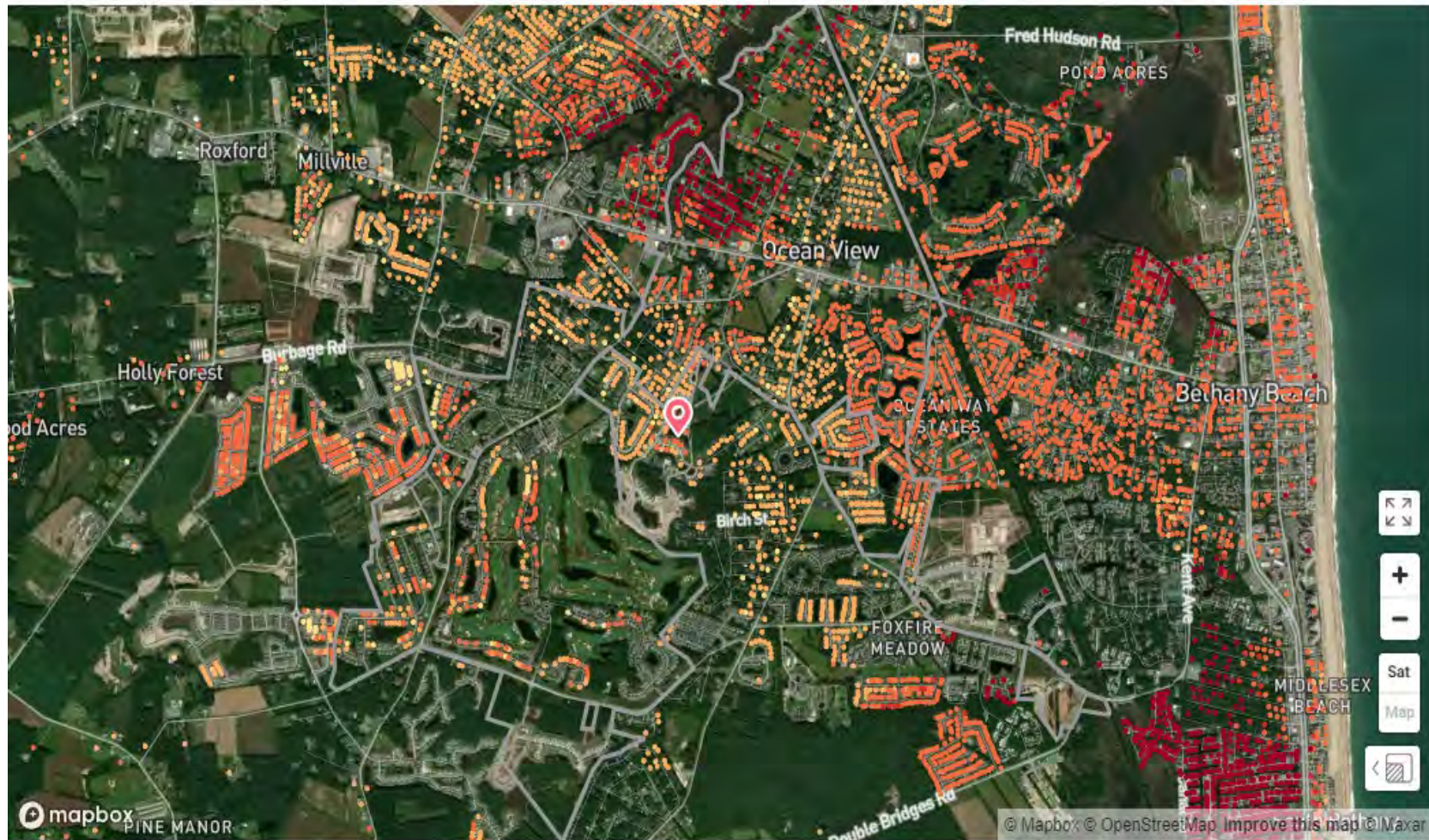
| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---|---------|----------|------------|-----------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Goodman Park, Meyle Estates West View Development | All Hazards | | | | Completed | \$250,000 | Self-funded |
| Woodlyn Park drainage improvements | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | | | | Completed | \$565,000 | Self-funded |
| Storm water management projects (3) drainage for roads | Flooding (Riverine and | Yes | High | Short term | Completed | \$750,000 | Self-funded |

| | | | | | | | |
|---|--|-----|------|------------|-----------|-----------|--------|
| | Coastal), Hurricane/ Tropical Storms | | | | | | |
| Stormwater Drainage pipe system install: Central Ave – 100 feet (Banks Bennetts Tax Ditch floods) | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | Short term | Completed | \$500,000 | DeIDOT |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|------------|---------------------------|-------------------|-----------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| (3) Shovel ready stormwater management projects awaiting easement rights. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | 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) | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | Short term | Pending Construction | \$500,000 | Self-funded/FEMA |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|------------|-----------------|-------------------------------------|--------------------------|
| 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. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | | | Short term | | \$425,000 \$440,000 \$900,000 | Self-funded/ ARPA |
| Woodland Avenue Draining improvements and construction | Flooding (Riverine and Coastal) | | | Short term | | \$900,000 | Self-funded |
| West Avenue streetscape, drainage, and sidewalks Safe Corridor project | Flooding (Riverine and Coastal) | | | Short term | In construction | \$675,000 | Self-funded |
| Woodland Avenue Rt 26 to Hudson Avenue drainage and sidewalks Safe Corridor project | Flooding (Riverine and Coastal) | | | Short term | In design | \$300,000 | Self-funded |
| Woodland Avenue Hudson to Daisey drainage and sidewalks Safe Corridor project | Flooding (Riverine and Coastal) | | | Short term | | \$907,000 | Town |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------------------|---------|----------|------------|-----------------|----------------|--------------------------|
| West Avenue Oakwood to Assawoman Canal drainage and sidewalks Safe Corridor project | Flooding (Riverine and Coastal) | | | Short term | | \$900,000 | Town |
| Evacuation student & Staff LB School pedestrian bridge over drainage ditch | Flooding (Riverine and Coastal) | | | Short term | Pending funding | \$107,000 | Self-funded/ RSD |
| Hudson Avenue Flood Control Project | Flooding (Riverine and Coastal) | | | Short term | Pending | \$150,000 | Self-funded/ ARPA |



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 to over 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 (Riverine and Coastal)
 - I. Tidal flooding (Downtown)
- b. Hurricane/Tropical Storms
- 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 |
|----------------|-----|-----|------|-----|-----|-----|------|-----|------|-------|-----|--------|-----|----|----|------|------|-----|----|
| 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------------|------------------------|----------------------|------------------------|---------------------------------|--------------------------|------------------------------|
| Rehoboth Beach | 8 | 4 | 0 | 0 | 2 | 2 |

| Project Description | Hazard(s) Addressed | 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. | Flooding (Riverine and Coastal) | Yes | High | N/A | Completed | \$750,000 | USACE, DENREC |
| Conduct drainage improvements on First Street to increase efficiency by increasing piping capacity. | Flooding (Riverine and Coastal) | No | Moderate | N/A | Completed | \$75,000 | HMGP, FMA, PDM |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------|---------|----------|----------|--------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| N/A | | | | | | | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------|---------|----------|----------|--------|----------------|--------------------------|
| Potential / New Mitigation Actions For Consideration | | | | | | | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|------------------------|------------------|--------------------------|
| Storm-water management system town wide | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | 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) | Flooding (Riverine and Coastal) | No | High | Short-term | Pending funding source | \$50,000 | HMGP, FMA, PDM |
| Wilmington and Delaware Ave storm-water management study | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | Completed | Completed | \$ 1M (2 Phases) | HMGP, FMA, PDM |
| Develop multi-lingual community outreach | All Hazards | 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 sies as needed. Stormwater and sewer. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | Yes | High | Annual | Ongoing | \$1M | Own Resources, DNREC |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|---------------------|---------|----------|----------|-----------------|----------------|---|
| <p>Streetscape – Pedestrian Enhancement to support larger sidewalk. Baltimore and Wilmington Avenues.</p> <p>Widening sidewalks, movement, and armoring utilities. 7 ft pedestrian route with buffer areas to allow access for individuals with mobility impairment.</p> <p>(MAY WANT TO MAKE TWO ITEMS)</p> | All Hazards | Yes | Moderate | 7 years | Pending funding | \$35M | HMGP, FMA, BRICK, DeIDOT, 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|-----------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Town of Seaford | 1 | 1 | 0 | 0 | 0 | 0 |

| Project Description | Hazard(s) Addressed | 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. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | High | Short term | In process | Zero cost | N/A |
| Ensure security of water production sites and storage facilities. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms, Pipeline Failure, Terrorism | Yes | High | Short term | Pending funding source | \$50,000 | HSGP, ARPA, HMPG, CDBG |

| Project Description | Hazard(s) Addressed | 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. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | 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. | Flooding (Riverine and Coastal) | Yes | High | Short term | Completed | \$1.99M | Town, US DOT |
| Construct storms drain improvements on Washington Street to increase the drainage capacity of the area and prevent future flooding. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | 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. | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | Moderate | Short term | Completed | \$50,000 | N/A |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | Moderate | Short Term | Pending funding | \$200,000 | HMGP, FMA, DNREC, DeIDOT |
| Natural Hazard risk outreach | All Hazards | | | | | 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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

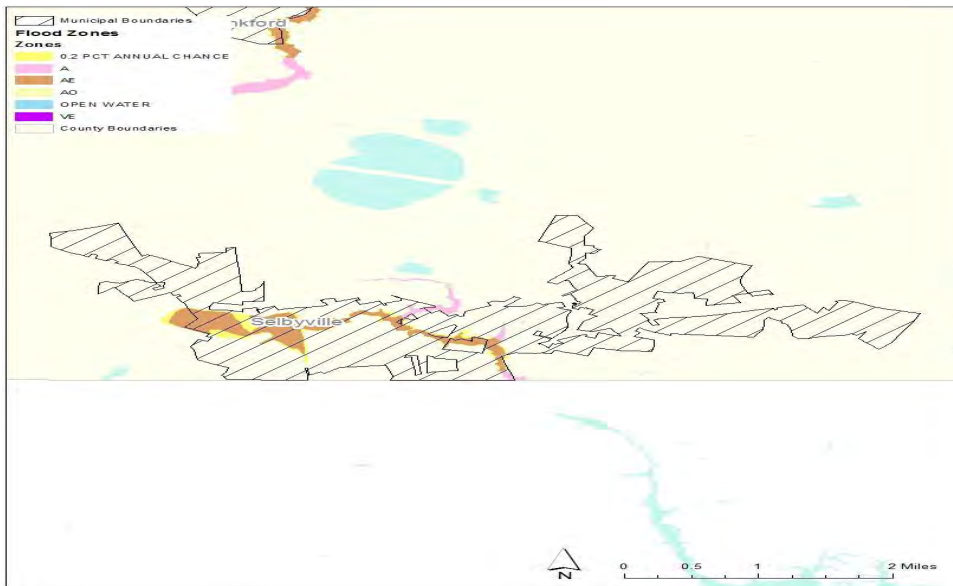
| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|--------------------|----------------------|----------------------|----------------------|--------------------------|----------------------|-----------------------|
| Town of Selbyville | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data | Pending updated data |

| Project Description | Hazard(s) Addressed | 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 | All Hazards | Yes | High | Ongoing | Ongoing | \$1000 | HMGP, FMA, PDM, CDBG |

| Project Description | Hazard(s) Addressed | 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 | Hurricane/ Tropical Storms | Yes | High | N/A | Ongoing | Minimal (built in) | N/A |
| Replace deteriorating bridge and culverts on Railroad Avenue over major storm water management ditch. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | 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. | Flooding (Riverine and Coastal), Hurricane/ | Yes | High | Completed | Completed | \$2,000 | Private/Public partnership state and local assistance |

| | | | | | | | |
|--|-----------------|--|--|--|--|--|--|
| | Tropical Storms | | | | | | |
|--|-----------------|--|--|--|--|--|--|

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|----------|---------|----------------|--------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| Stormwater Management Study Asset Inventory and Infrastructure Assessment | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | High | N/A | Pending | \$120,000 | DNREC ARPA BRIC |



TOWN OF 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 Middlesex and Sea Colony, Fenwick Island to the south, the Atlantic Ocean to the east, and unincorporated 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 (Riverine and Coastal)
 - I. Tidal flooding (Downtown)
- b. Hurricane/Tropical Storms
- 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 |
|---------------|-----|-----|------|-----|-----|-----|------|-----|------|-------|-----|--------|-----|----|----|------|------|-----|----|
| 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: | Approved 2022 | | |
| BCEGS Grades | BCEGS Grade | 8 | | |
| NFIP Participation | NFIP Entry Date | 10/6/1976 | | |
| CRS Communities | CRS Entry Date | 10/1/2007 | CRS Class: | 9 |

| | | | |
|-----------------|----------------------|-------------------|---------------------------|
| Self-Assessment | Technical Capability | Fiscal Capability | Administrative Capability |
| | M | L | H |

NFIP Registered Repetitive Loss Properties

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|---------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| South Bethany | 44 | 43 | 1 | 0 | 0 | 0 |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---------------------|---------------------|---------|----------|----------|--------|----------------|--------------------------|
|---------------------|---------------------|---------|----------|----------|--------|----------------|--------------------------|

| Previous Plan Mitigation Actions Review | | | | | | | |
|--|---------------------------------|-----|----------|------------|--|--|--------------------------------|
| Improve existing drainage system throughout the town. Rain Garden | Flooding (Riverine and Coastal) | Yes | High | Ongoing | In Progress Migrating to smaller projects as needed | \$250,000. \$20,000/\$30,000 per year | HMGP, FMA, BRIC, DeIDOT, DNREC |
| Upgrade the Town's Building and Zoning Ordinances to reflect NFIP and ISO requirements. Pending County Update. | All Hazards | 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. | Flooding (Riverine and Coastal) | Yes | Moderate | Short term | Complete | \$5,000 | HMGP, FMA, BRIC |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------|---------|----------|----------|--------|----------------|--------------------------|
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---|---------|----------|------------|-----------|----------------|--------------------------|
| Flood elevation one house: Back Bay (204 Carlisle Road/Drive) | Flooding (Riverine and Coastal) | 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. | Flooding (Riverine and Coastal), Hurricane/ Tropical Storms | | | | Completed | | |

| Project Description | Hazard(s) Addressed | 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 | Flooding (Riverine and Coastal) | Yes | High | Ongoing | Ongoing | \$10,000 | HMGP, FMA, |
| Public Outreach by Floodplain | Flooding | Yes | High | Ongoing | Ongoing | \$1,000 | Self-funding |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|--|---------|----------|-----------|-----------------|----------------|---------------------------------|
| Manager and Town Staff. Direct mailings and website management Brochure/Public Open House. | (Riverine and Coastal) | | | | | | |
| Street infrastructure and stormwater management. Elevate and resilient design revision York Drive. Secondary evacuation area | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | No | High | Long Term | Pending Funding | Est \$10M | DNREC, ACE, DelDOT, FEMA, BRICK |
| Cat Hill area resilient roadway design. Area dense. | All Hazards | No | High | Long Term | Pending | Pending study | DNREC, ACE, DelDOT, FEMA, BRICK |

TOWN OF 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 (Riverine and Coastal)
- b. Hurricane/Tropical Storms
- 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 |

| | | | |
|------------------------|----------------------|-------------------|---------------------------|
| Self-Assessment | Technical Capability | Fiscal Capability | Administrative Capability |
| | L | L | L |

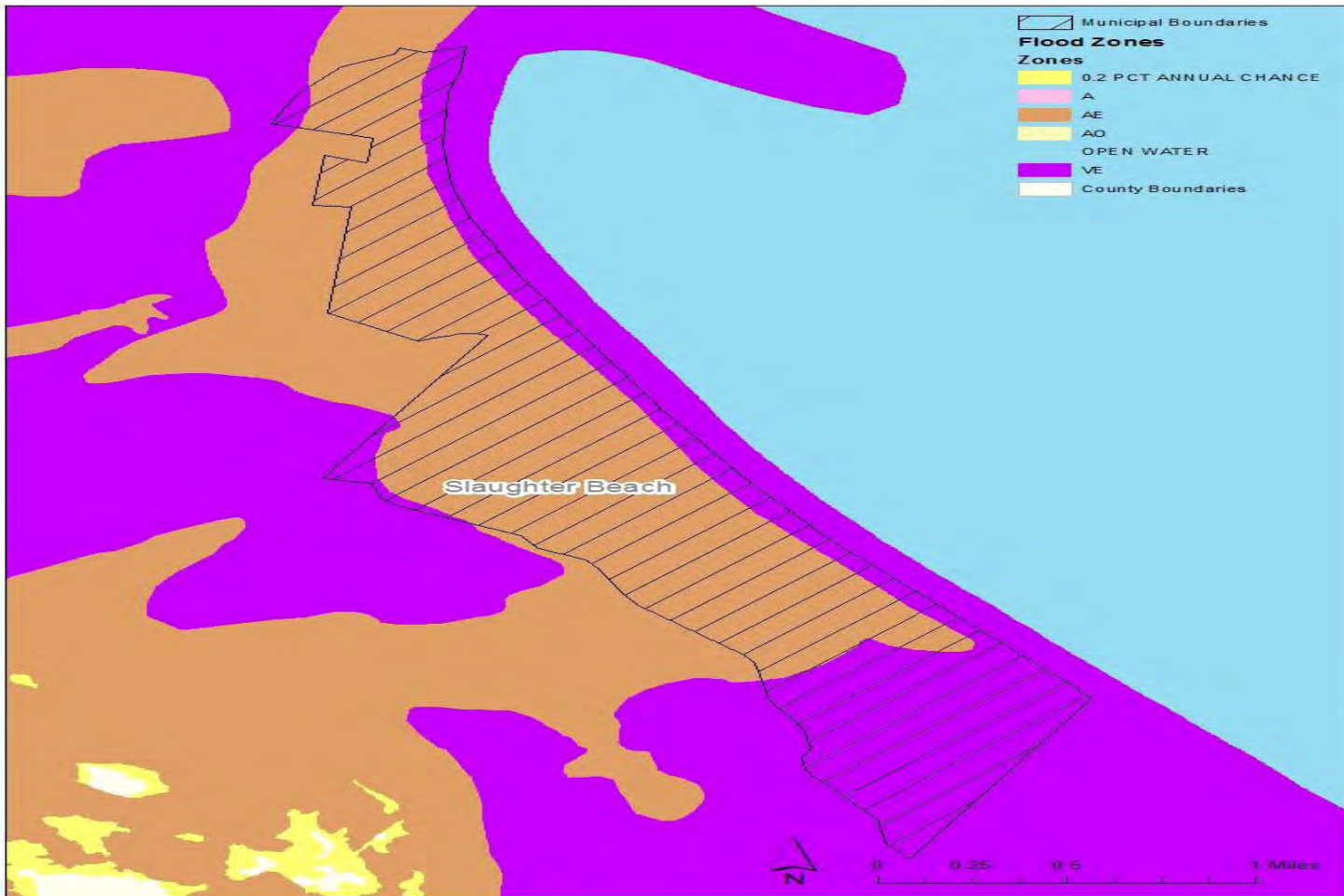
NFIP Registered Repetitive Loss Properties

| Jurisdiction | Repetitive Loss | Single Family | Two-Four Family | Non-Residential Business | Other Residential | Other Non-Residential |
|-----------------|-----------------|---------------|-----------------|--------------------------|-------------------|-----------------------|
| Slaughter Beach | 1 | 1 | 0 | 0 | 0 | 0 |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|--|--|---------|----------|-----------------|---------|----------------|---|
| Previous Plan Mitigation Actions Review | | | | | | | |
| Improve stormwater drainage throughout entire town | Flooding (Riverine and Coastal), Hurricane/Tropical Storms | Yes | High | 12 to 18 months | Ongoing | \$180,000 | Funded in North End of town |
| Flood-proof water pumping stations. | Flooding (Riverine and Coastal), Pipeline Failure | 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). | Flooding (Riverine and Coastal) | Yes | High | 24 months | Delayed | \$1M | Pending vulnerability Assessment |
| Elevate flood-prone homes. | Flooding (Riverine and Coastal) | Yes | High | 24 months | Ongoing | \$205,000 | Working with DEMA awarded contract |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|---------------------------------|---------|----------|-----------------------------|-------------|----------------|---|
| Perform regular beach replenishment | Flooding (Riverine and Coastal) | Yes | High | 12 months | Ongoing | \$15,000 | State reformed and replenished beach and beach grass. DENRC |
| Restore and/or renourish beach and protective dunes. | Flooding (Riverine and Coastal) | Yes | High | When funds become available | Not started | Pending study | See above |
| Initiate stormwater management system improvements along ± 1 mile of North Bay | Hurricane/ Tropical Storms | Yes | Low | When funds become available | Not started | Pending study | Stormwater drainage study above. |
| Mitigation Actions Started / Completed since 2016 Plan Update | | | | | | | |
| Develop automated telephone warning system. | All Hazards | 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. | All Hazards | 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. | All Hazards | Yes | Moderate | When funds become available | Completed | Pending study | |

| Project Description | Hazard(s) Addressed | Adopted | Priority | Timeline | Status | Estimated Cost | Potential Funding Source |
|---|--|---------|----------|-----------|---------|----------------|------------------------------------|
| Potential / New Mitigation Actions for Consideration | | | | | | | |
| In process of studying Sewer wastewater mgmt. lines | Flooding (Riverine and Coastal) | Yes | Moderate | 12 months | ongoing | \$60,000 | Feasibility study |
| Updating water quality | Pipeline Failure | | | | | Pending study | |
| Del Forrest Service Study for Frag | All Hazards | Yes | Moderate | 12 months | Ongoing | \$10,000 | In Process |
| Univ of Del Study Marsh water elevation. | Flooding (Riverine and Coastal) | Yes | Low | 12 months | Ongoing | Unknown | In progress in partnership with UD |
| Jetty repair north side of town | All Hazards | No | Low | 24 Months | | \$30M | Major restoration project |
| Propane tank tiedown ordinance | Hazmat | No | Low | 12 months | Pending | \$1500 | |
| Plan for Severe weather sheltering | Hurricane, Tropical Storm, Winter Storm, Severe Thunderstorm | No | Low | 12 months | Ongoing | Vulnerability | Pending Vulnerability Assessment |



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 Bureau 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

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.

The meeting included Adam Montella, Anthony Mangeri, Andrew Forcucci, Scott Sleeman and Joseph Thomas.

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 Lewes |
| Gene Dvornick | Georgetown |

| Name | Organization |
|---------------------|---|
| James W. Bailey | Broadkill Beach |
| Jamie Burk | Millsboro |
| Janelle Cornwell | City of Lewes Planning |
| John Apple | Bethany Beach |
| Joe Thomas | Sussex County |
| Kathleen Lock | Slaughter Beach |
| Matt McCall | FEMA |
| Kenny West | Town 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 |
| 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 |
| Sara Bynum-King | Town of Delmar |
| Stacey Long | Town of Selbyville |
| Teresa Tieman | Town of Bethany Beach |
| Thomas Roth | Town of Henlopen Acres |
| Kenneth Cimino | Town of Ocean View |

| Name | Organization |
|-----------------|------------------------|
| 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 |

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



Today's 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

Committee and Working Group

| <u>HMP Steering Committee</u> | <u>HMP Working Group</u> |
|---|--|
| <ul style="list-style-type: none">• X• X• X• X• DEMA and FEMA Region III (Advisory)• OGL Project Team (Advisory) | <ul style="list-style-type: none">• 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

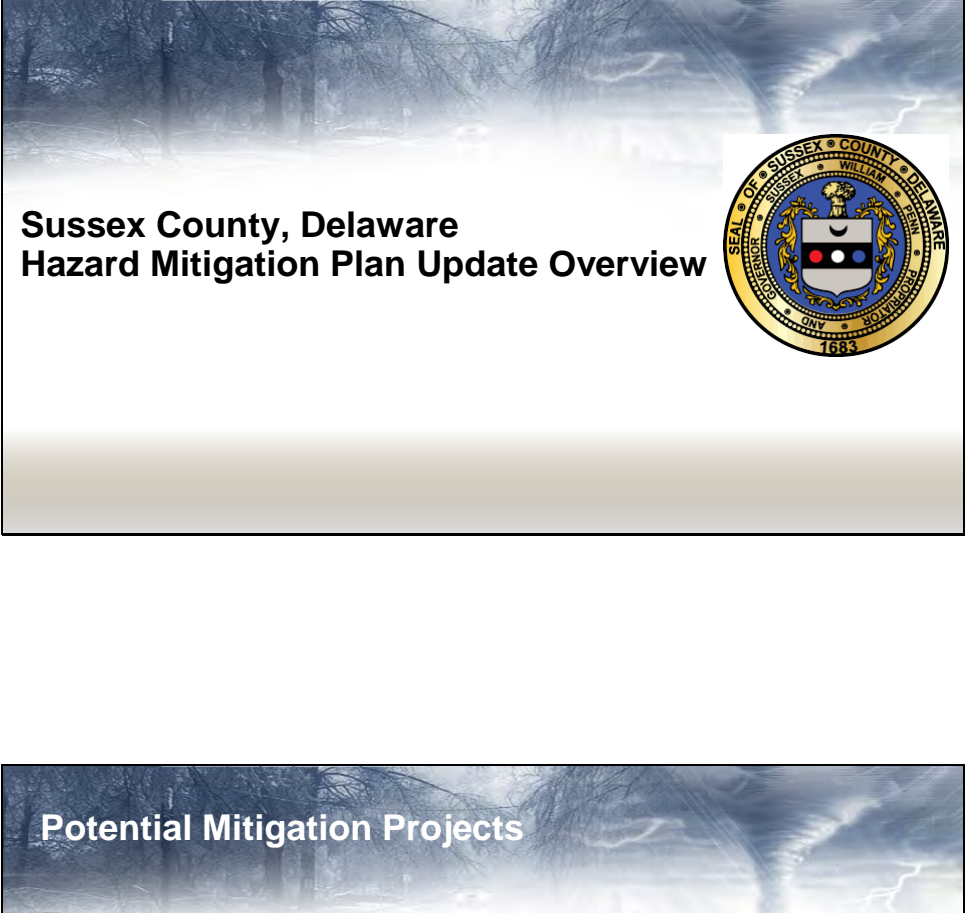
Today's workshop will:

- 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.

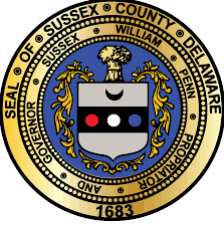


HMP Benefits

- 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



The seal of Sussex County, Delaware, is circular with a gold border. The outer ring contains the text "SEAL OF SUSSEX COUNTY DELAWARE" at the top and "1683" at the bottom. The inner circle features a shield with a white field containing a black crescent moon and a red dot, and a blue field containing a white dot. The shield is flanked by two figures, and the text "WILLIAM BENTLEY" is visible above the shield.



Potential Mitigation Projects

“Soft” Mitigation Projects:

- Building code enforcement.
- Land development regulations.
- Public education.
- Studies and plans.
- More...



A photograph showing two women in white shirts standing at a construction site. They are looking at a set of blueprints or documents. The background shows a brick wall and wooden framing.

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

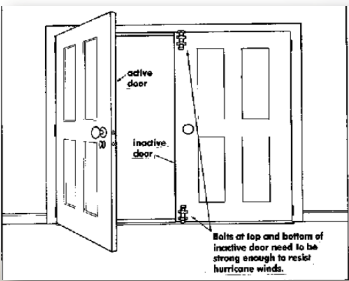
Impact-Resistant Glass

Colonial Shutters

Corrugated Metal Panel

Hardening or Retrofitting of Critical Facilities

Strengthen the Doors

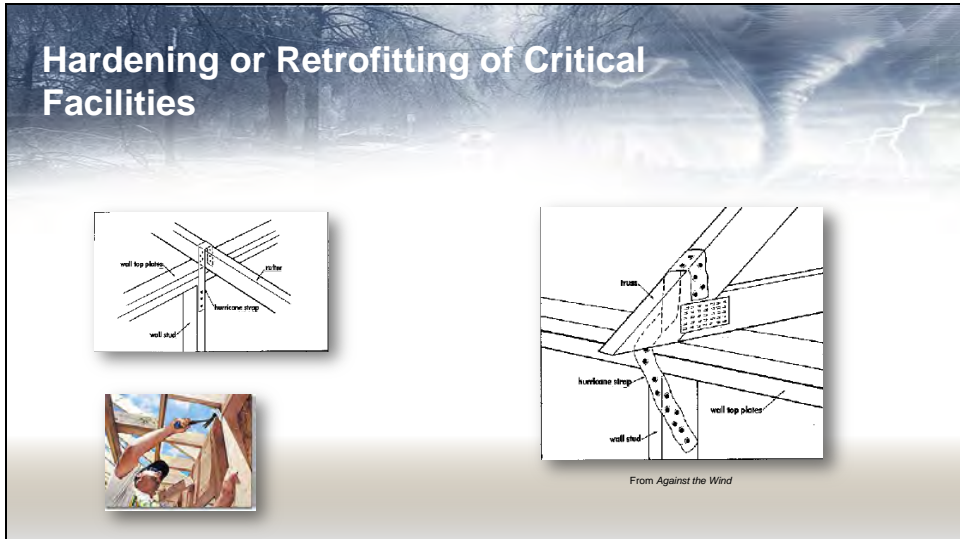


active door

inactive door

Bolts at top and bottom of inactive door need to be strong enough to resist hurricane winds.

From Against the Wind



Survey Validation Meeting

Date/Location: 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.

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.

| 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 Lewes |
| Gene Dvornick | Georgetown |
| James W. Bailey | Broadkill Beach |
| Jamie Burk | Millsboro |
| Janelle Cornwell | City of Lewes Planning |
| John Apple | Bethany Beach |
| Joe Thomas | Sussex County |

| Name | Organization |
|---------------------|---|
| Kathleen Lock | Slaughter Beach |
| Matt McCall | FEMA |
| Kenny West | Town 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 |
| 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 |
| Sara Bynum-King | Town of Delmar |
| Stacey Long | Town of Selbyville |
| Teresa Tieman | Town of Bethany Beach |
| Thomas Roth | Town of Henlopen Acres |
| 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 |

Meeting Agenda:

- I. Review and analysis of survey results
- II. Develop Hazard and Risk Matrix
- III. Establish Hazard Priority
- IV. Next Steps
- V. Timeline
- VI. Public Meetings

Jurisdictional Interviews

See Appendix A.

Project 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) | <ul style="list-style-type: none"> ▪ Send out meeting Teams invitations and agenda. ▪ Develop slide deck for meeting | Completed by April 14, 2022 |
| Scott S. (OGL) | <ul style="list-style-type: none"> ▪ Schedule meeting with GIS for status of HAZUS analysis ▪ Forward all jurisdictional interviews | N/A. |
| Anthony M. (OGL) | <ul style="list-style-type: none"> ▪ 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

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.

| 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 Lewes |
| Gene Dvornick | Georgetown |
| James W. Bailey | Broadkill Beach |
| Jamie Burk | Millsboro |
| Janelle Cornwell | City of Lewes Planning |
| John Apple | Bethany Beach |
| Joe Thomas | Sussex County |
| Kathleen Lock | Slaughter Beach |
| Matt McCall | FEMA |
| Kenny West | Town of Laurel |
| Megan Nehrbas | Sussex County Geographic Information office |
| Meghan Martin | Sussex County |

| Name | Organization |
|---------------------|------------------------|
| Corey Shinko | City of Rehoboth Beach |
| Joanne Perry | City of Rehoboth Beach |
| 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 |
| Sara Bynum-King | Town of Delmar |
| Stacey Long | Town of Selbyville |
| Teresa Tieman | Town of Bethany Beach |
| Thomas Roth | Town of Henlopen Acres |
| 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 |

Meeting Agenda:

- VII. Comments from Steering Committee
- VIII. Comments from
- IX. members of the Working Group
- X. Hazard and Risk Matrix
- XI. Hazard Priority
- XII. Next Steps

XIII. Timeline

XIV. 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. |

Hazus Discussion Meeting

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. |

| NAME | ORGANIZATION |
|-----------------|--------------------|
| 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. Data can be found in Appendix A.

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?

o **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

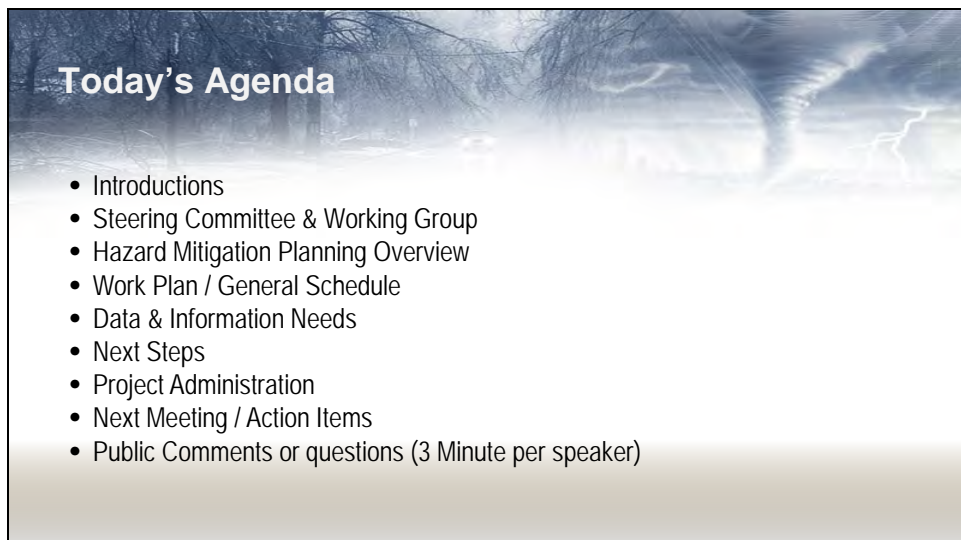
developed occurred when literally thousands of voters raced to local waterways to recover the trailer and hinge. And there are large and small boats, far too many of the trailers broke down on the roadways, were hard to recover because of the absence of sufficient Road assistance and crowded Road delays. 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



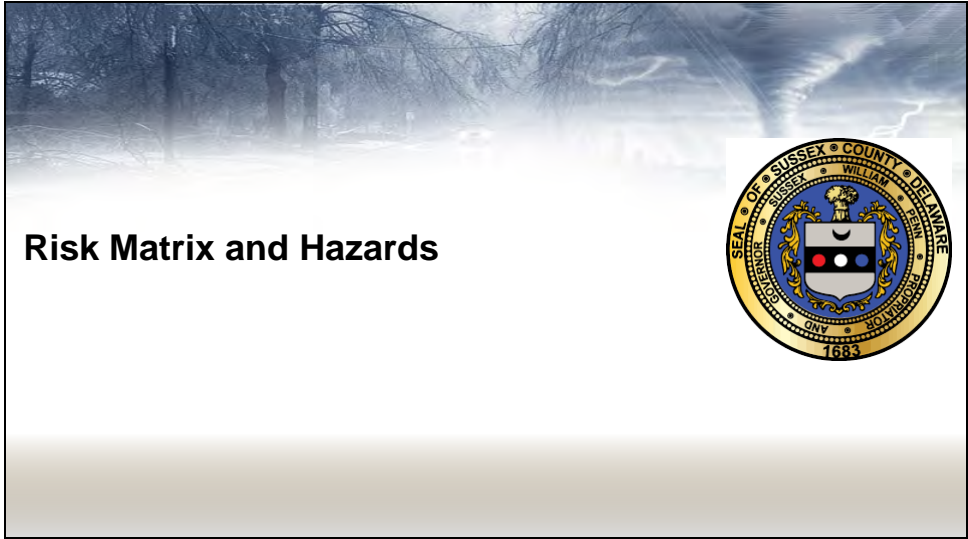
HMP Benefits

- 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).



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 |

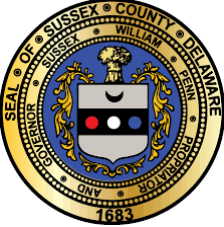
Hazards Ranking

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



The seal of Sussex County, Delaware, is circular with a gold border. The outer ring contains the text "SEAL OF SUSSEX COUNTY DELAWARE" at the top and "1683" at the bottom. The inner ring contains "SUSSEX COUNTY" at the top and "DELAWARE" at the bottom. The center features a shield with a blue field containing a white crescent moon and a red field containing a white star. Above the shield is a crest with a figure holding a staff. The shield is surrounded by a decorative wreath.

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



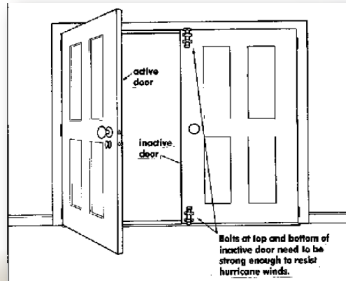
Colonial
Shutters



Corrugated
Metal Panel

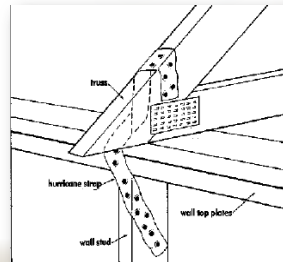
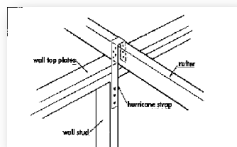
Hardening or Retrofitting of Critical Facilities

Strengthen the Doors



From Against the Wind

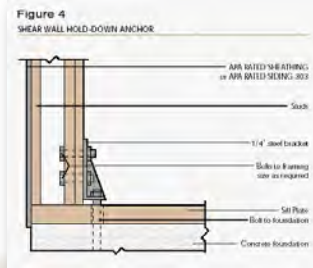
Hardening or Retrofitting of Critical Facilities



From Against the Wind

Hardening or Retrofitting of Critical Facilities

Bolt Walls to Foundation



From www.townparkconstruction.com

Hardening or Retrofitting of Critical Facilities

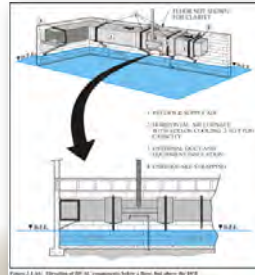
Relocate Utility Lines Underground



Fallen utility lines after Wilma. From www.galtnile.com

Hardening or Retrofitting of Critical Facilities

Elevate The Heating, Ventilating and Cooling (HVAC) Equipment, Such as Furnace and Hot Water Heater.



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.



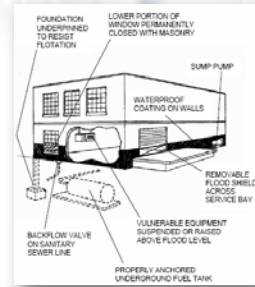
Elevated Appliances from www.louisianafloods.org



From www.louisianafloods.org

Dry Flood Proofing

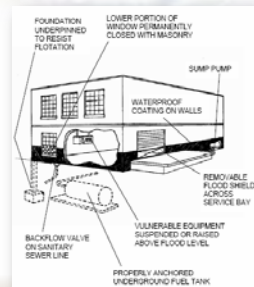
- Making the structure watertight below the level that needs flood protection.
- Requires sealing the walls and providing waterproof closures for any openings such as doors.



From FEMA, *Protecting Your Business from Flooding*

Dry Flood Proofing

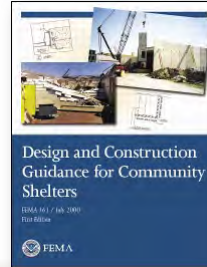
- Effective for low duration flooding with depths under 3 feet.
- Not effective for high velocity flooding.



From FEMA, *Protecting Your Business from Flooding*

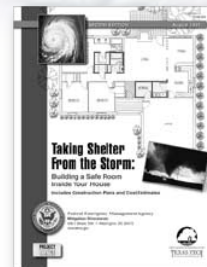
Community Shelters?

- 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.



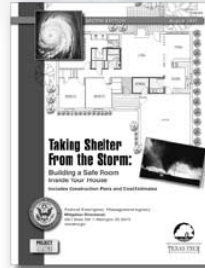
Shelter in Place Areas

- 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.

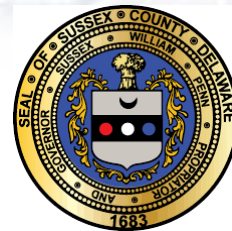


Active Threat Mitigation

- **Alert/Warning Systems**
- **Training**
 - Active Shooters
 - Terrorism
 - Civil Unrest



NEXT STEPS

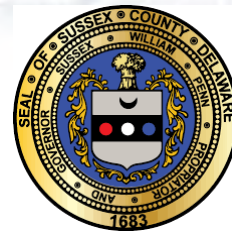


Next Steps

- **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



The seal of Sussex County, Delaware, is circular with a gold border. The outer ring contains the text "SEAL OF SUSSEX COUNTY DELAWARE" at the top and "1683" at the bottom. The inner circle features a shield with a blue top section containing a white crescent moon and a red bottom section containing a white anchor. The shield is flanked by two golden figures holding a banner that reads "WILLIAM PIERCE". Above the shield is a crest with a tree and a sun.



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

HMP Update/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 |
| 1 st 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:

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.

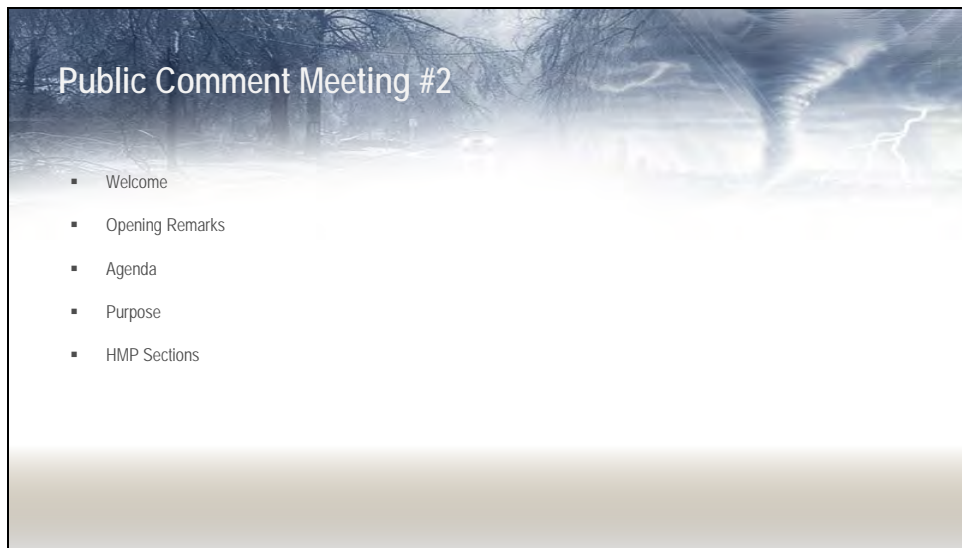
Question:

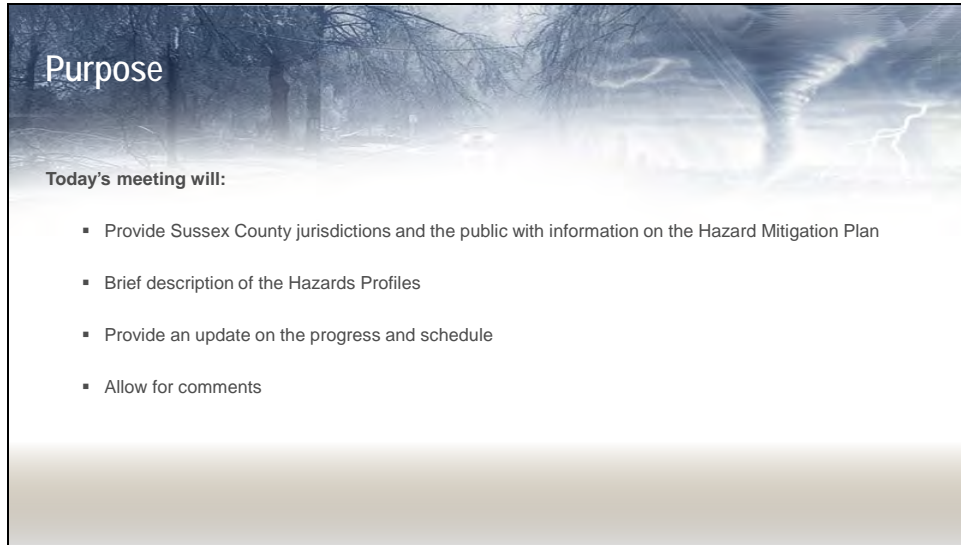
How did the public handle the two back-to-back tropical storms that happened a few years ago?

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.

HMP Update/Public Comment Meeting #2

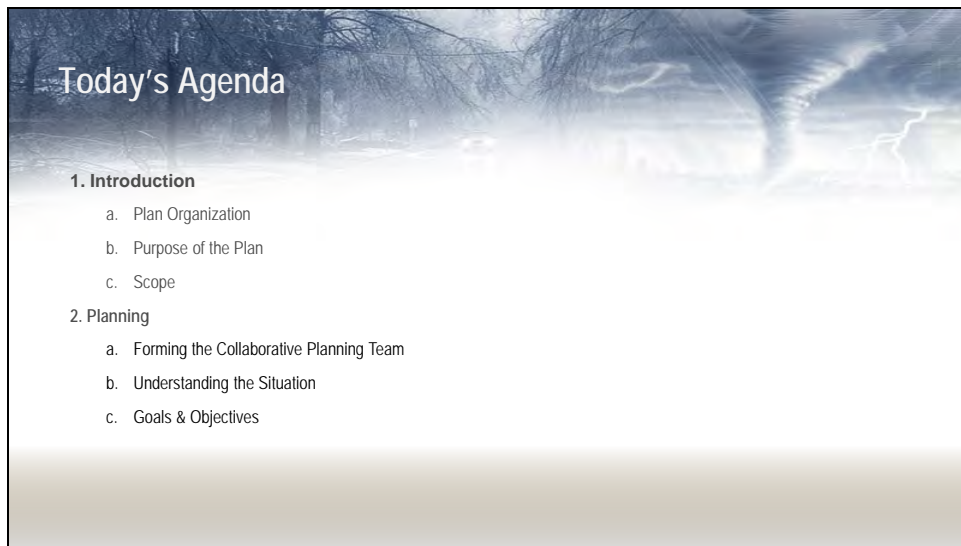




Purpose

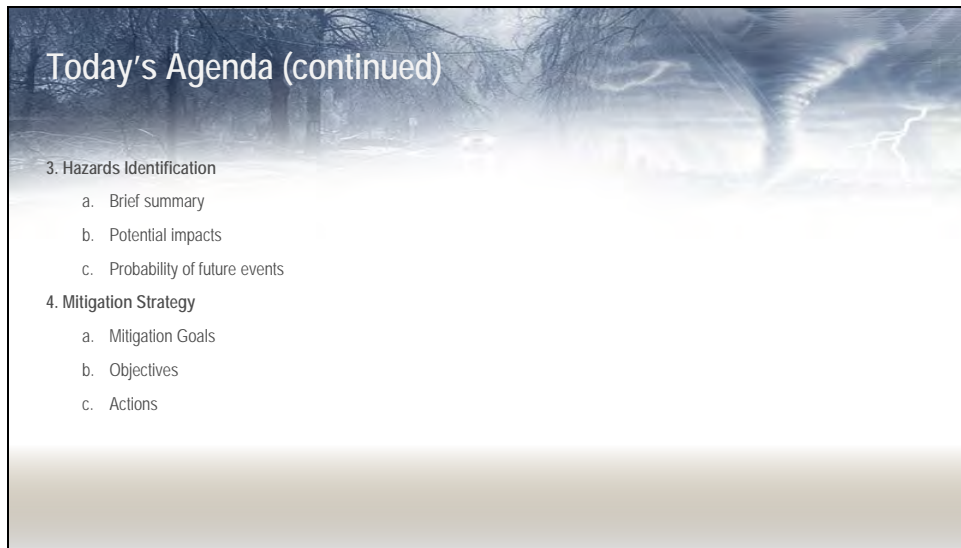
Today's meeting will:

- 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



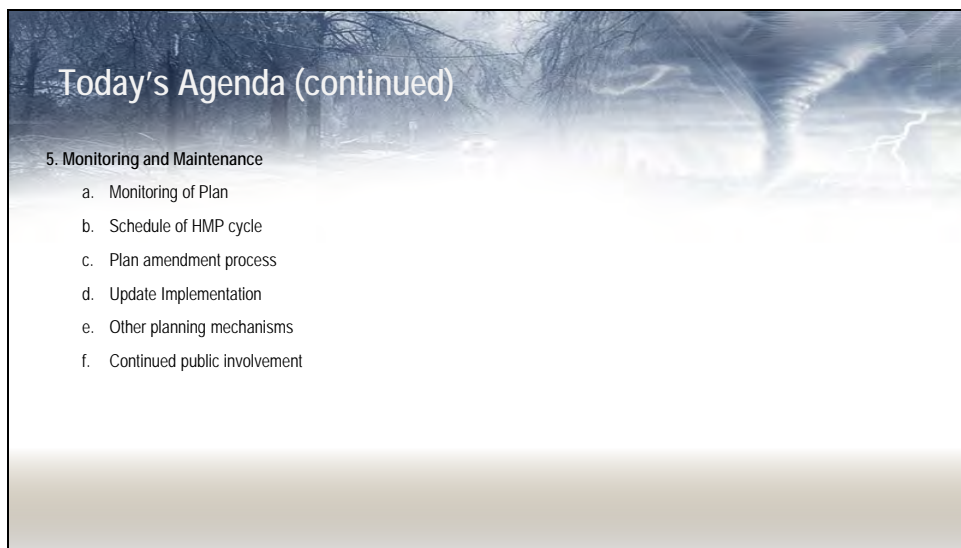
Today's Agenda

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 .

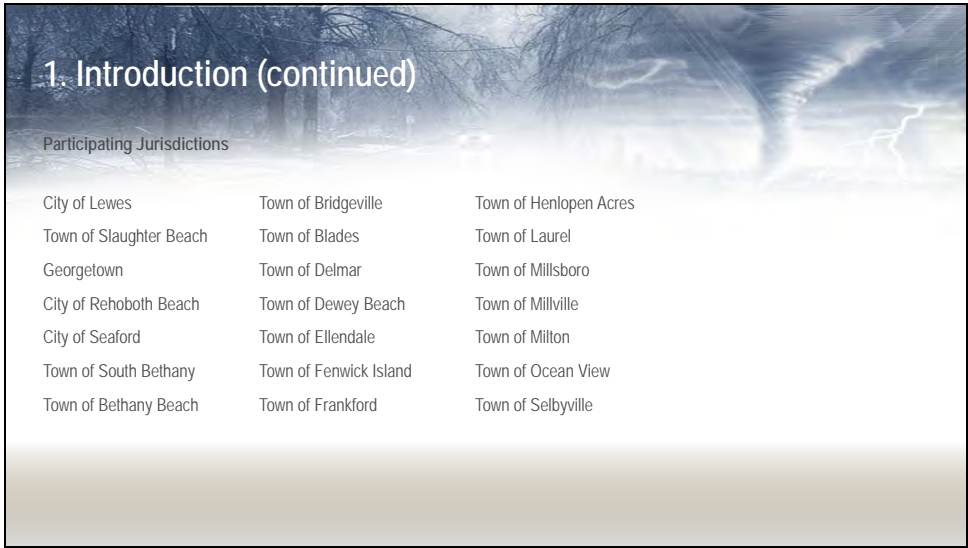


1. Introduction (continued)

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 members 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)



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: <ul style="list-style-type: none"> ▪ 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

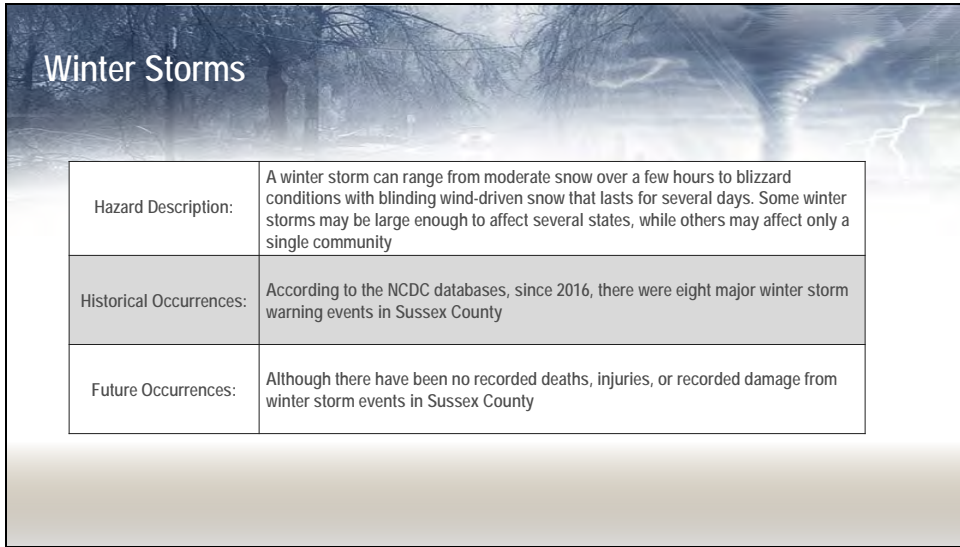
| | |
|-------------------------|--|
| Hazard Description: | A drought is defined as “a period of abnormally dry weather sufficiently prolonged for the lack of water to cause a serious hydrologic imbalance in the affected area. Droughts are extended periods of dry weather that cause problems such as crop damage, affect water supplies, and increased fire danger. <ul style="list-style-type: none"> ▪ 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 |

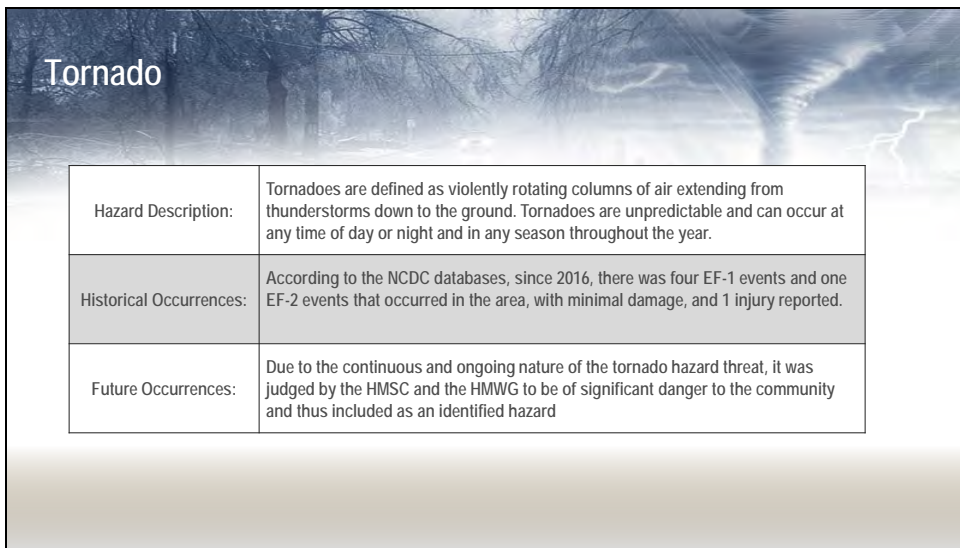
Hazmat

| | |
|-------------------------|---|
| 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: | <ul style="list-style-type: none"> ▪ 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. |



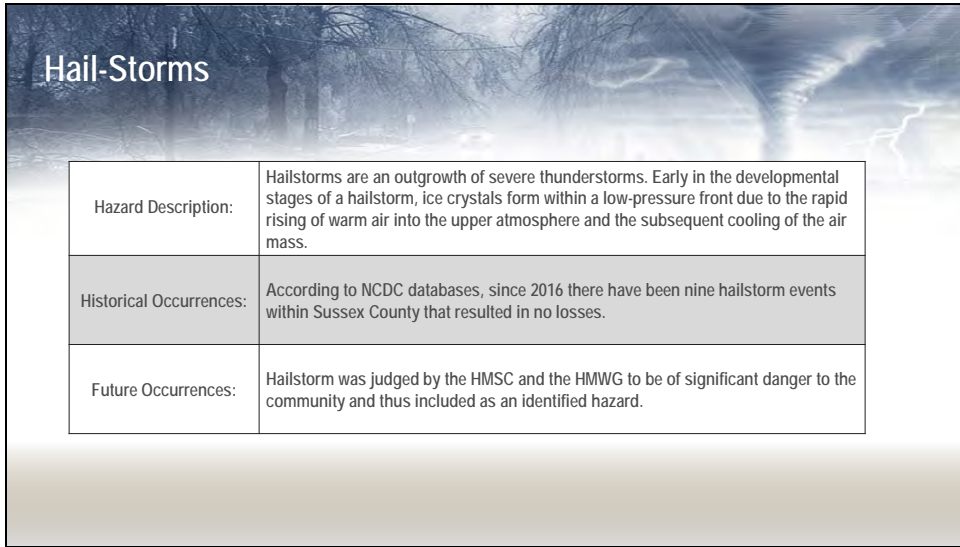
Winter Storms

| | |
|-------------------------|--|
| 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 |



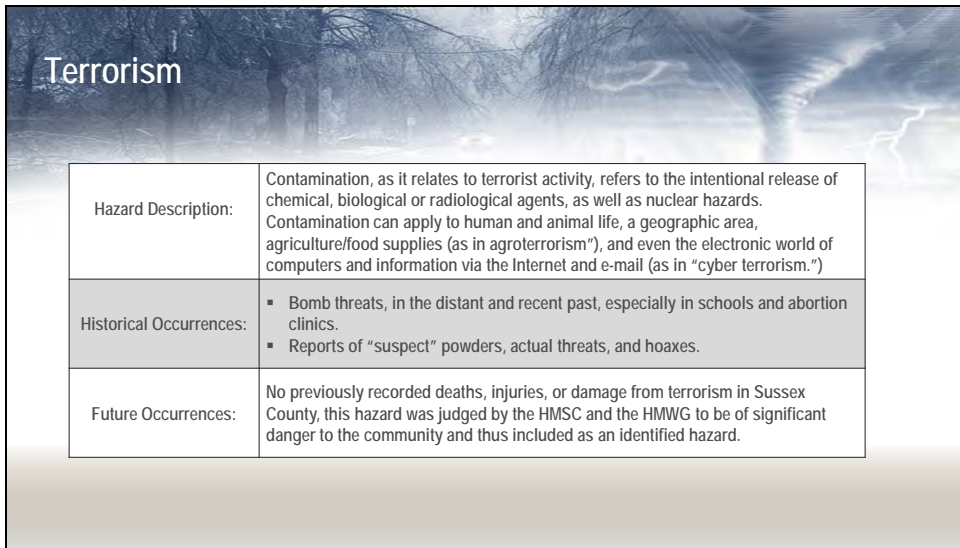
Tornado

| | |
|-------------------------|--|
| 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: | <ul style="list-style-type: none"> ▪ 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 impact of 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.

5. Plan Monitoring and Maintenance

Update Implementation

- Each jurisdiction participating in this Plan is responsible for implementing specific mitigation actions as 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.

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.

Continued Public Involvement

- Efforts to obtain public input was an integral part of the Plan Update and will continue to be essential as this Plan changes over time.

Time-Line

| | |
|-----------|---|
| 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

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 - 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

Final Project/Public Comment Meeting #3 (TBD)

Public Outreach

9/23/22, 2:10 PM

Town of Ellendale | Sussex County Delaware



(<https://ellendale.delaware.gov>)



Sussex County Hazard Mitigation Plan – Public Comment Meeting

05/02/2022 at 10:00 AM

Location:

Address:

This meeting is for the public to discuss what is an HMP, the hazards and risks that were considered and the ranking of priority based on the impacts to the community.

1. Introduction

- § Steering Committee Members
- § Hazard Mitigation Planning Members
- § Olson Group Ltd. Staff
- § Participating jurisdictions

2. Hazard Mitigation Planning Overview

- § What is a Hazard Mitigation Plan
- § Why is it needed

3. Hazards and Risks that were considered

- § Natural
- § Human-Caused
- § Technological

4. Problem Statements used to Identify Hazards

1

9/23/22, 2:10 PM

Town of Ellendale | Sussex County, Delaware

- 5. Impact considerations
- 6. Hazard Matrix
- 7. Prioritization of identified Hazards
- 8. Public Comments
- 9. Questions

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting (https://teams.microsoft.com/l/meetup-join/19%3ameeting_MjNhNWNlZjMtN2UxZS00ZjlmLWE4NzQtNDUwMmYzY2RkY2Qz%40thead.v2/0?context=%7b%22id%22%3a%22c8c63ca8-eba2-456f-9bfc-c5df244a79ad%22%2c%22oid%22%3a%2209ff07d1-a5ed-4d1c-a394-4a44e6e77d79%22%7d)

Or call in (audio only)

+1 469-998-6211,,981912905# (tel:+14699986211,,981912905#) United States, Dallas

Phone Conference ID: 981 912 905#

Find a local number (<https://dialin.teams.microsoft.com/d49de970-da4a-4b6a-8d4d-3d65cf8c041e?id=981912905>) | Reset PIN (<https://mysettings.lync.com/pstnconferencing>)

SEP 2022

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| 28 | 29 | 30 | 31 (https://ellendale.delaware.gov/events/2022-08-31/) | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 (https://ellendale.delaware.gov/events/2022-09-07/) | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 (https://ellendale.delaware.gov/events/2022-09-21/) | 22 | 23 | 24 (https://ellendale.delaware.gov/events/2022-09-24/) |
| 25 | 26 | 27 | 28 | 29 | 30 | 1 |

🕒 OFFICE HOURS:

Monday–Thursday: 9:00AM to 12:00PM

Have Questions? [Email us.](#) ✉

<https://sussexcountyde.gov/all-hazard-mitigation-plan-update-comment-form>

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All Hazard Mitigation Plan Update Comment Form

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Email Address *

Phone Number

Comments *

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▶ 2018 Comprehensive Plan Update
▶ ADA Compliance
▶ County Council
▶ Council Chambers Broadcast
▶ County Facility Use Application

▶ DelDOT Initiatives
▶ Employment
▶ Forms Library
▶ Hours & Holidays
▶ Inspection Request Form

▶ Marriage Licenses
▶ News Releases
▶ Non-Profit Grant Program
▶ Online Deeds
▶ Planning & Zoning

▶ Request for Litter Clean Up
▶ Self-Service Portal
▶ Sewer & Water Emergencies
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THE TOWN OF Fenwick Island

SEP 2022

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☰ Listen ▶

Sussex County Hazard Mitigation Plan Public Comment Meeting #1

05/02/2022 - 10:00 AM
Location:
Address:

Sussex County Hazard Mitigation Plan Public Comment  

To call into the meeting use the number and conference ID below:

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<https://fenwickisland.delaware.gov/events/sussex-county-hazard-mitigation-plan-public-comment-meeting-2/>

Government - Departments - Police - Beach Patrol Community - Flood Information Contact -



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Sussex County Hazard Mitigation Plan Public Comment Meeting #2

05/17/2022 - 03:30 PM
Location:
Address:

Microsoft Teams meeting
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Or call in (audio only)
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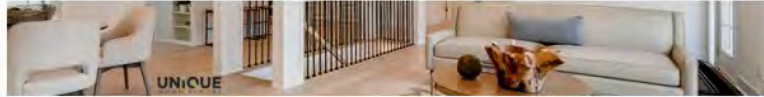
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<https://sussexreview.com/stories/624820383-sussex-county-hazard-mitigation-plan-to-be-held-may-2>

Sussex Review

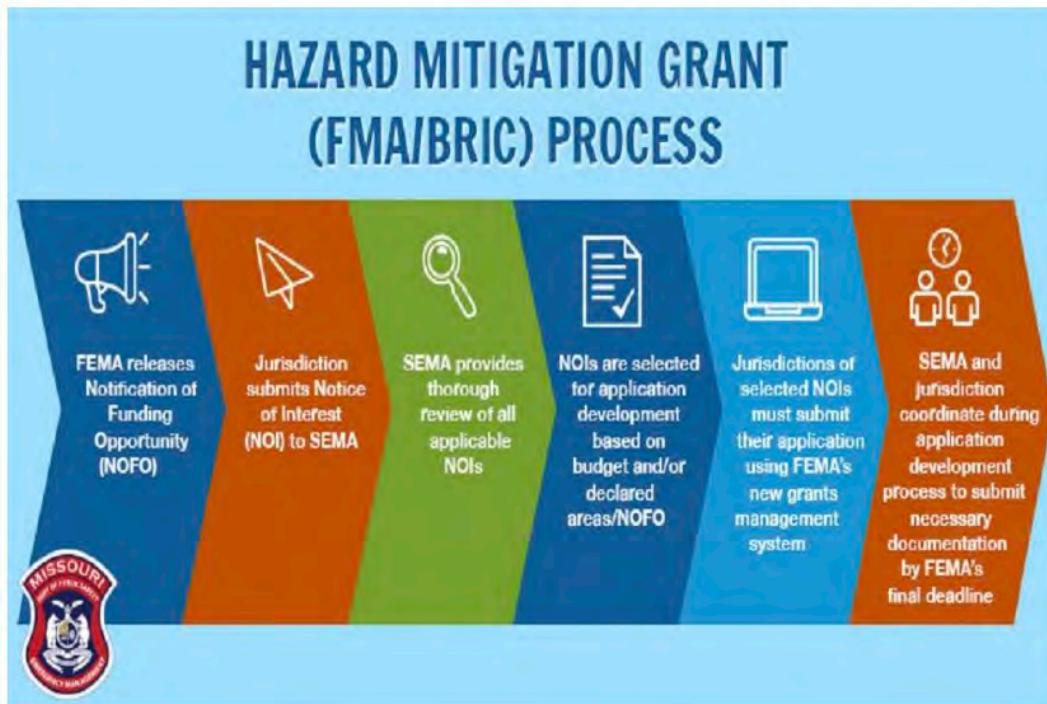
Friday, September 23, 2022

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Sussex County Hazard Mitigation Plan to be held May 2

LOCAL GOVERNMENT



By Press release submission
May 2, 2022

Town of Bethany Beach recently issued the following announcement.

Sussex County Hazard Mitigation Plan

Date:

May 2, 2022

Time:

10:00 AM

Time Details:

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Town of Bethany Beach

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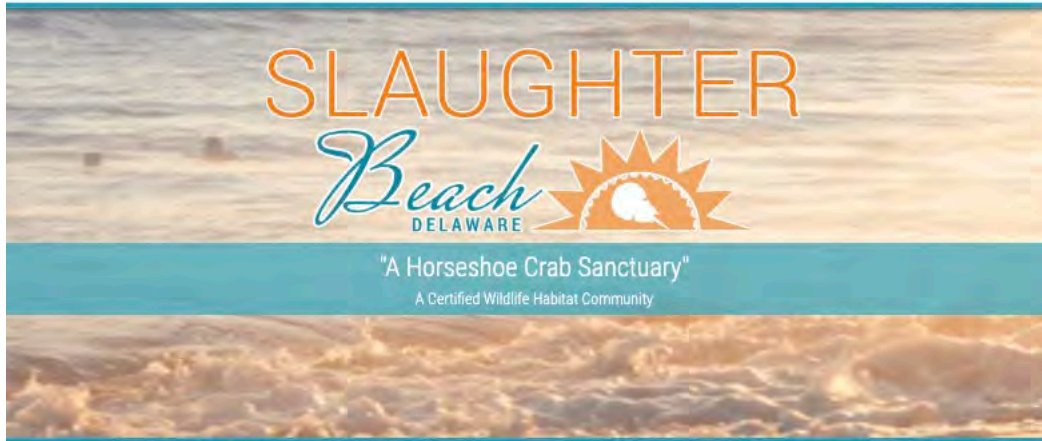
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1/3

<https://slaughterbeach.delaware.gov/2022/05/01/sussex-county-to-host-all-hazards-plan-meeting-may-2nd/>

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SEP 2022

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Council's Corner

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Sussex County to host all-hazards plan meeting May 2nd

Date Posted: Sunday, May 1st, 2022

Hazard Mitigation Plan Meeting: Due to the unexpected high interest in the HMP Meeting Sussex County has decided to hold two separate meetings. Today's meeting (April 22nd) will be a meeting for the Steering and Work Group and will not allow for public comment. They will hold an additional meeting on May 2, 2022, from 1:00 p.m. to 2:00 p.m. This meeting will include a slide presentation to the public covering all Agenda items they have previously published. At this meeting the public will be allowed to make public comments, they will allow for a maximum of three minutes per person. The May 2nd meeting will be held virtually only. The meeting is being held at the County Emergency Operations Center (EOC), which is currently undergoing renovation and is not open to the public. Sorry for the late notice regarding this meeting, but it has been a changing situation.

To access this meeting:
 via Microsoft Teams meeting
Join on your computer or mobile app [click here to join the meeting](#)

Or call in (audio only)+1 469-998-6211,,981912905#

More information can be found at this [Sussex County Link](#)

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 357 Bay Ave
 Slaughter Beach, DE 19963
 Ph: (302) 424-7559



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<https://www.capegazette.com/article/sussex-updating-hazard-mitigation-plan/238966>

9/23/22, 2:21 PM

Sussex updating hazard mitigation plan | Cape Gazette



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Sussex updating hazard mitigation plan

Public can provide input during upcoming virtual presentation May 2

April 28, 2022

The Sussex County Emergency Operations Center invites residents and property owners to attend an upcoming virtual public meeting to offer ideas and comments on a federally required update to the county's all hazard multi-jurisdictional mitigation plan.

The meeting will be held from 10 to 11 a.m., Monday, May 2, during a Microsoft Teams virtual session. The public can view and participate in the meeting by going to <https://bit.ly/3OFLX6K> (<https://bit.ly/3OFLX6K>); for those without computer access, a dial-in option is available by calling 469-998-6211 and entering the passcode 981 912 905 followed by the # key. There is no physical meeting location.

The hazard mitigation plan, first adopted in 2005 and updated most recently in 2017, serves as a comprehensive, long-term planning tool used to identify various strategies local emergency planners would use in the event of a disaster. The overall goal of the effort is to reduce or eliminate the loss of human life and damage to property as a result of hazards, both natural and manmade.

Local jurisdictions must update their plans every five years. As part of that process, the public has the opportunity to review the plan, offer input, and help shape the update. County emergency planners intend to present updated mitigation actions for the plan revision later this summer.

For more information, to view the current plan, or offer comments in advance, go to www.sussexcountyde.gov/all-hazard-mitigation-plan (<http://www.sussexcountyde.gov/all-hazard-mitigation-plan>). For more information, contact Sussex County Emergency Operations Director Joe Thomas at 302-855-7801.

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HOME PAGE

Sussex County Hazard Mitigation Plan

By townofbethanybeach.com | 5 months ago



Monday, May 2, 2022 Sussex County [Hazard Mitigation Plan](#) Public Comment Meeting #1 May 2, 2022, at 10am Location: Microsoft Teams meeting
Join on your computer or mobile app Or call in (audio only) +1 469-998-6211,,981912905# United States, Dallas Phone Conference ID: 981 912 905#
AGENDA Sussex County Hazard Mitigation Plan Public Comment Meeting #1 May 2, 2022, at 10am Introduction Steering...

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<https://www.wgmd.com/tag/sussex-county-all-hazard-multi-jurisdictional-mitigation-plan/>

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Sussex Countians and property owners can weigh in today (Monday, May 2nd) on the required update to the County's All Hazard Multi-Jurisdictional Mitigation Plan. The plan was first...

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March 31, 2021

Re: Privacy Act Request for FEMA Files/Information

Dear Federal Insurance Directorate Assistant Administrator or FID Deputy Assistant Administrator:

I am writing to request that the Federal Emergency Management Agency (FEMA) provide me with information regarding the following information for each community in the County of Sussex, Delaware, and for properties in the unincorporated area of the County of Sussex; total NFIP policies in force by jurisdiction, number of repetitive loss and severe repetitive loss properties and claim information for each by year and jurisdiction. We do not seek property-specific data and ask that any property-specific data be removed.

My office seeks to utilize the information to revise the Sussex County Multi-Jurisdiction Hazard Mitigation Plan. Specifically, The County of Sussex is the primary jurisdiction providing hazard mitigation planning support for all municipalities and the County of Sussex under 44 C.F.R. Part 201 and 44 C.F.R. Part 77. We need this information from FEMA to document community flood risk and repetitive loss concerns and mitigation efforts as part of the Multi-Jurisdictional hazard mitigation planning process. Therefore, I request that the above information be provided under the "routine use" provision of the Privacy Act of 1974, 5 U.S.C. 522a. I am requesting disclosure of this information under Routine Use (T) to community officials and representatives to provide repetitive loss records of properties within that community.

My office will not further disclose this information to other entities or use the information other than that stated above. The applicant's information will be protected per the Privacy Act of 1974. Once the Personally Identifiable Information is utilized for the legitimate and appropriate purposes stated above, the further transmission of these data files, electronic and analog/paper, will cease, and the personal information contained therein will be destroyed.

If you or your staff have any questions or need additional information about this matter, don't hesitate to contact me at (302) 855-7801. Sincerely,

Joseph L. Thomas, Director

Sussex County Emergency Operations

APPENDIX D: STAKEHOLDER SURVEY

Sussex County Delaware Survey



Image courtesy Sussex County Government

Sussex County Delaware 2022 Hazard Mitigation Plan (HMP)

1. Personal Information

| | |
|-------------------|------------------|
| Name * | Email * |
| Phone * | Position Title * |
| Agency/Locality * | |

2. Threat and Hazard Identification for Sussex County Delaware 2022

The following are the Threats and Hazards that were identified in the 2016 Hazard Mitigation Plan (HMP). The following survey will ask you to rank them from highest priority to lowest priority, the likelihood of the event occurring, and the impacts on buildings and structures, and the economy.

3. Ranking Order of Threats and Hazards.

Please click on the Threat or Hazard and move them up or down to put them in rank order. (1 being the highest priority and 17 being the least priority.)

| | |
|----|---------------------------------------|
| 1 | Other |
| 2 | Dam/Levee Failure |
| 3 | Drought |
| 4 | Erosion |
| 5 | Earthquake/Geological |
| 6 | Extreme Heat/Cold |
| 7 | Flooding |
| 8 | Hailstorms |
| 9 | HAZMAT |
| 10 | Hurricane Winds (straight Line Winds) |
| 11 | Pipeline Failure |
| 12 | Terrorism |
| 13 | Thunderstorms |
| 14 | Tornado |
| 15 | Tsunami |
| 16 | Wildfire |
| 17 | Winter Storm (Severe Weather) |
| 18 | Active Shooter (School/Crowds) |
| 19 | Cyber Attack (Infrastructure) |

| | |
|----|---------------------------|
| 20 | Cyber Attack (Ransomware) |
|----|---------------------------|

4. Disaster-Likelihood of Risk.

Identify the likelihood of risk for each threat or hazard.

| ▪ | High (75-100%) | Medium (25-75%) | Low (0-25%) |
|--|--------------------------|--------------------------|--------------------------|
| ▪ Other | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Dam/Levee Failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Drought | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Erosion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Earthquake/Geological | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Extreme Heat/Cold | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Flooding | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Hailstorms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ HAZMAT | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Hurricane Winds (straight Line Winds) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Pipeline Failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Terrorism | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Thunderstorms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Tornado | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Tsunami | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Wildfire | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | | | |
|----------------------------------|--------------------------|--------------------------|--------------------------|
| ▪ Winter Storm (Severe Weather) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Active Shooter (School/Crowds) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Cyber Attack (Infrastructure) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Cyber Attack (Ransomware) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

5. Disaster-Level of Impact on buildings, structures, and homes.

Catastrophic: Beyond repair/ cannot use

Critical: Substantial repair/cannot use for an extended period

Marginal: Moderate repairs/limited use while being repaired

Negligible: Minor repairs/ full use

| ▪ | ▪ Catastrophic (Beyond Repair) | ▪ Critical (Substantial Repair) | ▪ Marginal (Moderate Repairs) | ▪ Negligible (Minor Repairs) |
|-------------------------|--------------------------------|---------------------------------|-------------------------------|------------------------------|
| ▪ Other | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Dam/Levee Failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Drought | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Erosion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Earthquake/Geological | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Extreme Heat/Cold | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| ▪ Flooding | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Hailstorms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ HAZMAT | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Hurricane Winds (straight Line Winds) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Pipeline Failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Terrorism | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Thunderstorms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Tornado | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Tsunami | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Wildfire | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Winter Storm (Severe Weather) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Active Shooter (School/Crowds) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Cyber Attack (Infrastructure) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Cyber Attack (Ransomware) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

6. Disaster-Level of Impact on the local economy.

- Catastrophic: Total loss of economy (business will not recover)
 - Critical: Substantia Loss (3-5 years for recovery)
 - Marginal: Moderate Loss (> 1 year for recovery)
- Negligible: Minor Loss (<1 year for recovery)

| ▪ | ▪ Catastrophic (No Recovery) | ▪ Critical (3-5 years) | ▪ Marginal (>1 year) | ▪ Negligible (<1 year) |
|---|------------------------------|--------------------------|--------------------------|--------------------------|
| ▪ Other | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Dam/Levee Failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Drought | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Erosion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Earthquake/Geological | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Extreme Heat/Cold | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Flooding | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Hailstorms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ HAZMAT | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Hurricane Winds (straight Line Winds) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Pipeline Failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Terrorism | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Thunderstorms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Tornado | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Tsunami | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Wildfire | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Winter Storm (Severe Weather) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | | | | |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| ▪ Active Shooter (School/Crowds) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Cyber Attack (Infrastructure) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ▪ Cyber Attack (Ransomware) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

7. Additional Threats or Hazards

- Please identify any new threats or hazards: The level of threat or hazard, the level of risk for each threat or hazard, and the severity of impact on operations (Use Open Text).



We appreciate your time and contribution to the survey process. If you have any questions or pertinent information please do not hesitate to contact:

Adam Montella - amontella@olsongroupltd.com; 813-355-7988

Andrew Forcucci - aforcucci@olsongroupltd.com; 563-581-5775

Scott T Sleeman - ssleeman@olsongroupltd.com; 512-534-1878

APPENDIX E: ADOPTION RESOLUTIONS

Contents of this section

- D.1 Sussex County
- D.2 Municipalities

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]

APPROVAL AND ADOPTION OF RESOLUTION
Sussex County, Delaware All-Hazards Mitigation Plan

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:

[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.

[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)].

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.

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 F: FORMAL APPROVAL LETTERS FOR SUSSEX COUNTY AND PARTICIPATING JURISDICTIONS

Contents of this section

E.1 Sussex County

E.2 Jurisdictions

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]