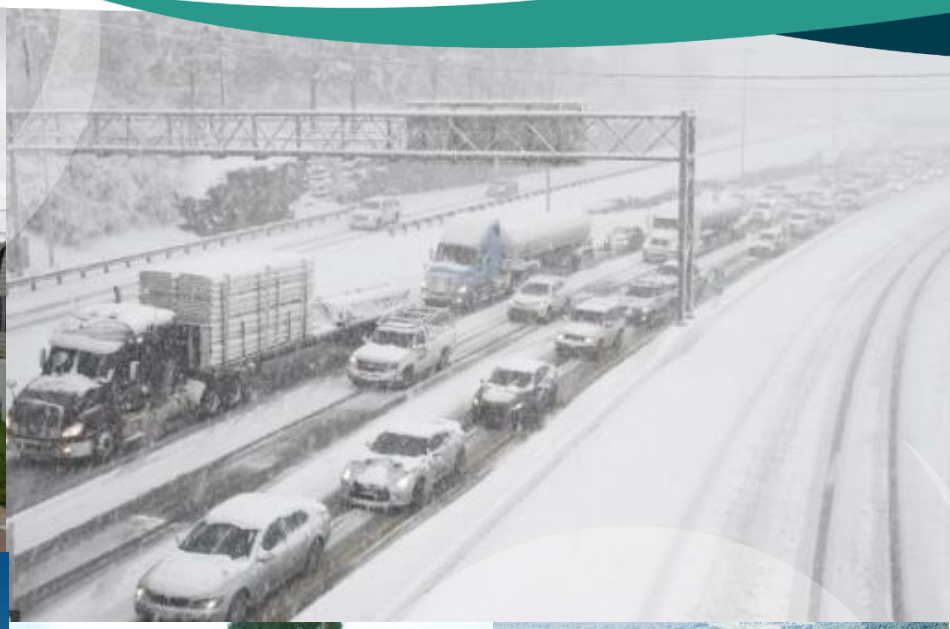

2021 Hazard Mitigation Plan Update

Kent County, Delaware

VPC VISION PLANNING AND CONSULTING

KENT COUNTY LEVY COURT PUBLIC SAFETY

March 2021

2021 Hazard Mitigation Plan
Kent County, Delaware

Source: https://www.visitdelaware.com/listings/capital-square-legislative-hall/62/

March 2021

Acknowledgements
This Hazard Mitigation Plan was prepared under the guidance of the Kent County Department of Public Safety, Emergency Management Division, and the Steering Committee, The members of the Steering Committee are listed in Chapter 3.

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Cover Page Photo Sources: 1) Delmarva Public Media 2) Delaware State Police 3) Town of Bowers Beach 4) Delaware Dept. of Natural Resources 5) Town of Farmington Facebook

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

<table>
<tr><td>Jurisdiction:
Kent County, Delaware</td><td colspan="2">Title of Plan:
2020 Kent County Hazard Mitigation Plan</td><td>Date of Plan:
January 13, 2021
Resubmit on March 16, 2021</td></tr>
<tr><td colspan="2">Local Point of Contact:
Brandon Olenik</td><td colspan="2" rowspan="3">Address:
911 Public Safety Blvd.
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<tr><td colspan="2">Agency:
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302-735-2201</td><td colspan="2">E-Mail:
brandon.olenik@co.kent.de.us</td></tr>
</table>

State Reviewer:	Title:	Date:

FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region ***(insert #)***		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:

REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** **(section and/or**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Pg. 40-47, Appx C		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Pg. 40-47, Appx C		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Pg. 46		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Pg. 38, 133, 187		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Pg. 182		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Pg. 180-185		
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Pg. 48-103		

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Pg. 48-103 (Past Occurrences subsection for each hazard)		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Page 104-131 (Inventory and Summary of Vulnerable Assets and Estimate of Losses sections for each hazard) Appendix F		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Pg. 150-152		
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Pg. 133-153		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Pg. 156-158, Appx C		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Pg. 154-155		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Pg. 154 – 179		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Pg. 154 – 179		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Pg. 133-153		
ELEMENT C: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Pg. 34-38		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Pg. 159 – 179		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Pg. 159 – 160		
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	N/A		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	N/A		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:

PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan.

The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*
4)

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*

- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

1.0 CHAPTER 1 – INTRODUCTION

1.1 Overview of Hazard Mitigation

In an effort to reduce the Nation's mounting natural disaster losses, the United States Congress passed the Disaster Mitigation Act of 2000 (DMA 2000 or DMA2K) to provide new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for state and local entities to closely coordinate mitigation planning and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for Federal mitigation grant funds.

This 2020 Plan Update is conducted in coordination with the Federal Emergency Management Agency (FEMA) and the Delaware Emergency Management Agency (DEMA) to ensure that it meets all applicable DMA 2000 planning requirements. A Local Mitigation Plan Review Tool, included in the Plan Update, provides a summary of FEMA's current minimum standards of acceptability, and notes the location within this Plan where each planning requirement is met.

Hazard Mitigation is defined by the Federal Emergency Management Agency (FEMA) as "sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects". The hazard mitigation planning process involves the coordination of actions taken to reduce injuries, deaths, property damage, economic losses, and degradation of natural resources due to natural and human-caused disasters. Hazard mitigation is considered one of four phases in emergency management activities. This includes:

- Preparedness - activities that involve planning and preparing for when a disaster strikes and include response capability actions to ensure an effective and efficient use of resources and efforts to minimize damage.
- Mitigation - activities that involve actions that reduce or eliminate the probability of an occurrence or reduce the impact of a disaster. The goal of the mitigation phase is to decrease the need for a respective response.
- Response - activities that involve providing emergency assistance to victims and minimizing property loss and can include preliminary or initial damage assessments. The response phase begins during or immediately after the onset of a disaster and informs the recovery process.
- Recovery - activities that include short and long-term activities that help return individuals and communities to normalcy as soon as possible. Recovery actions involve clean-up efforts, temporary housing, and repair or replacement of infrastructure.

1.2 Background

The original Hazard Mitigation Plan (HMP) for Kent County was developed in 2009 for Kent County and its 20 cities/towns, respectively. The Initial Plan document included the planning process, community profile, hazard identification and analysis, vulnerability assessment, capability assessment, mitigation strategy, and plan maintenance sections. The 2015 Plan Update served as an update to the 2009 Plan and elaborated upon the various hazards and vulnerabilities that had been investigated and mitigation actions were revisited to track progress. This 2020 Plan Update is an update to the 2015 Plan Update.

1.3 Purpose

This 2020 Plan Update is intended to enable the County and its cities/towns to effectively respond to hazards as they occur and reduce the potential risks of these hazards to the health, safety, and welfare of the residents. The overall goal for the Update is to continue to allow Kent County municipalities to be eligible for a range of financial assistance following hazard events.

The 2020 Plan Update consists of a thorough review of the 2015 Plan, which was used as a base document, with each chapter updated as and where necessary. The Plan Update involves the review of data on potential hazards and reprioritization of these hazards in terms of frequency, severity, and impacts. This Plan Update includes a review of the county profile, county and municipal capabilities, county, and municipal mitigation actions, which were revised, deleted, or modified to address the high priority hazards, and a Plan Maintenance and Monitoring section.

1.4 Scope

In July of 2020, Kent County Levy Court contracted with Vision Planning and Consulting (VPC) from Fulton, Maryland to develop the Plan Update in compliance with the requirements of the Disaster Mitigation Act of 2000. This Hazard Mitigation Plan Update was funded by Hazard Mitigation Assistance (HMA) funds from FEMA and administered by DEMA. This Plan Update is a multi-jurisdictional plan that covers Kent County and its 20 cities/towns municipalities.

It must be noted that future funding for mitigation projects will be contingent upon having each municipality/jurisdiction in Kent County adopt the Plan after the County adopts the Update. Any jurisdiction that does not adopt the 2020 Plan Update may become ineligible for pre- and post-disaster mitigation funds.

1.5 Organization of the Plan

The Hazard Mitigation Plan Update comprises eight (8) chapters. Chapter 1 provides an introduction to the plan update process and organization. Chapter 2 provides an overview of the geographic, socio- economic, and demographic characteristics. Chapter 3 discusses the planning process; Chapter 4 comprises the hazard identification and risk assessment. Chapter 5 contains a capability assessment including a review of existing plans and ordinances from the counties and municipalities. Chapter 6 discusses the mitigation strategy including updated mitigation goals and objectives, mitigation actions, and the method for prioritization and implementation of mitigation actions. Chapter 7 outlines how Kent County and its municipalities will implement the Plan once it is adopted and ways to monitor progress and ensure continued public involvement, and Chapter 8 discusses plan adoption. This Plan Update also includes six (6) supporting appendices.

1.6 Authority and References

Authority for this Plan originates from the following federal sources:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, as amended;
- Code of Federal Regulations (CFR), Title 44, Parts 201 and 206; and
- Disaster Mitigation Act of 2000, Public Law 106-390, as amended.

Authority for this Plan originates from the following Delaware sources:

- State of Delaware All-Hazard Mitigation Plan, revised August 2018.

The following Federal Emergency Management Agency (FEMA) guides and reference documents were used to prepare this document:

- FEMA. Local Mitigation Planning Tool and Guide. March 2012.
- FEMA. Local Mitigation Planning Handbook. March 2013.

2.0 CHAPTER 2 - COMMUNITY PROFILE

2.1 History

In 1670 English began to settle in the valley of St. Jones River, formerly known as Wolf Creek. A decade later in 1680, the Duke of York chartered St. Jones County, which was carved out of New Amstel (New Castle County) and Hoarkill (Sussex County). St. Jones County was transferred to William Penn in 1682 and became part of Penn's newly chartered Delaware Colony.

On the orders of William Penn for a court town to be laid out, a courthouse was built in 1697. The town of Dover, named after Dover in England's Kent, was laid out in 1717 and became the capital of Delaware in 1777. Delaware became "the First State" by being the first to ratify the U.S. Constitution in 1787. During the 18th Century, Kent County was known to be a small grain farming region.

2.2 Geography

Kent County is the central county in Delaware and is bordered by New Castle County (Delaware) to the north, Maryland to the west, Sussex County (Delaware) to the south, and Delaware Bay and Atlantic Ocean to the east. The county's location affords easy access to the major metropolitan areas of the North East United States – the cities of Baltimore, New York, Philadelphia, and Washington D.C. are all approximately within a two-hour drive or less. Kent County covers a total area of 798 square miles, of which 586 square miles is land and 212 square miles is water.[1]

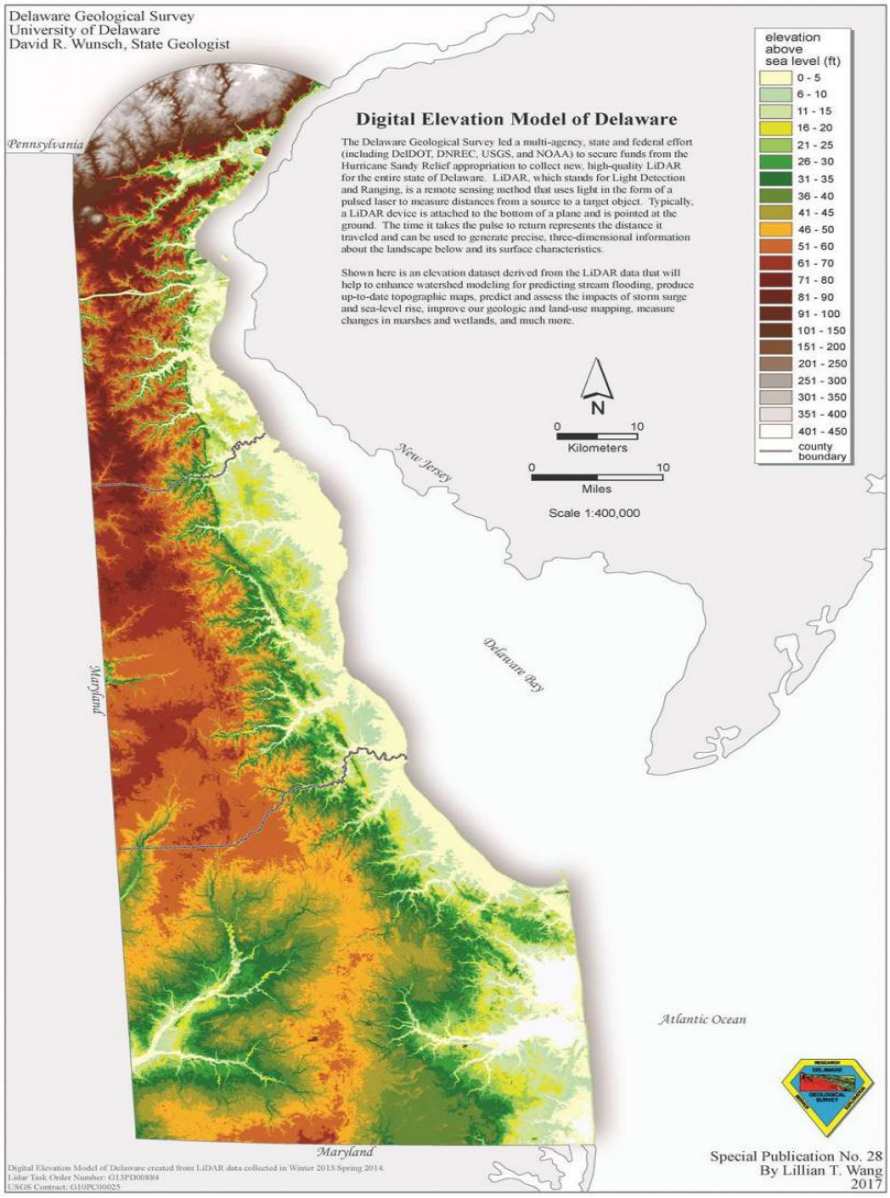
Like all of Delaware's counties, Kent County is subdivided into 'Hundreds'. Hundreds are unincorporated subdivisions of counties that were once used as a basis for representation in the Delaware General Assembly and originate from the times when Delaware and Maryland were colonial holdings of Great Britain.[2] Originally apportioned into six Hundreds, today the County has eight Hundreds: Duck Creek, Little Creek, Kenton, Dover, North Murderkill, South Murderkill, Milford and Mispillion.

2.2.1 Climate

Kent County has a moderate climate, with an average annual temperature of 57 degrees Fahrenheit. The mean daily temperature ranges from 35 degrees in January to 78 degrees in July. The normal annual rainfall is 46 inches per year and the annual snowfall totals approximately 16 inches a year.

[1] https://www2.census.gov/geo/docs/maps-data/data/gazetteer/2019_Gazetteer/2019_gaz_counties_10.txt
[2] https://delgensoc.org/cpage.php?pt=35

Figure 2.1 Elevation Map of Delaware



Source: Delaware Geological Survey

2.2.2 Physical Features

The area's topography is generally flat, ranging from sea level along the shores of the Delaware Bay and Atlantic Ocean to approximately 80 to 85 feet above sea level along the western edge of the County (Figure 2.1).[3] Geologically, Kent County is a part of the "Coastal Plain Province" which is composed of overlapping beds of unconsolidated or semi-consolidated clay, silt, sand, and gravel. About one-third of the region is wooded with about equal divisions between soft and hard woods.

[3] https://www.dgs.udel.edu/publications/sp28-digital-elevation-model-delaware

The Delaware Bay is the area's most marked natural feature. Most of the bay coastline in Kent County is marsh and forms the Bombay Hook National Wildlife Refuge and other important wildlife areas. Kent County also has several waterways that flow through it, including the Murderkill River, Leipsic River Choptank River, the Saint Jones River, Marshy Hope Creek, and Silver Lake.

Figure 2.2 Geographic map of Kent County (left), Watersheds of Kent County (right)

Source: gisgeography.com

Source: Delaware DNREC

2.2.3 Watersheds

Most of Kent County lies within the Delaware River Basin. The Delaware River's main stem is 330 miles long and extends from the confluence of its east and west branches at Hancock, New York to the mouth of the Delaware Bay just south of Wilmington. The western part of Kent County drains into the Chesapeake Basin. Figure 2.2 illustrates the rivers that flow through Kent County and their respective watersheds.

The specific tributaries in Kent County that feed the Chesapeake Bay and Delaware Bay include:

- Leipsic River
- Little Creek
- St. Jones River
- Murderkill River
- Chester River
- Choptank River
- Marshyhope River

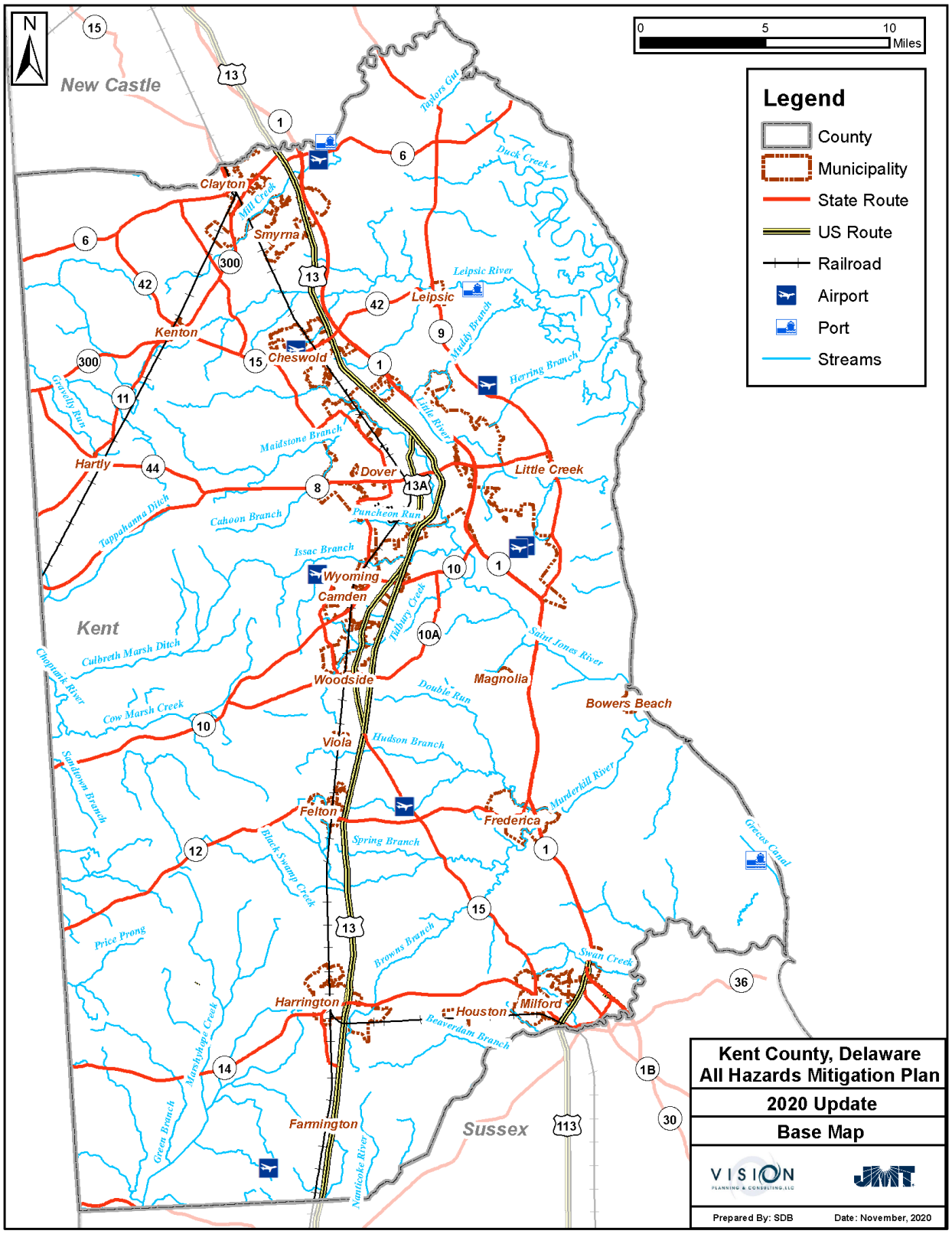
2.2.4 Municipalities/Jurisdictions

Kent County has three cities, and 19 towns. These incorporated cities and towns are listed in Table 1. The county seat is the City of Dover, which is Delaware's state capital and the largest city in Kent County. Figure 2.3 shows the Kent County Base Map, including waterways, major transportation routes, and locations of cities and towns.

Table 2.1 Jurisdictions of Kent County

Cities	
Dover	Milford
Harrington	
Towns	
Bowers	Houston
Camden	Kenton
Cheswold	Leipsic
Clayton	Little Creek
Farmington	Magnolia
Felton	Smyrna
Frederica	Viola
Felton	Woodside
Frederica	Wyoming
Hartly	

Figure 2.3 Kent County Base Map



2.3 Demographics and Socio-Economic Profile

According to the US Census Bureau's 2019 population estimates Kent County has a total population of 180,786 residents.[4] The change in population from 2010 to 2019 in the County's cities and towns is illustrated in Table 2.2. Since 2010, the County's population has seen an increase of 18,476 residents, which amounts to a 11.38 percent population increase. Since 2010, all cities and towns in Kent County have experienced population growth. The city with the greatest population increase is Milford (21.95%), and the town with the greatest population increase is Clayton (19.08%).

Table 2.2 Population of Kent County Jurisdictions[5]

City	2010 Census	2015 Population Estimate	2019 Population Estimate	Percentage change 2010-2019
Dover	36,047	36,967	38,166	6.33%
Harrington	3,562	3,678	3,638	1.88%
Milford	9,559	10,597	11,732	21.95%
Town	**2010 Census**	**2015 Population Estimate**	**2019 Population Estimate**	**Percentage change 2010-2019**
Bowers	335	360	374	10.65%
Camden	3,464	3,458	3,551	2.93%
Cheswold	1,380	1,571	1,695	12.92%
Clayton	2,918	3,147	3,508	19.08%
Farmington	110	118	122	10.91%
Felton	1,298	1,366	1,414	9.95%
Frederica	774	813	849	11.27%
Hartly	74	72	76	11.76%
Houston	374	391	405	9.76%
Kenton	261	261	271	11.52%
Leipsic	183	198	205	10.22%
Little Creek	224	227	235	9.30%
Magnolia	225	282	289	8.24%
Smyrna	10,023	11,248	11,813	16.14%
Viola	157	160	165	8.55%
Woodside	181	186	193	9.66%
Wyoming	1,313	1,447	1,549	17.26%
County	**2010 Census**	**2015 Population Estimate**	**2019 Population Estimate**	**Percentage change 2010-2019**
Kent County	162,310	173,128	180,786	11.38%

The demographic breakdown of the 2019 estimates shown in Table 2.3 indicates that there is a significant percentage of the population that is 18 years of age (22.8%), as well as people 65 years

[4] https://www.census.gov/quickfacts/fact/table/kentcountydelaware/BZA210218

[5] US Census Bureau, Annual Estimates of the Resident Population for Incorporated Places in Delaware: April 1, 2010 to July 1, 2019 (SUB-IP-EST2019-ANNRES-10)

and over (17.5%). It is estimated that over half the population of Kent County (51.8%) identify as female.[6] Table 2.4 provides the racial breakdown within Kent County.

Table 2.3 Kent County Population Age Breakdown[7]

Population Group	Percentage of Total Population
Persons under 5 years	6.2%
Persons under 18 years	22.8%
Persons 65 years and over	17.5%
Persons under 65 years with a disability	10.8%

Table 2.4 Kent County Racial Breakdown[8]

Race	Percentage of Total Population
White	65.6%
Black or African American	27.3%
American Indian and Alaskan Native alone	0.7%
Asian	2.4%
Native Hawaiian and Other Pacific Islander	0.1%
Two or More Races	3.8%
Hispanic or Latino	7.4%
White, not Hispanic or Latino	60.4%

According to the U.C. Census Bureau's 2018 ACS 1-Year Estimates and as shown in Table 2.5, there are 67,841 households in the County, and an average of 2.5 persons per household.[9] There is an estimated 73,086 total housing units in the County.[10]

Table 2.5 Kent County Housing Statistics

Subject	Estimate
Total Households	67,841
Total housing units	73,086
Occupied housing units	67,841
Owner occupied	68%
Renter occupied	32%

As per the U.C. Census Bureau's 2018 ACS 1-Year Estimates, the median household income in Kent County is $54,419 (in 2018 dollars).[11] Illustrated in Table 2.6 are the corresponding income brackets

[6] https://www.census.gov/quickfacts/fact/table/kentcountydelaware/AGE135219#AGE135219
[7] https://www.census.gov/quickfacts/fact/table/kentcountydelaware/BZA210218
[8] https://www.census.gov/quickfacts/fact/table/kentcountydelaware/BZA210218
[9] https://data.census.gov/cedsci/table?q=Kent%20County,%20Delaware&tid=ACSST1Y2018.S1101&hidePreview=false
[10] https://data.census.gov/cedsci/table?q=Kent%20County,%20Delaware&t=Housing&tid=ACSDP1Y2018.DP04&hidePreview=false
[11] https://data.census.gov/cedsci/table?q=Kent%20County,%20Delaware&t=Housing&tid=ACSST1Y2018.S2503&hidePreview=false

to the number and percentage of occupied housing units in the County. It is estimated that a total of 13.8% of people in Kent County are in poverty.[12]

Table 2.6 Kent County Household Income

Income Bracket (2018 Dollars)	Occupied Housing Units	Percentage of Occupied Housing Units
Less than $5,000	2,318	3.4%
$5,000 to $9,999	1,980	2.9%
$10,000 to $14,999	3,043	4.5%
$15,000 to $19,999	2,826	4.2%
$20,000 to $24,999	4,421	6.5%
$25,000 to $34,999	7,506	11.1%
$35,000 to $49,999	8,829	13%
$50,000 to $74,999	13,025	19.2%
$75,000 to $99,999	8,680	12.8%
$100,000 to $149,999	9,795	14.4%
$150,000 or more	5,418	8%

2.4 Employment and Industry Profile

According to the U.C. Census Bureau's 2018 ACS 1-Year Estimates, there were a total of 80,288 civilians older than 16 years who were employed in 2018.[13] The educational services, health care and social services industry employed the largest section of people, 28 percent of the total number employed.

Table 2.7 identifies employment by industry for Kent County as a whole. As reported by the U.S. Bureau of Labor Statistics, in the fourth quarter of 2019 Kent County reported an average weekly wage of $900, more than 20 percent below the national average of $1,185.[14]

Table 2.7 Kent County Employment by Industry Breakdown[15]

Industry	Number of Employees	Percentage
Civilian employed population, 16 years and older	80,288	100%
Agriculture, forestry, fishing and hunting, and mining	1,125	1.4%
Construction	5,787	7.21%
Manufacturing	7,499	9.34%
Wholesale trade	1,205	1.5%
Retail trade	12,682	15.8%
Transportation and warehousing, and utilities	4,012	5%
Information	514	0.64%
Finance and insurance, real estate and rental and leasing	5,264	6.56%

[12] https://www.census.gov/quickfacts/fact/table/kentcountydelaware/BZA210218

[13] https://data.census.gov/cedsci/table?q=Kent%20County,%20Delaware&t=Industry&tid=ACSST1Y2018.S2403&moe=false&hidePreview=false

[14] https://www.bls.gov/regions/mid-atlantic/news-release/countyemploymentandwages_delaware.htm#qcewdec1_201912

[15] https://data.census.gov/cedsci/table?q=Kent%20County,%20Delaware&t=Industry&tid=ACSST1Y2018.S2403&moe=false&hidePreview=false

Professional, scientific, and management, and administrative and waste management services	4,408	5.49%
Educational services, and health care and social assistance	22,491	28.01%
Arts, entertainment, and recreation, and accommodation and food services	7,268	9.05%
Other services, except public administration	1,877	2.34%
Public administration	6,156	7.67%

Major employers in Kent County include a diverse range of industries. Table 2.8 identifies these major employers and where they are located.

Table 2.8 Top Major Employers in Kent County[16]

Major Employers	
Bayhealth Kent General Hospital, Dover	Dover Downs Hotel & Casino, Dover
Bayhealth Milford Memorial, Milford	LC Dover LP, Frederica
Burris Logistics, Harrington	Midway Slots, Harrington
Chesapeake Utilities, Dover	Perdue Farms Inc., Milford
Delaware State University, Dover	State of Delaware, Dover
Dover Air Force Base, Dover	Walmart Inc., Smyrna

2.5 Education/Institutional

For the 2020 school year, Kent County has 55 public schools that serve its students (Table 2.9). The State of Delaware has an 80-year-old funding system, one of the oldest in the country, and is one of only four states that doesn't provide additional state funding for English learners or low-income/at-risk students.[17] Figures 2.4 and 2.5 show the locations of public schools and charter schools. Regarding higher education, Kent County has two public universities and one private university, listed in Table 2.10.

Table 2.9 Kent County Public Schools[18]

Public Schools	Number in Kent County
Elementary schools	27
Middle schools	8
High schools	8
Pre-kindergarten/kindergarten	2
Special, alternative, and other	10
Public Choice Schools	**Number in Kent County**
Vocational technical (Vo-tech) schools	1

[16] https://www.choosecentraldelaware.com/whycentraldelaware/major-employers-choose-central-delaware/
[17] http://www.rodelde.org/ataglance/
[18] Delaware Department of Education, Online School and District Profiles: Delaware Public Schools by Type and County (2017-18).

Public charter schools	6

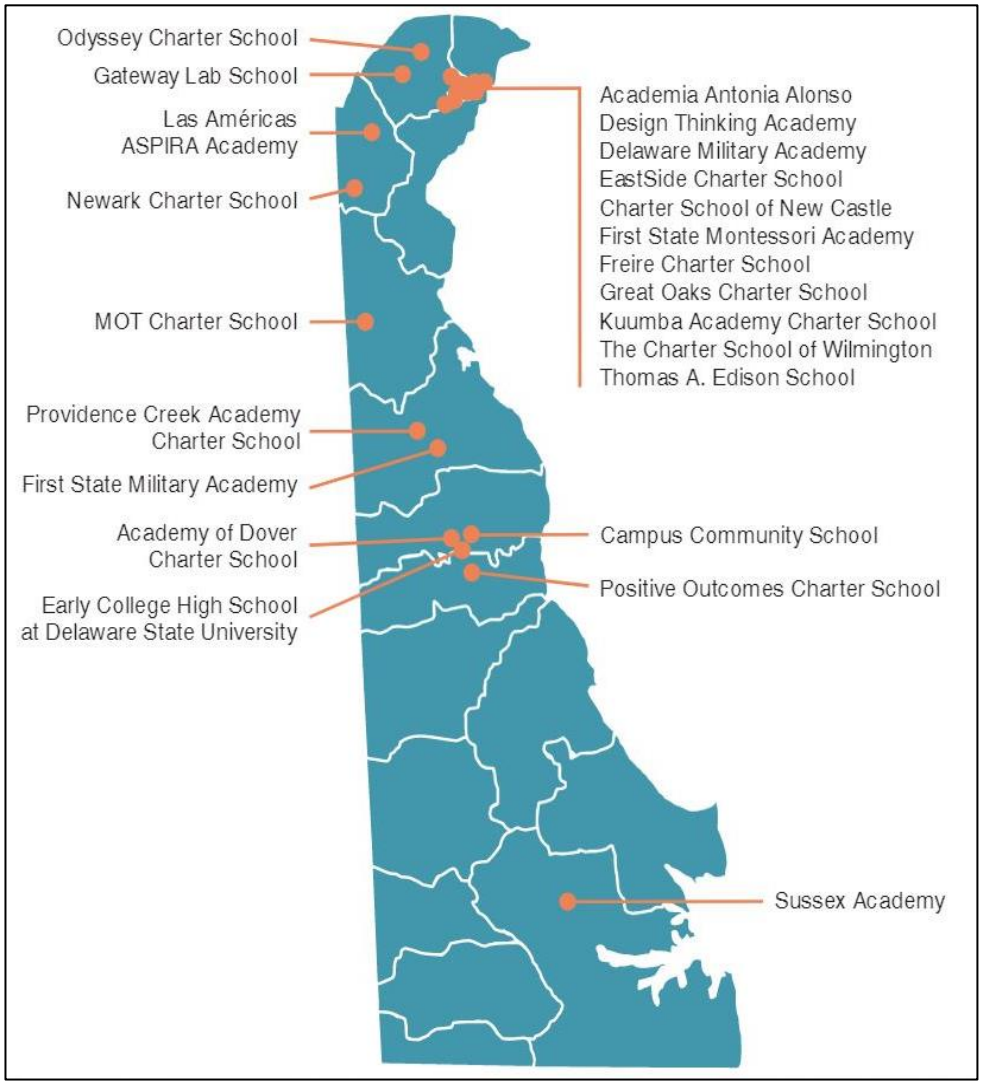
Table 2.10 Public and Private Universities in Kent County

Public Universities	Private Universities
Delaware State University, Dover	Wesley College, Dover
Delaware Technical Community College, Dover	

Figure 2.4 Public School Districts across Delaware

Source: Harry K Foundation

Figure 2.5 Public Charter Schools across Delaware



Source: 2018-19 DE public Education At A Glance, Rodelde.org

2.6 Transportation

The majority of trips made within Kent County are via automobiles, as would be expected in a largely rural and suburban County. Public transit in Kent County includes local and inter-county bus service and paratransit provided by the Delaware Transit Corporation (DTC) operating at DART First State.[19]

There are 56 miles of active freight railroad lines in Kent County which are operated by Norfolk Southern. These lines include the Delmarva Secondary Line and Indian River Secondary Line.

[19] https://www.co.kent.de.us/media/913825/2018-Comprehensive-Plan-Adopted-9-11-18-Full-Document-with-Appendices.pdf

Kent County has seven aviation facilities available for public use, primary of which is the Dover Air Force Base Civil Air Terminal. Other facilities include the Smyrna Airport, Chandelle Estates Airport, Delaware Airpark, Jenkins Airport, Chorman Airport, and the DelDOT Helistop.

The Delaware Bay, Leipsic River, St. Jones River, Murderkill River, and other waterways that flow through Kent County provide opportunities for recreation as well as the movement of people and goods. The commercial and recreational fishing facilities in Bowers Beach are the most significant docking facilities in the County. Figure 2.6 shows a transportation map of the County.

Figure 2.6 Map of Delaware Transportation

Source: DelDot 2018 Fact Book

2.7 Utilities

The Water Supply Section of the Delaware Department of Natural Resources and Environmental Control (DNREC) issues well and water allocation permits, and licenses water well contractors. The section also oversees statewide drought management, groundwater quality monitoring, and wellhead and source water protection programs. The section works with the Delaware River Basin Commission (DRBC) to manage water withdrawal from the Delaware River.[20]

The Water Supply Coordinating Council, established by the Delaware General Assembly, works to develop and publish water supply plans for Kent County. The Well Permits Branch manages and issues well construction and use permits for wells that withdraw 50,000 gallons of water or less daily. The Water Well Licensing Board oversees the licensing of well drilling professionals, developing forms and examinations, reviewing applications, examining candidates, and making recommendations for actions by the DNREC.

While residents of Kent County get their water supply by drilling wells, many individual homeowners in small towns and rural areas do not have the protections offered by municipal systems.[21] In addition there is a threat of water contamination caused by fertilizers, insecticide, or other substances leaching into the ground.

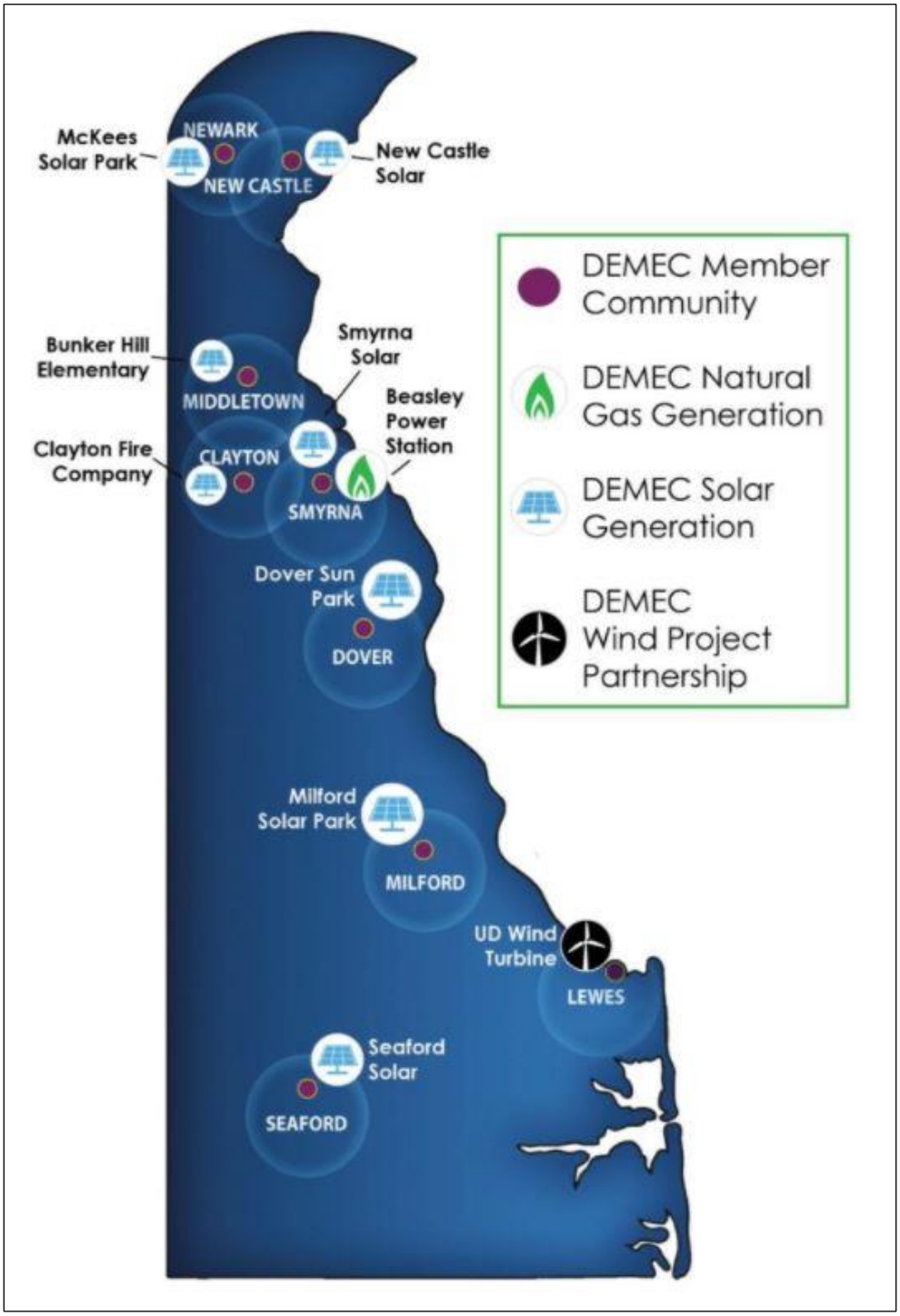
The Delaware Municipal Electric Corporation (DEMEC) is a public utility and a Joint Action Agency that represents nine municipal electric departments in the State including the electric departments of Dover, Milford, Clayton, and Smyrna. DEMEC invests in a range of electricity generation sources including natural gas, solar, and wind energy as illustrated in Figure 2.7.

2.8 Land Use

The housing market, rate of development and land use patterns in Kent County have changed noticeably since 2008. The 2018 comprehensive plan for Kent County reflects a long-term strategy where specific mixed use, higher density, commercial, industrial center development can be supported, while preserving the character of the area and adequate infrastructure is in place or planned to serve it. Figure 2.8 illustrates the existing land use across Kent County and Figure 2.10 illustrates the future land use map.

[20] https://dnrec.alpha.delaware.gov/water/supply/
[21] https://www.doverpost.com/article/20160310/NEWS/303099999

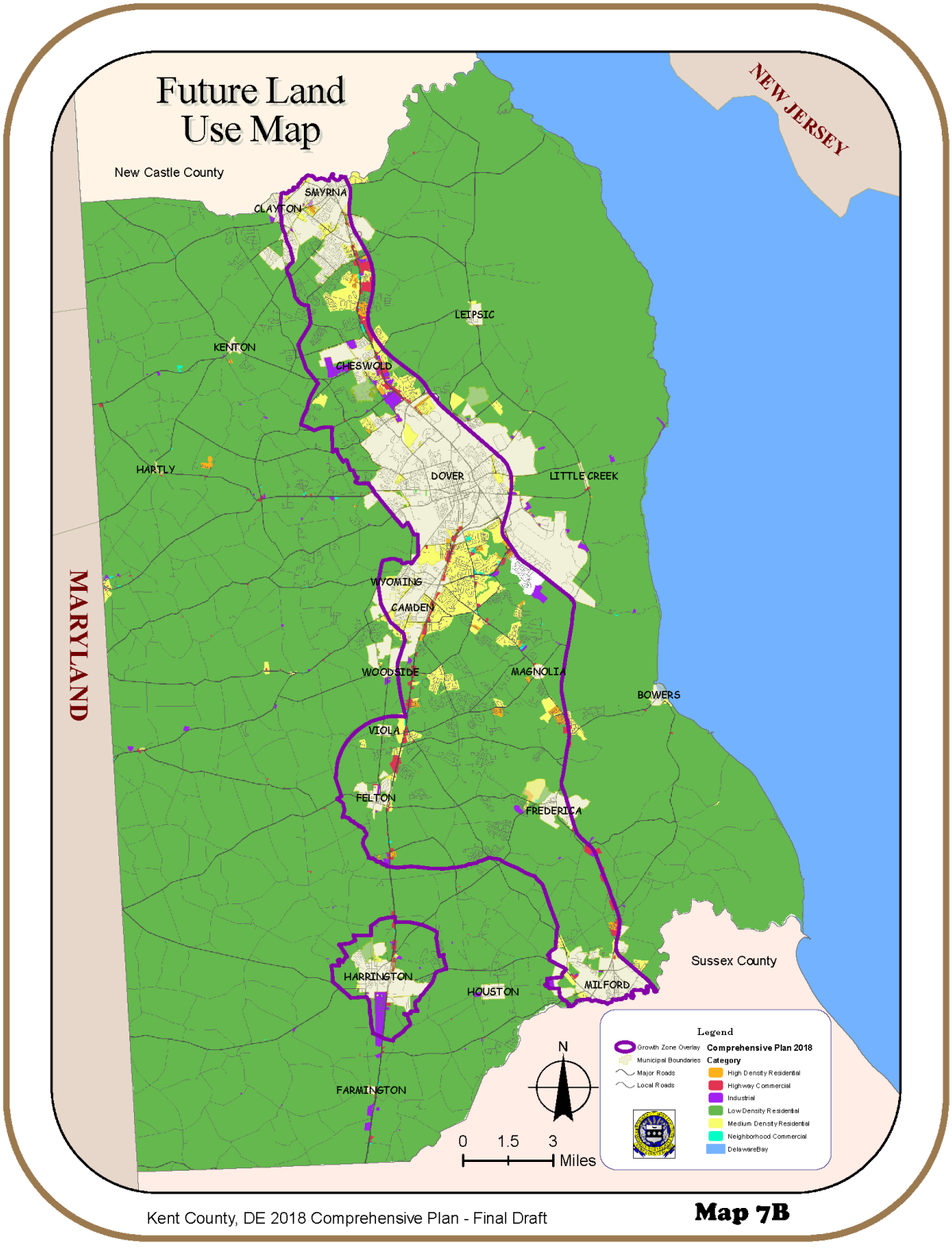
Figure 2.7 DEMEC Power Generation Stations[22]



[22] https://www.demecinc.net/generation/

Figure 2.8 Existing Land Use in Kent County

Figure 2.10 Future Land Use Map for Kent County



2.8.1 Growth and Development

Kent County has undergone significant growth over the past few decades and typical land use patterns are no longer predominately agricultural as they were in the earlier part of the 1900s. The County experienced significant residential development between 2000 and 2007. However, this has declined since 2007, as depicted in Figure 2.10. While the County has seen commercial development since then, the trend continues to be that of large scale commercial and industrial development taking place within municipalities where infrastructure is readily available.[23] The County continues to maintain the Growth Zone Overlay District that encourages residential and nonresidential development and infrastructure investments around existing developed areas including municipalities. The predominant land use outside the Growth Zone Overlay District is agriculture. Other sensitive environmental features such as wetlands, woodlands, and critical habitat exist outside the Growth Zone.

Figure 2.12 New Housing Starts in Kent County

Source: Kent County 2018 Comprehensive Plan

The goals from the 2018 Comprehensive Plan build on the concept of community centers at central locations that provide greater access to employment, services, and recreation. The Comprehensive Plan also supports green infrastructure, encourages the protection of the rural character of the County and the preservation of its open spaces.

2.9 Data Sources and Limitations

The most recent U.S. Census Bureau data were used to compile this chapter. The recently updated 2018 Kent County Comprehensive Plan was also utilized to gather pertinent information and statistics regarding the County profile. Other sources referred to are listed below:

[23] https://www.co.kent.de.us/media/913825/2018-Comprehensive-Plan-Adopted-9-11-18-Full-Document-with-Appendices.pdf

- 2018 State of Delaware Hazard Mitigation Plan
- Delaware Geological Survey
- Delaware Genealogical Society
- Delaware Department of Natural Resources and Environmental Control
- U.S. Bureau of Labor Statistics
- Choose Central Delaware
- Rodel Foundation of Delaware
- Delaware Department of Education
- Delaware Municipal Electric Corporation

3.0 CHAPTER 3 – PLANNING PROCESS

3.1 What is Hazard Mitigation

FEMA defines hazard mitigation as the effort to reduce loss of life and property by lessening the impact of disasters.[24] A hazard mitigation plan serves as a road map for a community's long term strategy to reduce disaster losses and break the cycle of repeated destruction from natural disasters. Effective mitigation requires a comprehensive understanding of local risks, a plan on how to address potentially hard choices, and invest in long-term community well-being.[25] The planning process used to update this Kent County HMP involves risk-based decision making to reduce damage to people, property, infrastructure, and the environment from future disasters.

3.2 Hazard Mitigation Plan Update Process

Local governments are required to develop and update their hazard mitigation plan in order to remain eligible for certain types of non-emergency disaster assistance from FEMA. The 2015 HMP Update was undertaken by Kent County's Department of Public Safety (DPS), Division of Emergency Management (EMA) and Vision Planning and Consulting, between late 2014 and early 2015. This 2020 Plan Update is also being performed by Kent County DPS, EMA, and VPC. This 2020 Update is being completed as part of the 5-year plan update cycle in order to maintain Kent County's eligibility for mitigation funds.

The Kent County HMP Update process was conducted over a five-month period and comprised four main phases: 1) organizing the work group and process; 2) assessing natural hazards, vulnerability, and mitigation capabilities; 3) developing a mitigation plan; and 4) implementing the plan.

While the basic phases were similar to the ones followed in the 2015 Plan, each phase was adjusted slightly to obtain maximum participation from steering committee members, municipalities, and residents. Members of the Steering Committee from the 2015 Planning Process were approached and invited to be on the Committee for the 2020 Plan Update Process in order to ensure continuity as well as to capitalize on their knowledge of the community and familiarity with the update process. Based on feedback from previous Committee members, some additional members were then invited to participate in the Committee for this Update. As in the original planning process, a Letter of Intent to Participate was mailed to all jurisdictions to inform them of the Plan Update. A municipal workshop was held to maximize participation from all 20 municipalities and to educate them throughout the Plan Update process.

These four steps are addressed in-depth below:

Phase 1 – Organize Work Group and Process: The first phase involved reenergizing residents to become interested, involved, and educated in the plan update process. In order to achieve this goal, input was solicited throughout the planning process via three avenues: 1) Steering Committee Meetings; 2) Municipal Workshop; and 3) Public Meeting. Each of these avenues for public involvement served its own purpose and required a different tier of involvement to ensure

[24] https://www.fema.gov/what-mitigation.
[25] Ibid.

participation from local, county, state, and regional levels. Each of these will be discussed in detail in the next section of this chapter.

Phase 2 – Assess Hazards, Risks, Vulnerability, and Mitigation Capability: In this step, information on past hazard events that affected Kent County was gathered and specific hazard areas were identified. This step also involved a literature review of publications addressing historical hazard events, an internet search for data related to historic events, and an inventory and review of the existing GIS coverage and other documentation pertinent to the County. The hazard identification included summaries on past occurrences and the probability of future events. The vulnerability analysis identified specific areas, including critical facilities, that were vulnerable to hazards and included estimates of potential losses. Past and future development trends were also analyzed as part of this step. This phase also discussed land uses and development trends in the County and identified high hazard areas that were not suitable for future development.

The Mitigation Capability Assessment was conducted to identify the roles and capabilities of various departments/agencies in the County, areas for coordination and/or improvement; and provide a platform to integrate plans and other documents so recommendations and strategies are not in contradiction with one another. The Assessment also involved a review of sample county and municipal plans and ordinances that addressed or had the potential to address hazard mitigation issues.

Phase 3 – Develop a Mitigation Plan: Based on data from the hazard, vulnerability, and capability assessments, mitigation goals were developed that were aimed at protecting Kent County from long-term vulnerability to the identified hazards. A comprehensive range of mitigation actions and projects to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure, was developed in this step.

The Plan explored mitigation actions in the following four categories to attain the goals:

- Plans and Regulations – government authorities, policies, or codes to encourage risk reduction;
- Structure and Infrastructure Projects – modifying old structures/infrastructure or new construction to reduce hazard impacts;
- Natural Systems Protection – Minimizing losses and preserving/restoring the proper function of natural systems; and
- Education and Awareness Programs – Long term problems to inform and educate about hazards and mitigation options, including trainings.

While some mitigation actions are more 'broad' in nature and cover the entire County, others are specific to each municipality. It was ensured that each of the 20 municipalities' actions from 2015 were revisited and that each municipality had at least one or more mitigation actions identified in the plan update, along with a timeline and entity(ies) responsible for implementation.

Phase 4 – Implement the Plan - In the final phase, an action plan was developed that described how the mitigation strategies and activities identified would be prioritized, implemented, funded, and administered by the County and its municipalities. Cost estimates and possible funding sources to implement recommended projects were identified. This phase also included methods to monitor, evaluate, and update the mitigation plan within a five-year cycle as well as recommendations on how to incorporate community participation into the plan maintenance process.

3.3 The Planning Team

A Steering Committee for the Plan Update was formed for the purposes of this planning process. A total of 17 members were invited to serve on the Steering Committee to represent various Kent County departments, State agencies, outside agencies, local entities, businesses with a stake in hazard mitigation, the American Red Cross (ARC), and DEMA. Invitations were also sent to the Emergency Management departments for each of the neighboring counties. Table 3.1 includes the individuals invited to be a Plan Update Steering Committee member, and the agencies/organization in which they represented. The table also identifies representatives from each municipality that were invited to take part in the planning process. An attempt was made to retain the members of the 2015 Steering Committee. All meeting invitations were sent to representatives via email and were sent at least two weeks prior to each meeting.

Table 3.1 Plan Update Steering Committee Members and Municipal Representatives

Name	Agency/Affiliation
Colin Faulkner	Department of Public Safety - Fire and EMS
Brandon Olenik	Department of Public Safety – Division of Emergency Management
Diana Golt	Department of Public Works - Engineering - Wastewater Facilities
Kevin Sipple	911
Sarah Keifer	Department of Planning - Facilities Management - Building Permits
Jeremy Sheppard	Department of Parks and Recreation
Kim Crouch	Department of Information Technology
Joe Simmons	GIS
Mark Kinnaman	GIS
Amy Thomas	Town of Felton
Jason Stewart	Town of Camden
Kay Sass	City of Dover
Matthew Harline	City of Dover
Michael Callender	Town of Cheswold
Matthew Lichtenstein	Delaware Department of Transportation
Rodney Layfield	Delaware State Police
Sharon Jefferson Hawk	American Red Cross
Neighboring Counties	
Dave Carpenter	New Castle County
Joe Thomas	Sussex County
Lori Morris	Queen Anne's County, MD
EMA Director	Caroline County, MD
Municipalities	
Ada Puzzo	Bowers Beach
Jason Stewart	Camden
Michael Callender Theon Callender	Cheswold

Name	Agency/Affiliation
Jeff Hurlock Sue Muncey	Clayton
Kay Sass Matthew Harline	Dover
Richie Smith	Farmington
Amy Thomas	Felton
Ricky Maddox Brian Miller Dan Barbato Dustan Russum	Frederica
Daniel Tartt Karen Brittingham Amanda Marlow	Harrington
Mark Maquire	Hartly
Greg Gilmore	Houston
Howard Coleman Paul Caple	Kenton
Craig Pugh Martha Wilkinson	Leipsic
Glenn Gauvry Penny Gentry	Little Creek
Diane P. Cahall James Frazier	Magnolia
Mark Whitfield Michael Svaby	Milford
Andrew Haines	Smyrna
Gina Meserendino	Viola
Michael Warren	Woodside
Michael Wooleyhand	Wyoming

3.4 Meetings and Documentation

A kick-off meeting was held between the Consulting team and County DPS officials on July 20th, 2020. This meeting officially began the planning process which covered the tasks involved and project schedule, as well as suggestions for Steering Committee members. It is important to note that opportunity was provided for neighboring communities, local and regional agencies to participate in this planning process.

3.4.1 Steering Committee Meetings

The first Steering Committee Meeting was held on September 30th, 2020. Due to the COVID-19 Pandemic, this meeting took place online via Zoom Videoconferencing. The following agenda items were covered at this meeting:

- Provide project overview;
- Glean input on various hazards, hazard identification and county hazard rankings;
- Review data from the hazard vulnerability and risk assessment;
- Review and update goals; and

- Review and determine the status of past county mitigation actions (from the 2015 Plan).

The following discusses the information exchange process during the first HMP Update Steering Committee Meeting. During this first Meeting, members were provided and presented a PowerPoint presentation that facilitated discussion and information exchange. This presentation allowed for information exchange in regard to several different plan components. Our Team first presented and worked with the Committee to review the previous Plan's hazard rankings. This allowed members to discuss specific occurrences that may have occurred in the previous five years, and to provide information on whether specific hazards have become more or less impactful. Following discussion and gleaning impact on specific hazards, our Team worked with the committee to update and final the hazard ranking for this 2020 Plan Update.

Also related to the Risk Assessment, our Team reviewed initial Risk Assessment results and provided Steering Committee Members potential loss estimates for different hazards that could impact the County. This information exchange process allowed Steering Committee Members to observe potential impacts and in turn help members form ideas for specific mitigation strategies to reduce those potential impacts and losses presented.

Our Team then presented the 2015 Plan's Goals to the Committee for review. Each Goal was thoroughly examined during this meeting and edited/updated for clarity, cohesiveness, and consistency, based on recommendations of the Committee. Members were also provided an opportunity to develop new goals for this Plan Update.

The final point of information exchange during the first Steering Committee Meeting involved reviewing and determining the status of the 2015 HMP's county hazard mitigation actions. Each previous action was thoroughly discussed to determine each action's status (Completed, Not Started, In Progress, Ongoing, Cancelled). Each previous action carried forward to this 2020 Update was reviewed and discussed with Committee Members for clarity, cohesiveness, and consistency, and edited/updated, as necessary. Members were also provided an opportunity to present potential new county mitigation action ideas.

The second Committee meeting was held on October 28th, 2020. Due to the COVID-19 Pandemic, this second meeting took place online via Zoom Videoconferencing. The following agenda items were covered at this meeting:

- Progress to date;
- Discuss HIRA results;
- Brief review of past mitigation actions and actions carried forward;
- Review of new mitigation actions and associated implementation strategies;
- Review draft plan.

The following discusses the information exchange process during the second HMP Update Steering Committee Meeting. During this second Meeting, members were provided a PowerPoint presentation that facilitated discussion and information exchange. This presentation allowed for information exchange in regard to several different plan components. Our Team first discussed with the Committee the progress to date regarding the plan update process. Final Risk Assessment information was then presented to Committee Members, providing an opportunity for members to further understand potential loss and risk estimates, and to provide back additional information that may not be visible through HIRA results, but rather through local experience and knowledge. Specific maps were also presented to the Members which helped stimulate additional discussion and information exchange related to potential hazard areas and impacts.

Following Risk Assessment-related discussions, the actions from the 2015 Plan that were being forward to the 2020 Update were presented and reviewed for a final time.

New actions and associated implementation strategies for this 2020 Plan Update were then presented to the Steering Committee Members for review and comment. VPC collaborated with Members via email to develop these new mitigation actions, and the actions were then presented for all members to review and discuss accordingly. Steering Committee Members were critical in developing these new actions and determining lead agencies/departments for each respective action.

3.4.2 Municipality/Stakeholder Meetings

In August 2020, an introduction email was directed to municipal floodplain coordinators and/or hazard mitigation representatives for all municipalities in the County explaining the start of the Plan Update process; to discuss the purpose of the capabilities questionnaire and other documents that they would be asked to complete; and to discuss potential municipal meetings/workshops.

At least two weeks prior to the first municipality meeting/workshop, the VPC Team sent four documents that included information to update different plan sections. Each municipality was provided four documents: 1) Municipal Capabilities Questionnaire; 2) Status of Past Municipal Mitigation Actions Worksheet; 3) Municipal Hazard Areas Identification Worksheet; and 4) Floodplain Coordinator Questionnaire. Municipalities were encouraged to fill out these documents to the best of their ability prior to the municipal workshop and invited to bring these documents to the municipal workshop for assistance with completing anything that was unable to be completed prior to. Follow-up emails were also sent to encourage municipalities to complete these forms. Each of these forms allow municipalities the opportunity to participate in several different aspects of the plan update process, such as the HIRA, Capability Assessment, and Mitigation Strategy. Meeting invitations and reminders for the Municipal Meeting were sent via email to municipal representatives.

The first Municipality Meetings took place on September 23rd, 2020, and due to the COVID-19 Pandemic, the meeting took place online via Zoom Videoconferencing. This Municipal Mitigation Workshop, facilitated by the Consultants, provided an opportunity for municipal officials to become educated about, and involved in, the plan update process. At the meeting/workshop, municipal officials:

- Reviewed initial results from the hazard vulnerability and risk assessment;
- Identified local hazard areas with their municipalities;
- Identified critical facilities within their municipality;
- Completed the Municipalities Capabilities Survey and Floodplain Coordinator National Flood Insurance Program (NFIP) Questionnaire;
- Identified status of past mitigation projects and discussed potential mitigation projects; and
- Discussed future participation opportunities and next steps.

This meeting focused on information exchange from the municipalities to help inform the different plan update sections. VPC staff first presented municipal representatives with initial HIRA results, including hazard rankings and potential loss estimates from specific hazards. We then worked with the municipal representatives to obtain municipal information that may not be identified through GIS analysis. This data was exchanged with municipalities to ensure a full understanding of risk and its nuisances from each jurisdiction's perspective is garnered.

VPC also hosted a hybrid Public and Stakeholder/Municipality Meeting which served as the Public Meeting and the second Municipality Meeting. This allowed the public an opportunity to understand

and comment on the Plan Update and provided municipal representative an additional opportunity to participate. Details regarding the Public and Stakeholder Meeting/Municipality Meeting.

Additional documentation for each meeting is provided in Appendix C.

3.5 Public and Stakeholder Participation

A Public and Stakeholder Meeting/Municipality Meeting was held on November 2nd, 2020. Due to the ongoing Covid-19 Pandemic, this meeting was facilitated through Zoom Videoconferencing. The public meeting was advertised in the Delaware State News, NewsZap, and on the Kent County Emergency Management Division website. The public was provided an opportunity to:

- Review the results of the updated HIRA;
- Review updated goals and objectives;
- Review of new mitigation actions and associated implementation strategies; and
- Review draft plan.

Due to the lack of attendance for the virtual public meeting, the meeting presentation was posted again on the County Government website for public comment. Copies of the draft Plan Update were made available on the Kent County Government Website for a period of two weeks for public comment. When Levy Court adopts, it will be a public meeting, providing the public an opportunity to comment prior to adoption. Any comments received during the public meeting, where relevant and feasible, will be incorporated into the final version of the Plan Update.

3.6 Multi-Jurisdictional Planning

There are a total of 20 municipalities/jurisdictions in Kent County. A listing of the jurisdictions that participated in this planning process is provided below. This is also a listing of the jurisdictions in Kent County that will adopting the updated HMP.

- Bowers Beach
- Camden
- Cheswold
- Clayton
- Dover
- Farmington
- Felton
- Frederica
- Harrington
- Kenton
- Leipsic
- Little Creek
- Magnolia
- Milford
- Smyrna
- Woodside
- Wyoming

The following Kent County jurisdictions will not be adopting the updated HMP based on unmet participation requirements:

- Hartly
- Houston
- Viola

Table 3.2 provides a synopsis of municipal participation through the planning process.

Table 3.2 Jurisdictional Participation Summary

City/Town	Communication Established	Attended Municipal Meeting	Municipal Capability Survey	Floodplain Coordinator Questionnaire	Hazard Identification Areas Worksheet	Mitigation Actions Worksheet(s)

Bowers Beach	✓	✓				✓
Camden	✓	✓	✓	✓	✓	✓
Cheswold	✓	✓	✓		✓	✓
Clayton	✓	✓				✓
Dover	✓	✓	✓	✓	✓	✓
Farmington	✓	✓	✓		✓	✓
Felton	✓	✓	✓	✓	✓	✓
Frederica	✓	✓	✓	✓	✓	✓
Harrington	✓	✓	✓	✓	✓	✓
Hartly						
Houston						
Kenton	✓	✓	✓			✓
Leipsic	✓		✓			✓
Little Creek	✓		✓		✓	✓
Magnolia	✓		✓	✓	✓	✓
Milford	✓	✓	✓	✓	✓	✓
Smyrna	✓	✓	✓		✓	✓
Viola						
Woodside	✓				✓	✓
Wyoming	✓		✓			✓

Although Leipsic, Little Creek, Magnolia, Woodside, and Wyoming did not attend the advertised municipal participation meetings, individual phone and email conversations were held with representatives to coordinated with each. Individual coordination with these municipalities includes:

- Leipsic – Phone conversation on 1/15/2021 and on 1/19/2021.
    - Discussed HIRA results, hazard rankings, and updated goals presented during the Municipal Meeting; Completed the Municipal Capability Survey and updated the mitigation strategy for Leipsic.
- Little Creek - Phone conversation on 10/30/2020 and email coordination.
    - Discussed HIRA results, hazard rankings, and updated goals presented during Municipal Meeting; Completed the Municipal Capability Survey, identified local hazard areas, and updated the mitigation strategy for Little Creek.
- Magnolia – Phone conversation on 9/29/2020 and email coordination.
    - Discussed HIRA results, hazard rankings, and updated goals presented during the Municipal Meetings; Ensured accuracy of completed forms.
- Woodside – Phone conversation on 1/19/2021 and email coordination.
    - Discussed HIRA results, hazard rankings, and updated goals presented during Municipal Meeting; Identified local hazard areas, and updated the mitigation strategy for Woodside.
- Wyoming – Phone conversation on 1/6/2021 and email coordination.
    - Discussed HIRA results, hazard rankings, and updated goals presented during the Municipal Meeting; Completed the Municipal Capability Survey and updated the mitigation strategy for Wyoming.

4.0 CHAPTER 4 – HAZARD IDENTIFICATION

4.1 Update Summary Process

Multiple sources were referenced to obtain a comprehensive identification of all potential hazards affecting the County. These include the NCEI, United States Geologic Survey (USGS), the 2017 State of Delaware Hazard Mitigation Plan, and other FEMA or DEMA produced sources. For all hazards without readily and freely accessible data, information from the State of Delaware Hazard Mitigation Plan was referred to and included. It is also important to note that in the identification of previous hazard occurrences, data from the NCEI (previously named the NCDC) was utilized where available, while standard FEMA definitions were utilized for hazard definitions. This update process will also reflect changes in priorities based on updated hazard rankings, vulnerabilities, and prioritized mitigation actions.

4.2 Hazard Identification

The Consultants facilitated a Municipal Mitigation Workshop on February 25 and 26, 2020 to offer municipal representatives the opportunity to review previously identified hazard locations and the impacts to their jurisdiction. Municipal officials marked up maps and noted specific problem areas; the hazards were discussed and confirmed by the Steering Committee. It was determined to include one additional hazard was in this update (Pandemic/Epidemic). As a result, the following hazards (Table 4.1) were evaluated and examined further as part of this Plan Update:

Table 4.1 Kent County Hazards

Natural Hazards	Human Caused Hazards
Flood	Pandemic/Infectious Disease Outbreak
Hurricanes and Coastal Storms	Terrorism
Severe Thunderstorms and Tornados	Weapons of Mass Destruction
Wildfire	Hazardous Materials (HazMat)
Drought/Extreme Heat	Energy Pipeline Failures
Winter Storms and Freezes	
Hail	
Erosion	
Dam/Levee Failure	
Earthquakes	
Sinkholes and Landslides	
Tsunami	
Volcano	

Some of these hazards are interrelated (i.e., hurricanes can cause flooding and tornadoes), and some consist of hazardous elements that are not listed separately (i.e., severe thunderstorms can cause lightning; hurricanes can cause coastal erosion). In addition, terrorist-related incidents or accidents involving chemical, radiological or biological agents can coincide with natural hazard events, such as flooding caused by destruction of a dam or an accidental chemical release caused by a tornado. It should also be noted that some hazards, such as severe winter storms, may impact a large area yet cause little damage, while other hazards, such as a tornado, may impact a small area yet cause

extensive damage. This section provides a general description for each of the hazards listed above along with their hazardous elements, written from a national perspective. It is important to note that some hazards can be countywide, while some can be localized. Each municipality was provided an opportunity to identify specific municipal hazard areas. Those areas are identified on the Municipal Hazard Areas Maps in Appendix D.

4.2.1 Presidential Disaster Declaration

Table 4.2 indicates the Presidential Disaster Declarations in Kent County.

Table 4.2 Presidential Disaster Declarations[26]

Presidential Disaster Declarations in Kent County		
Date	Event Type	Declaration Number
8/4/2020	Tropical Storm Isaias	DR-4566
1/20/2020	Pandemic	DR-4526
1/22/2016	Severe Winter Storm	DR-4265
11/16/2012	Hurricane Sandy	DR-4090
10/29/2012	Hurricane Sandy	EM-3357
9/30/2011	Hurricane Irene	DR-4037
8/28/2011	Hurricane Irene	EM-3336
3/31/2010	Severe Winter Storm	DR-1896
7/5/2006	Severe Flooding	DR-1654
9/30/2005	Hurricane Katrina	EM-3263
11/15/2004	Hurricane Jeanne	DR-1572
9/23/2003	Tropical Storm Henri	DR-1495
9/20/2003	Hurricane Isabel	DR-1494
3/20/2003	Severe Snowstorm	DR-3183
9/21/1999	Hurricane Floyd	DR-1297
2/13/1998	Severe Winter Storms, High Winds and Flooding	DR-1205

[26] https://www.fema.gov/disasters/disaster-declarations?field_dv2_state_territory_tribal_value=DE&field_year_value=All&field_dv2_declaration_type_value=All&field_dv2_incident_type_target_id_selective=All

1/12/1996	Blizzard of '96	DR-1082
3/16/1994	Severe Ice Storms and Flooding	DR-1017
3/18/1993	Severe Snowfall and Winter Storm	EM-3111
1/15/1993	Severe Coastal Storm and Flooding	DR-976
2/6/1992	Severe Coastal Storm	DR-933
8/15/1965	Water Shortage	DR-207
3/9/1962	Delaware Severe Storms, High Tides, Flooding	DR-126

4.2.2 Flood

Flooding occurs when stream capacities are exceeded due to large volumes of water from precipitation or from winter snow melt which enters streams as surface run-off. Flooding can also occur from undersized culverts, bridges, or storm pipes that cannot accept the increased flow of water during storm events. This causes water to back up behind the structures and overtop the natural stream channel banks in what is referred to as the "backwater effect". Another form of flooding, flash flooding, occurs during a short but intense rainfall event. Although the total amount of precipitation is often much less than standard 24-hour design storm (1-year, 2-year, 5-year, 10-year, 25-year, 50-year, or 100-year) precipitation depths, the precipitation falls in a short time period. This leads to intense surface runoff and stream levels rise quickly in response to the run-off. The effects of flash flooding are exacerbated by increases in impervious surfaces from new developments. The severity of a flooding event is determined by the following: a combination of stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing.

General floods are usually long-term events that may last for several days. The primary types of general 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 surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, nor'easters, and other large coastal storms. Urban flooding occurs where man-made development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Flash flooding events usually occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall, or from a sudden release of water held by an ice jam. Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. Although flash flooding occurs often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces. Flash flood waters move at very high speeds and "walls" of water can reach heights of 10 to 20 feet. Flash flood waters and the accompanying 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 floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is 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 floods 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 in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year.

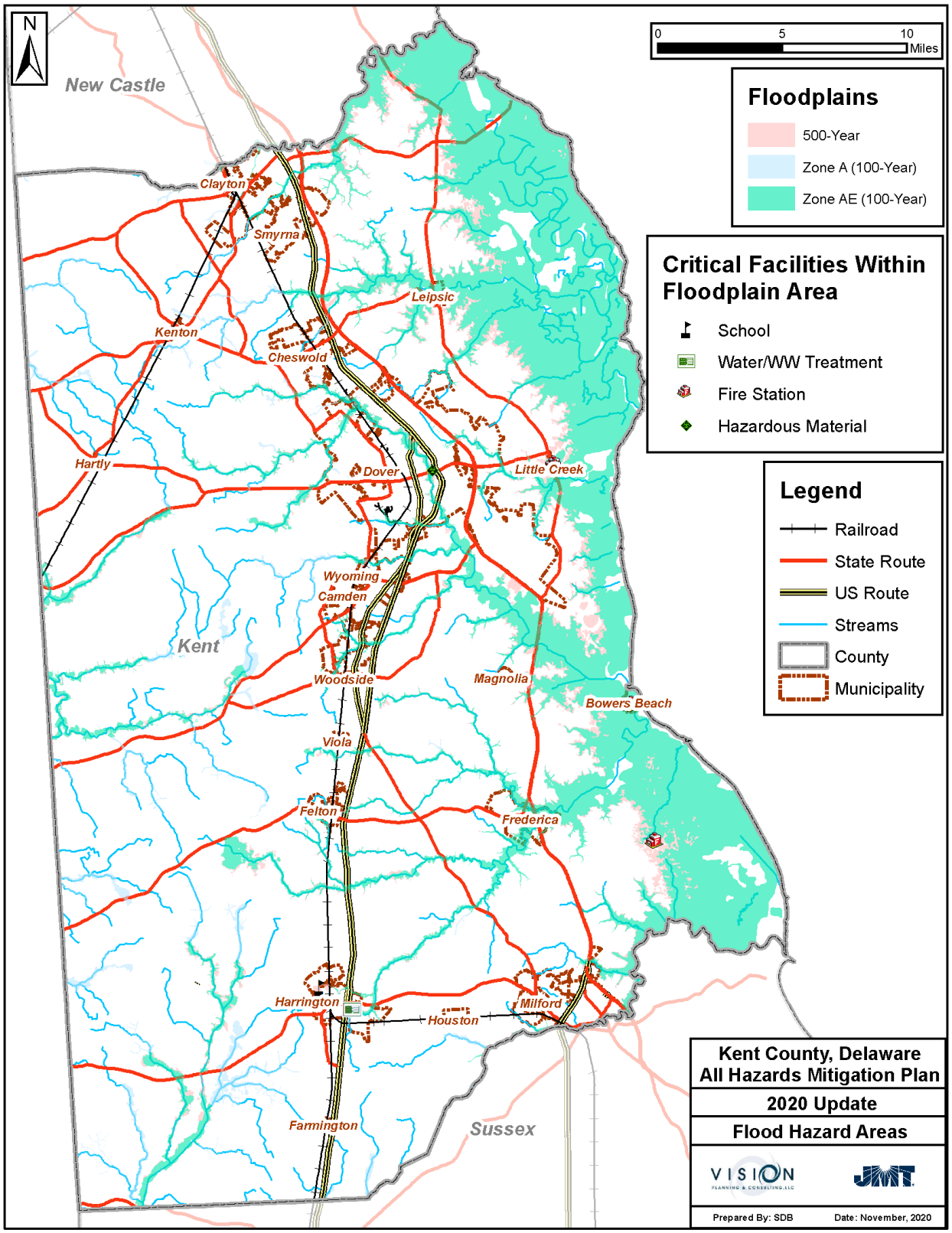
4.2.2.1 Location and Extent

The County is exposed to two types of flooding, inland flooding and coastal flooding. Severe flooding is generally restricted to the 100-year floodplain boundary (2014 FEMA DFIRM), which is identified on the Kent County 100-year floodplain map (Figure 4.1), as well as along the coastline, also shown in Appendix D. Figure 4.1 and other mapping products were presented to Steering Committee members as well as municipal representatives during risk assessment discussions and allowed them an opportunity to understand the mapping products a information being presented within them.

There are two primary areas of flooding in Kent County, the first being the Bay Shore Area and the second being the western half of the county.[27] The Bay Shore Area is frequently subject to flooding due to high tides, however, monetary damage is usually minimal because most flooding occurs on the beaches and wetland.[28] Smyrna and Dover are subject to tidal effects.[29] The western half of the county is a very flat, poorly drained area and, consequently, is frequently subjected to temporary ponding of storm water, with damage usually limited to crop damage. [30]

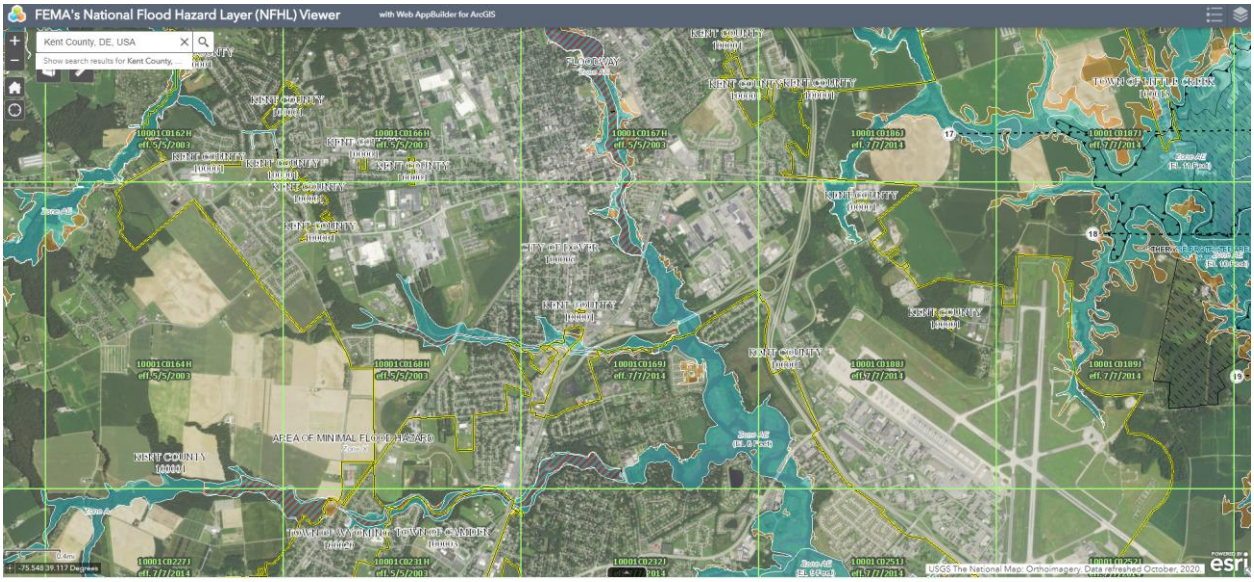
[27] Kent County Flood Insurance Study, 2014
[28] Kent County Flood Insurance Study, 2014
[29] Kent County Flood Insurance Study, 2014
[30] Kent County Flood Insurance Study, 2014

Figure 4.1 Kent County Flood Hazard Areas Map



Kent County National Flood Hazard Layer was also made available to Steering Committee members and all communities. The link was made available to all communities via email during the information exchange period, to allow the communities to reference this map in completing any of the informational documents. Kent county's FEMA DFIRM (Figure 4.2) and associated interactive mapping may be found here: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Figure 4.2 Kent County National Flood Hazard Layer



4.2.2.2 Range of Magnitude

Table 4.3 summarizes the range of magnitude for flood hazards.

Table 4.3 Range of Magnitude - Flood Hazards

Severity	Causes	Frequency	Damage Extents
Minimum	Local Storms – Flash Floods	Annual	Minor road washouts; storm pipe failure
Medium	Regional Storms – Heavy Rainfall	5 to 10 years	Bridge and culvert damage; some properties flooded
Maximum	Large Multi-Day Storms - Hurricanes	10 to 100 years	Major rivers and large streams experience overbank flooding; properties flooded; bridge and culvert failure

4.2.2.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 37 recorded flood or flash flood events in Kent County between 1996 and 2020, with three of those events resulting in $1.149M

in property damage. There were zero recorded injuries and deaths as a result of floods or flash floods in the County.[31] Table 4.4 shows the past occurrences in the County since 1980.

Table 4.4 Previous Flood and Flash Flood Occurrences

	Location	Date	Event Type	Deaths	Injuries	Prop. Damage
KENT CO.	NORTHERN	6/19/1996	Flash Flood	0	0	300,000
KENT CO.	DOVER	8/20/1997	Flash Flood	0	0	0
KENT CO.	NORTHWEST PORTION	8/10/1998	Flash Flood	0	0	0
KENT CO.	EAST PORTION	8/20/1999	Flash Flood	0	0	0
KENT CO.	COUNTYWIDE	9/16/1999	Flash Flood	0	0	224,000
KENT CO.	CENTRAL PORTION	8/19/2001	Flash Flood	0	0	0
KENT (ZONE)		10/14/2001	Flood	0	0	0
KENT CO.	SOUTHEAST PORTION	6/21/2003	Flash Flood	0	0	0
KENT (ZONE)		4/14/2004	Flood	0	0	0
KENT CO.	DOVER	6/25/2004	Flash Flood	0	0	0
KENT CO.	NORTH PORTION	7/12/2004	Flash Flood	0	0	625,000
KENT CO.	SOUTHEAST PORTION	8/1/2004	Flash Flood	0	0	0
KENT CO.	WEST PORTION	6/26/2006	Flash Flood	0	0	0
KENT CO.	NORTH PORTION	7/22/2006	Flash Flood	0	0	0
KENT CO.	BLACKISTON	4/15/2007	Flood	0	0	0
KENT CO.	HOUSTON	7/6/2008	Flash Flood	0	0	0
KENT CO.	HARTLY	8/22/2009	Flash Flood	0	0	0
KENT CO.	CHESNUT GROVE	8/22/2009	Flash Flood	0	0	0
KENT CO.	LEIPSIC	10/28/2009	Flood	0	0	0
KENT CO.	FELTON	7/19/2011	Flash Flood	0	0	0
KENT CO.	CLAYTON	7/31/2011	Flash Flood	0	0	0
KENT CO.	SMYRNA	8/14/2011	Flash Flood	0	0	0
KENT CO.	WOODLAND BEACH	8/27/2011	Flash Flood	0	0	0
KENT CO.	WOODLAND BEACH	8/28/2011	Flood	0	0	0
KENT CO.	BIG STONE BEACH	10/29/2012	Flood	0	0	0
KENT CO.	DOVER	6/7/2013	Flash Flood	0	0	0
KENT CO.	HARTLY	6/18/2013	Flash Flood	0	0	0
KENT CO.	PORT MAHON	7/12/2013	Flash Flood	0	0	0
KENT CO.	DOVER	7/12/2013	Flood	0	0	0
KENT CO.	BLACKISTON	7/28/2013	Flash Flood	0	0	0
KENT CO.	DOVER	6/13/2014	Flash Flood	0	0	0
KENT CO.	SMYRNA ARPT	8/1/2014	Flash Flood	0	0	0
KENT CO.	MILFORD	9/29/2016	Flood	0	0	0
KENT CO.	BLACKISTON	7/28/2017	Flood	0	0	0

[31] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Flash+Flood&eventType=%28Z%29+Flood&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

KENT CO.	DOVER	8/7/2017	Flood	0	0	0
KENT CO.	DOVER	8/7/2017	Flood	0	0	0
KENT CO.	CHESNUT GROVE	8/7/2017	Flood	0	0	0
KENT CO.	DOVER ARPT	8/7/2017	Flood	0	0	0
KENT CO.	CLAYTON	8/7/2017	Flood	0	0	0
KENT CO.	LEIPSIC	8/7/2017	Flood	0	0	0
KENT CO.	BROOKDALE HGTS	8/7/2017	Flood	0	0	0
KENT CO.	COWGILL	8/7/2017	Flood	0	0	0
KENT CO.	LITTLE HEAVEN	2/10/2018	Flood	0	0	0
KENT CO.	LITTLE HEAVEN	5/12/2018	Flood	0	0	0
KENT CO.	SANDTOWN	5/19/2018	Flood	0	0	0
KENT CO.	CHESNUT GROVE	8/31/2018	Flash Flood	0	0	0
Totals:				**0**	**0**	**1.149M**

In addition to flooding and flash flooding, Kent County is susceptible to coastal flooding from coastal storms, storm surge events, and tidal flooding event, from the Atlantic Ocean and Delaware Bay.

According to the NCEI Storms Events Database, there have been 34 recorded coastal flood and storm surge/tide events in Kent County between 1998 and 2020 (23 coastal flood, 11 storm surge/tide), with three of those events resulting in $726K in property damage.[32] There were zero recorded injuries and deaths as a results of floods or flash floods in the County. Table 4.5 shows the past occurrences in the County since 1998.

Table 4.5 Previous Coastal Flood and Storm Surge/Tide Event Occurrences

Location	County/Zone	St.	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:							0	0	726.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/28/1998	06:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/04/1998	13:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/16/1999	14:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/02/2003	06:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/17/2003	06:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	04/17/2003	20:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/19/2003	01:00	EST	Storm Surge/tide	0	0	0.00K	0.00K

[32] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Coastal+Flood&eventType=%28Z%29+Storm+Surge%2FTide&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

KENT (ZONE)	KENT (ZONE)	DE	10/15/2004	09:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/24/2004	18:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/11/2004	08:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	04/02/2005	14:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/13/2005	16:00	EST	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/04/2006	14:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/31/2006	08:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/02/2006	04:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/12/2006	13:00	EST	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/07/2006	10:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/28/2006	02:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	11/22/2006	08:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	06/13/2007	19:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/27/2007	09:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	05/12/2008	04:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/06/2008	15:00	EST-5	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	11/12/2009	15:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	08/27/2011	19:00	EST-5	Storm Surge/tide	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	06/04/2012	20:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/29/2012	21:00	EST-5	Coastal Flood	0	0	700.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/06/2013	15:00	EST-5	Coastal Flood	0	0	25.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/02/2015	09:00	EST-5	Coastal Flood	0	0	1.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/08/2016	08:10	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/09/2016	08:00	EST-5	Coastal Flood	0	0	0.00K	0.00K

KENT (ZONE)	KENT (ZONE)	DE	09/09/2018	19:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/10/2018	09:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	10/27/2018	09:00	EST-5	Coastal Flood	0	0	0.00K	0.00K
Totals:							**0**	**0**	**726.00K**	**0.00K**

4.2.2.4 Future Occurrences

Large-scale river flood event probabilities are measured by the inverse of the return period. Therefore, the 100-year flood event has a 1 in 100 or 1 percent chance of occurring in any given year. Flood damages also result in those municipalities traversed by smaller streams that experience flooding from smaller, more frequent storms. The average frequency of a flood resulting in damage over the 24-year period presented in the NCEI dataset is approximately 1.5 floods per year. The average frequency of a coastal / tidal flood event resulting in damage over the 22-year period presented in the NCEI dataset is also approximately 1.5 events per year. This essentially equates to a 100 percent annual probability of a riverine / stream flood event or coastal / tidal flood event occurring somewhere in the County in any given year.

4.2.3 Hurricanes and Coastal Storms

Coastal storm is a generic term used to describe a large area of low atmospheric pressure, with counterclockwise flowing winds (in the northern hemisphere), moving along the coastal areas of a large landmass.[33] In the mid-Atlantic region of the United States, coastal storms generally are either a mid-latitude cyclone, or a tropical cyclone. Mid-latitude cyclones are larger and derive energy from contrasting air masses. During the winter months, as they move along the coast they are often referred to as "nor'easters" due to the prevailing wind direction.[34]

Tropical cyclones (e.g. tropical storms and hurricanes) are smaller in size, but often stronger areas of low atmospheric pressure are often associated with very high wind speeds and copious amounts of precipitation.[35] Each type of storm brings similar impacts to coastal areas, which may include high winds, storm surge, coastal flooding, heavy precipitation, inland flooding, and in the winter, frozen precipitation.[36] Although tropical cyclones occur far less frequently than mid-latitude cyclones, they are often stronger systems leading to increased impacts to coastal areas. Combined, these storms are arguably the most important weather-related hazard that affects Delaware.[37]

4.2.3.1 Location and Extent

Coastal storms are regional events and can affect all areas within Kent County, but most likely will have heaviest impacts to areas along the shoreline. In a study conducted at the University of Delaware, 2309 coastal storms were documented along the mid-Atlantic coast during the period

[33] State of Delaware Hazard Mitigation Plan, 2018
[34] State of Delaware Hazard Mitigation Plan, 2018
[35] State of Delaware Hazard Mitigation Plan, 2018
[36] State of Delaware Hazard Mitigation Plan, 2018
[37] State of Delaware Hazard Mitigation Plan, 2018

1945 – 2016. Of these, approximately 96% were mid-latitude cyclones. Coastal storms occur all months of the year, but generally peak during the late winter and early spring months.[38]

4.2.3.2 Range of Magnitude

Coastal storms range in size and intensity and can have ranging impacts. There are four stages of tropical development, ranging from tropical disturbance, to tropical depression, to tropical storm, to tropical cyclone (Hurricane). The strongest of the stages is hurricane, and hurricanes are classified according to the Saffir-Simpson scale (Table 4.6), ranging from Category 1 (weakest) to Category 5 (strongest), summarized in Table 4.6. Figure 4.3 shows hurricane scenarios and associated coastal flooding scenarios, and Figure 4.4 shows predicted maximum wind gusts associated with the 100-year storm.

Table 4.6 Saffir-Simpson Hurricane Wind Scale[39]

Category	Sustained Winds (mph)	Type of Damage Done
1	74-95	Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129	Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	130-156	Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	>157	A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

[38] State of Delaware Hazard Mitigation Plan, 2018
[39] National Weather Service, National Hurricane Center

Figure 4.3 Hurricane and Coastal Flooding Scenarios

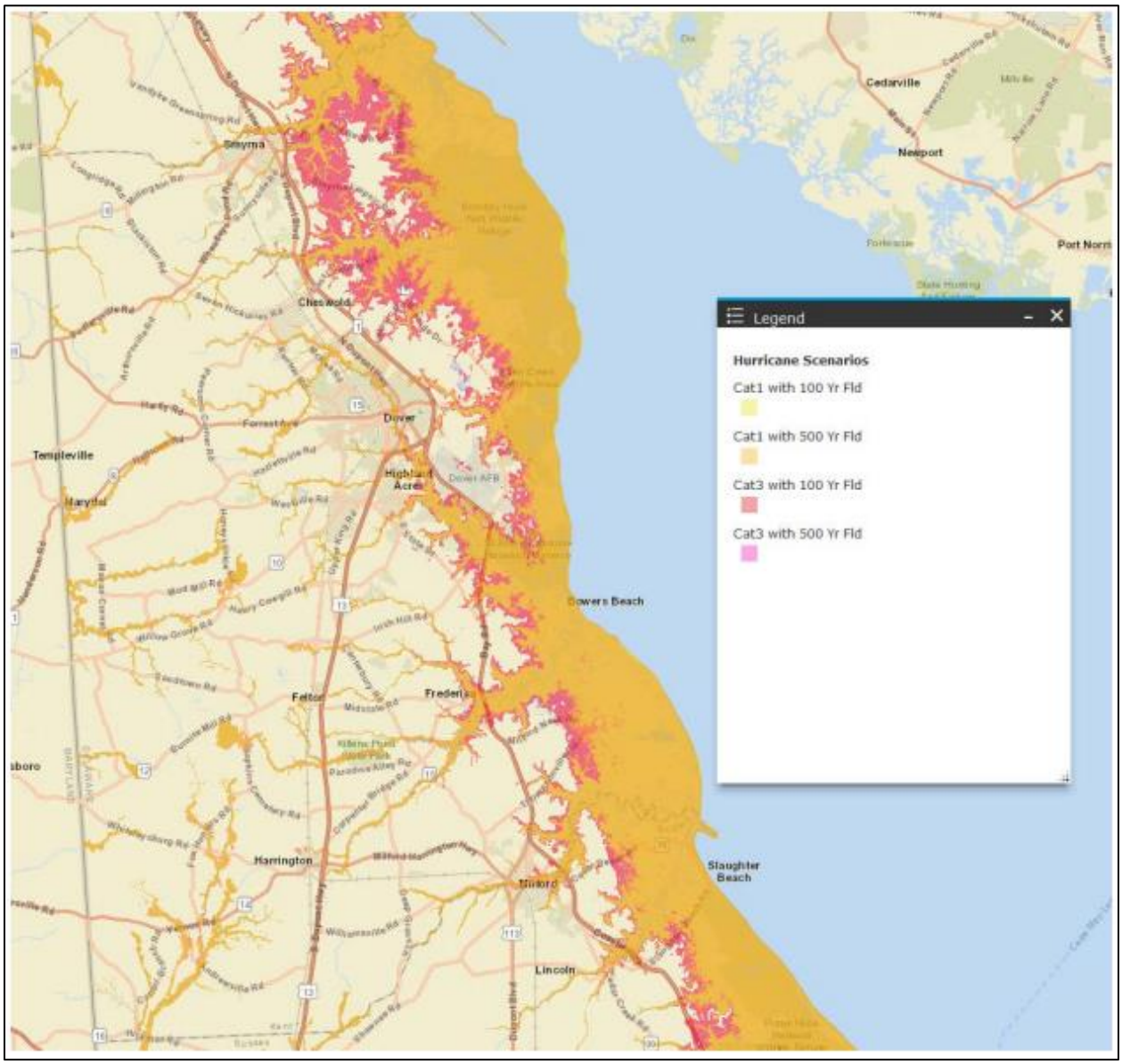
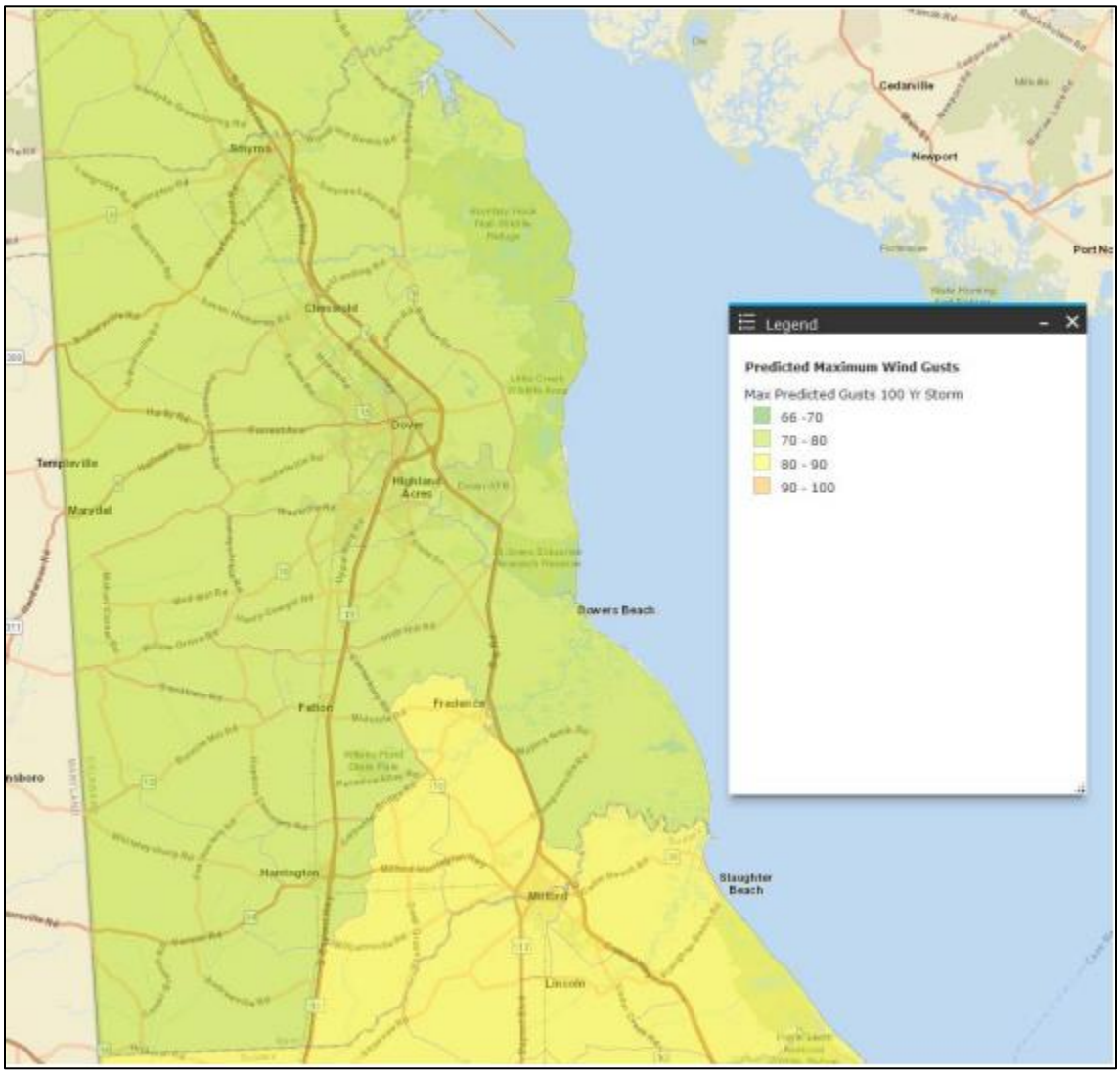


Figure 4.4 Maximum Wind Gusts for 100-yr Storm



4.2.3.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 4 recorded Hurricanes and Coastal Storms (direct landfall) in Kent County between 1996 and 2020), resulting in $8.5M in property damage. There were zero recorded injuries and deaths as a result of coastal storms or hurricanes in the County. Table 4.7 shows the past occurrences in the County since 1998, while Figure 4.5 shows tracks of all Hurricanes (Category 1 to 3) that have come within 200 nautical miles of Lewes, DE from 1851 until 2014.[40]

Table 4.7 Previous Hurricane/Tropical Storm Occurrences

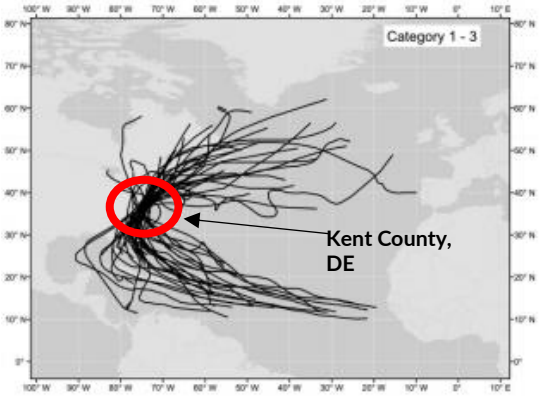
Location	County/Zone	St.	Date	Time	Type	Dth	Inj	PrD	CrD
Totals:						0	0	8.500M	0.00K
KENT (ZONE)	KENT (ZONE)	DE	07/13/1996	02:00	Tropical Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	09/18/2003	15:00	Tropical Storm	0	0	8.500M	0.00K

[40] State of Delaware Hazard Mitigation Plan, 2018

KENT (ZONE)	KENT (ZONE)	DE	09/06/2008	10:00	Tropical Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	08/27/2011	13:00	Tropical Storm	0	0	0.00K	0.00K
Totals:						**0**	**0**	**8.500M**	**0.00K**

Although there have only been four that have made direct landfall or tracked through Kent County as a hurricane or tropical storm, there have been many other post-tropical storms have tracked through Delaware causing inland and coastal flooding impacts. The most significant coastal storms to track through Kent County are described in detail below.

Figure 4.5 Tracks of all Hurricanes within 200 miles of Lewes, DE (1851-2914)



Hurricane Sandy (2012) - Post Tropical Storm Sandy caused an estimated $5.5 million dollars of damage across the three counties in Delaware. The damage estimates from the state were broken down to $2.8 million in New Castle County, $832,000 in Kent County and $1.9 million in Sussex County. Damages were due to tidal flooding as significant wave action resulted during multiple high tide cycles, due to increasing onshore winds prior to landfall. Damages were also due in part to inland flooding caused by excessive rainfall, as up to 10 inches of rain were reported. In addition, high winds resulted in many trees and wires coming down statewide. This created 100,000 power outages and resulted in many road closures due to downed trees and flooding. The hardest hit county was New Castle County. All power was restored by November 2nd. No direct deaths or injuries were reported in Delaware due to the storm and the overall number of traffic accidents was low because of driving restrictions.

Hurricane Irene (2011) – Hurricane Irene Hurricane Irene produced heavy flooding rain, widespread tropical storm force wind gusts, a confirmed tornado near Lewes in Sussex County, moderate to severe coastal flooding and beach erosion and caused two flooding related deaths, forced evacuations near the coast over the weekend of August 27th and 28th in Delaware. About 100,000 people were evacuated from the Atlantic Coast. Numerous roadways were flooded and closed and thousands of trees were knocked down. About 100,000 utility customers lost power. In addition, chickens were killed by flooding and agricultural crops were damaged by the flooding. Delaware received federal disaster declaration.

Tropical Storm Hanna (2008) – Tropical Storm Hanna brought heavy rain and strong winds in Delaware and some minor tidal flooding in Delaware Bay on the 6th. Rain moved into the region during the morning, fell heavy at times in the afternoon and ended during the early evening. Storm totals ranged from around 1 to around 3.5 inches. The strongest winds occurred during the late morning and afternoon with peak gusts as high as 53 mph. About 10,000 homes and businesses lost power on the Delmarva Peninsula. All power was restored by the 7th. Minor tidal flooding occurred in Delaware Bay during the afternoon as the surge averaged two to three feet. Many planned outdoor activities were cancelled. The heavy rain caused minor roadway and low lying area flooding. The unseasonably dry weather leading into Hanna prevented stream and river flooding from occurring. The pounding surf caused about a three foot vertical cut to occur at Rehoboth Beach. Peak wind gusts included 44 mph in Dover (Kent County).

Hurricane Isabel (2003) - Isabel developed as a tropical storm September 6 about 600 miles west of the Southern Cape Verde Islands. The following day the storm was upgraded to a hurricane and within five days Isabel became the first Category 5 hurricane in the Atlantic since Hurricane Mitch in 1998. Isabel made landfall along the U.S. East Coast on September 18 as a Category 2 storm. Seven federal disaster declarations were issued as a result of Isabel, including the State of Delaware. Isabel may become best known for the wide-spread power outages it caused. Two days after Isabel lashed Delaware with wind and rain, approximately 60,000 of Conectiv's 280,000 customers were without power. A spokesperson for the power company said that trees falling across power lines caused most of the outages.

Tropical Storm Henri (Remnants—2003) - The National Weather Service reported that over a two-day period remnants of Tropical Storm Henri dumped eight (8) to 10 inches of rain in a narrow, slow-moving band that included central and northern Delaware, with 7.08 inches reported in Hockessin over a period of a few hours. Much of the region already had received above-normal rainfall in recent weeks.

Tropical Storm Allison (Remnants—2001) - Showers and thunderstorms associated with the remnants of Tropical Storm Allison dropped heavy rain across New Castle County from the mid-afternoon through the early evening of the 16th. The heavy rain caused flooding on some of the smaller steams in the county as well as some urban and poor drainage flooding. As the low moved east of the New Jersey coast during the morning of the 17th, heavy rain fell again for a couple of hours near dawn. Storm totals averaged between two (2) and four (4) inches and included 3.94 inches at the Dover Air Force Base. No serious damages or injuries were reported.

Hurricane Floyd (1999) - According to the National Climatic Data Center, one notable hurricane has impacted the State of Delaware in recent history—Hurricane Floyd, which brought torrential rains and damaging winds on September 16, 1999. The hurricane caused widespread flash flooding as storm totals averaged around nine inches (10.58 inches in Sussex County). Most of this rain fell within a 12-hour period establishing a new state record. A total of $8 million in property damage was reported, along with two fatalities—the first hurricane-related deaths in the state since Hurricane Hazel in 1954. In addition, there were a number of injuries, at least two of which were serious. Overall, the event most heavily affected New Castle County, Kent County's neighbor to the north.

Hurricane Dennis (1999) - The combination of swells from Hurricane Dennis and a stiff northeast flow caused by a strong high pressure system building over the New England States produced rip currents and minor tidal flooding. Rip currents from Dennis started along the Delaware Beaches on Sunday August 29th. About 100 rescues occurred with a few minor injuries. On the 30th, swimming was banned at most of the Delaware Beaches. As Dennis pulled east of North Carolina on the 31st and weakened, the rip currents slowly ceased. A major contributing factor to the winds and rip currents was a very strong high pressure system that built into eastern Canada and the New England States on the 30th and 31st. The northeast flow around it and Hurricane Dennis produced wind gusts up to 50 MPH on the 30th and caused some minor tidal flooding from around noon on the 30th into the afternoon of the 31st. Minor tidal flooding extended into the back bays and inlets as the northeast winds prevented the tide from receding. As both Dennis and the high pressure system weakened, tides subsided after the afternoon of the 31st. The constant pounding and strong winds did cause beach erosion.

Hurricane Edouard (1996)

On August 30, 1996, a hurricane watch and tropical storm warning was issued from Cape Lookout, North Carolina northward to Cape Henlopen, Delaware (including the Pamlico and Albermarle Sounds) in preparation for the approach of Hurricane Edouard. The hurricane watch was extended northward the following day to include north of Cape Henlopen, Delaware to Plymouth, Massachusetts. Early on September 2, Edouard veered sharply toward the northeast and the center of the hurricane passed about 75 nautical miles southeast of Nantucket Island, its closest point of approach to the United States.

Tropical Storm Bertha (1996)

A weakening Tropical Storm Bertha passed across the state on July 13, 1996. While the long trip over land from Wilmington, North Carolina through Virginia to Delaware did weaken Bertha, some wind-related damage did occur in Kent and Sussex counties. The only tidal flooding reported was minor and occurred on Delaware State Route 54 near Fenwick Island, one of the most flood-prone roads in the state. Beach erosion was minor. The storm dropped between 1.5 and three inches of rain across most of the state, with locally higher amounts of around four inches reported in Sussex County just south of Kent County. This caused some poor drainage flooding, but the only river to flood was the Christina in New Castle County to the north.

Other significant storms include Hurricane Agnes (1972), Hurricane Camille (1969), Hurricane Donna (1960), Hurricane Connie and Diane (1955), Hurricane Hazel (1954), Hurricanes Corl and Edna (1954).

4.2.3.4 Future Occurrences

According to the NCEI Storms Events Database, there have been 4 recorded Hurricanes and Coastal Storms (direct landfall) in Kent County between 1996 and 2020. For the purposes of this Plan Update, a Poisson probabilistic model may be applied to determine the annual probability of occurrence for these types of hazard events. The average annual rate of occurrence, $\lambda = 4/24 = 0.167$. The probability P (at least one hurricane or coastal storm in a year) = $1 - e^{-\lambda} = 1 - e^{-0.167} = 15\%$.

4.2.4 Severe Thunderstorms and Tornados

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.

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 (but sometimes result from hurricanes or tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and windblown debris.

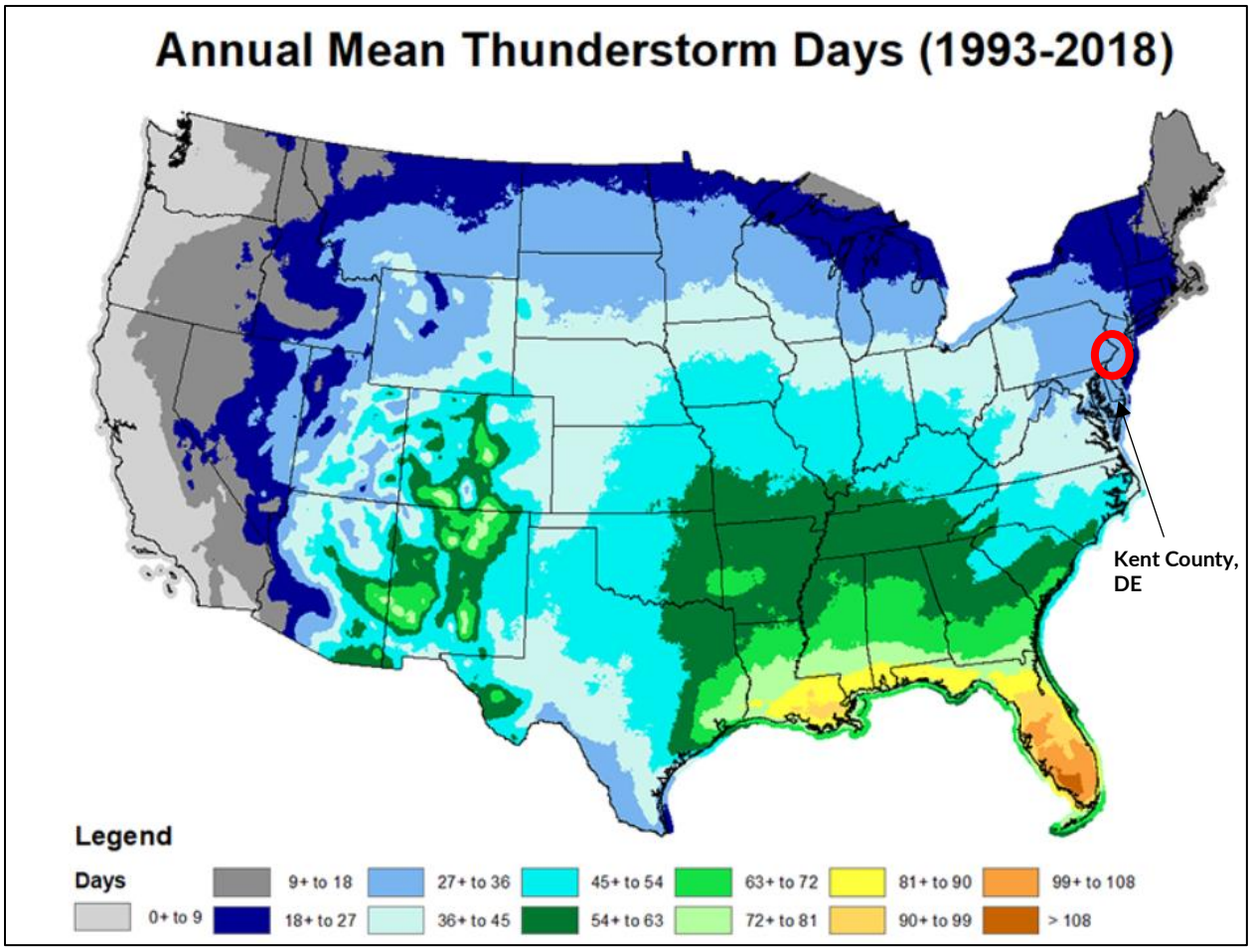
Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning 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 causes thunder. On average, 89 people are killed each year by lightning strikes in the United States.

4.2.4.1 Location and Extent

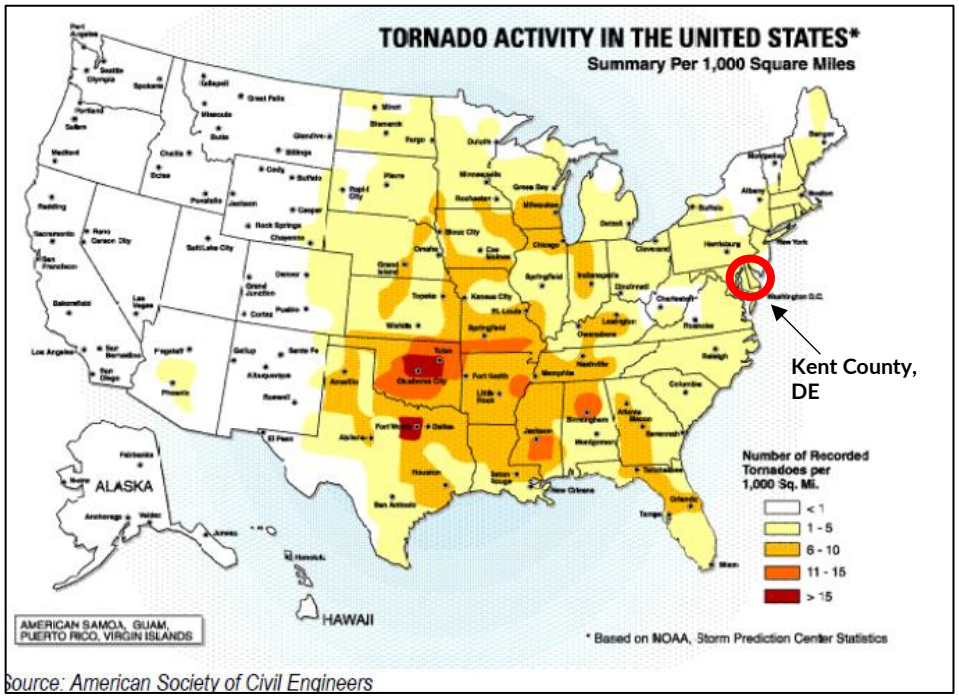
Although thunderstorms generally affect a small area when they occur, they are very dangerous because of their ability to generate tornadoes, hailstorms, strong winds, flash flooding, and damaging lightning. While thunderstorms can occur in all regions of the United States, they are most common in the central and southern states because atmospheric conditions in those regions are most ideal for generating these powerful storms. Although tornadoes and severe thunderstorms generally impact an isolated area in any given event, there is the potential for these events to impact any part of the County. Figure 4.6 shows the annual mean thunderstorm days throughout the U.S, and Delaware is located the zone of 40-50 annual events, while Figure 4.7 portrays the tornado activity throughout the U.S, and Figure 4.8 shows wind zones in the U.S.

Figure 4.6 Annual Mean Thunderstorm Days in the U.S.



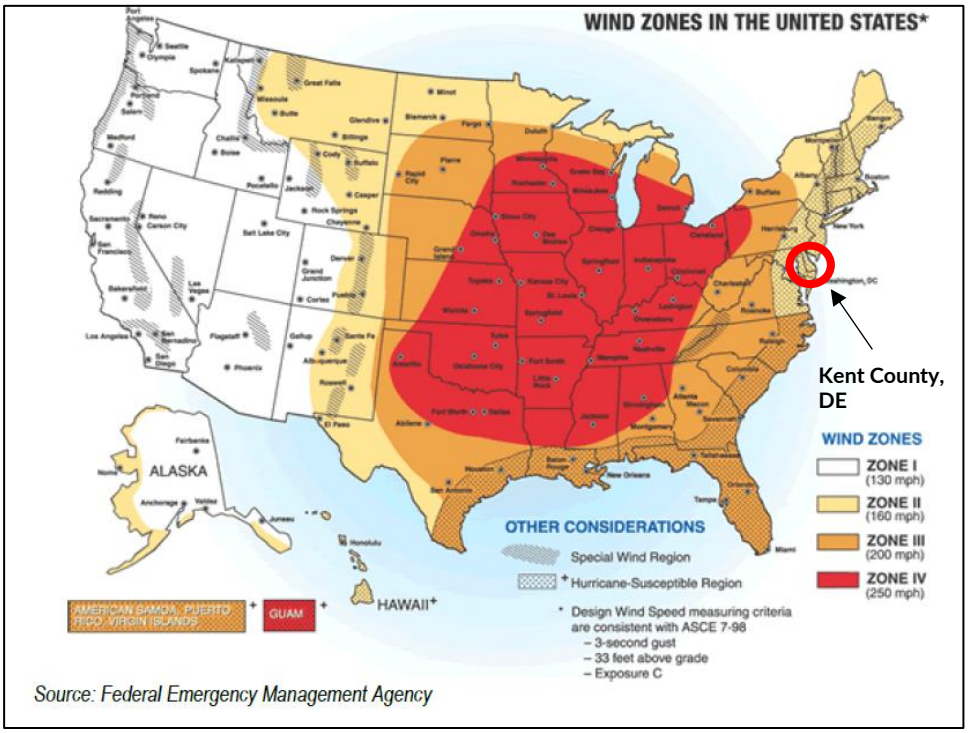
Source: National Weather Service

Figure 4.7 Tornado Activity in the U.S.



Source: American Society of Civil Engineers

Figure 4.8 Wind Zones in the U.S



Source: Federal Emergency Management Agency

4.2.4.2 Range of Magnitude

Tornadoes and "microbursts" can occur during thunderstorms and other weather systems where relatively high winds prevail. Tornadoes are classified according to the Enhanced Fujita (EF) scale which is based on wind speed and degrees of damages applied to various structure types. There are six categories of tornadoes with the weakest labeled as EF0 and the most intense, as EF5 (Table 4.4). Hurricanes are classified according to the Saffir-Simpson scale (Table 4.8), ranging from Category 1 (weakest) to Category 5 (strongest).

Table 4.8 Saffir-Simpson Scale

Category	Wind Speed (mph)	Damage Level	Type of Damage Done
EF0	65-85	Light	Some damage to chimneys; breaks branches off trees.
EF1	86-110	Moderate	Peels surface off roofs; mobile homes pushed off foundations or overturned.
EF2	111-135	Considerable	Roofs torn off frame houses; mobile homes demolished; large trees snapped or uprooted.
EF3	136-165	Severe	Roof and some walls torn off well- constructed houses; trains overturned; most trees uprooted.
EF4	166-200	Devastating	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	>200	Incredible	Strong frame houses lifted off foundations; automobile sized missiles carried in excess of 100 meters; steel reinforced concrete structures badly damaged.

4.2.4.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 168 recorded Thunderstorm Wind and Tornado events in Kent County between 1958 and 2020 (148 thunderstorm wind, 20 tornados), which has resulted in $7.431M in property damage and $100K in crop damage. These 168 events have resulted in 2 deaths and 58 injuries.[41] Table 4.9 shows the past occurrences in the County since 1998.

Table 4.9 Past Thunderstorm Wind and Tornado Occurrences

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								2	58	7.431M	100.00K
KENT CO.	KENT CO.	DE	08/25/1958	14:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/16/1961	15:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1962	20:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1962	20:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	04/23/1963	19:00	CST	Thunderstorm Wind	53 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	03/26/1964	14:00	CST	Tornado	F1	0	0	2.50K	0.00K
KENT CO.	KENT CO.	DE	08/26/1964	15:00	CST	Thunderstorm Wind	58 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/16/1966	21:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K

[41]https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Thunderstorm+Wind&eventType=%28C%29+Tornado&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

KENT CO.	KENT CO.	DE	01/27/1967	13:30	CST	Tornado	F2	0	7	250.00K	0.00K
KENT CO.	KENT CO.	DE	08/25/1968	20:55	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/18/1970	17:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/04/1970	15:50	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	01/26/1971	12:45	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	01/26/1971	14:00	CST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	05/12/1974	15:45	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	09/03/1974	18:17	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	12/01/1974	18:52	CST	Thunderstorm Wind	53 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	04/03/1975	08:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	04/03/1975	09:30	CST	Tornado	F1	0	3	250.00K	0.00K
KENT CO.	KENT CO.	DE	06/19/1975	21:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/04/1975	18:30	CST	Tornado	F0	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	03/13/1976	11:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	03/13/1977	18:20	CST	Tornado	F1	0	0	25.00K	0.00K
KENT CO.	KENT CO.	DE	06/09/1977	09:57	CST	Tornado	F2	0	1	250.00K	0.00K
KENT CO.	KENT CO.	DE	07/06/1977	17:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/03/1980	15:33	CST	Thunderstorm Wind	58 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/03/1980	15:40	CST	Thunderstorm Wind	60 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/15/1980	19:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/03/1980	17:00	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/11/1980	21:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1981	15:00	CST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	04/03/1982	17:20	CST	Thunderstorm Wind	55 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/16/1982	22:15	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/16/1982	22:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/16/1982	22:45	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/16/1982	23:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	05/15/1983	14:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	05/15/1983	14:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1983	18:50	CST	Tornado	F2	2	9	250.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1983	19:05	CST	Thunderstorm Wind	62 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1983	19:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/11/1983	18:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/22/1983	19:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	11/15/1983	17:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	05/08/1984	16:20	CST	Thunderstorm Wind	55 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	09/03/1984	18:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K

KENT CO.	KENT CO.	DE	09/03/1984	18:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/31/1985	16:40	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/12/1987	11:10	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/21/1987	17:00	CST	Thunderstorm Wind	70 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/07/1988	14:35	EDT	Tornado	F1	0	30	2.500M	0.00K
KENT CO.	KENT CO.	DE	06/07/1988	14:49	CST	Thunderstorm Wind	57 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/15/1988	18:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/15/1988	18:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	03/18/1989	15:15	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/15/1989	18:15	CST	Thunderstorm Wind	57 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	11/16/1989	08:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	02/23/1990	21:30	CST	Thunderstorm Wind	0 kts.	0	1	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/08/1990	17:08	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/10/1990	18:20	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/08/1991	13:15	EST	Tornado	F0	0	0	250.00K	0.00K
KENT CO.	KENT CO.	DE	07/10/1992	17:43	PST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	07/31/1992	17:00	EST	Tornado	F1	0	0	25.00K	0.00K
KENT CO.	KENT CO.	DE	07/31/1992	17:20	EST	Tornado	F2	0	0	250.00K	0.00K
Harrington to	KENT CO.	DE	04/01/1993	19:20	EST	Tornado	F0	0	0	5.00K	0.00K
Bowers Beach	KENT CO.	DE	04/01/1993	19:47	EST	Tornado	F1	0	0	50.00K	0.00K
Harrington	KENT CO.	DE	04/26/1993	14:45	EST	Thunderstorm Wind	0 kts.	0	0	50.00K	0.00K
Dover Cheswold	KENT CO.	DE	06/27/1994	12:00	EST	Thunderstorm Wind	54 kts.	0	0	0.00K	0.00K
Petersburg	KENT CO.	DE	06/27/1994	12:00	EST	Tornado	F1	0	0	0.00K	0.00K
Farmington	KENT CO.	DE	07/27/1994	18:35	EST	Tornado	F0	0	4	200.00K	0.00K
Harrington	KENT CO.	DE	07/27/1994	18:40	EST	Tornado	F1	0	0	400.00K	0.00K
KENT CO.	KENT CO.	DE	07/27/1994	18:47	EST	Tornado	F0	0	0	200.00K	0.00K
Felton	KENT CO.	DE	07/27/1994	18:50	EST	Thunderstorm Wind	65 kts.	0	0	200.00K	0.00K
DOVER	KENT CO.	DE	04/30/1996	16:00	EST	Thunderstorm Wind		0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	02/22/1997	13:20	EST	Thunderstorm Wind		0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	02/22/1997	13:35	EST	Thunderstorm Wind		0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	06/22/1997	16:30	EST	Thunderstorm Wind		0	0	0.00K	0.00K
COUNTYWIDE	KENT CO.	DE	06/01/1998	00:30	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	06/13/1998	16:33	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
MILFORD	KENT CO.	DE	06/16/1998	19:45	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	06/26/1998	16:00	EST	Thunderstorm Wind	70 kts.	0	0	1.500M	0.00K
MARYDEL	KENT CO.	DE	06/26/1998	17:25	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
VIOLA	KENT CO.	DE	08/18/1998	16:50	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	09/02/1998	08:20	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K

CLAYTON	KENT CO.	DE	02/12/1999	17:30	EST	Thunderstorm Wind		0	1	200.00K	0.00K
CANTERBURY	KENT CO.	DE	02/25/2000	18:00	EST	Thunderstorm Wind		0	0	0.00K	0.00K
DOVER	KENT CO.	DE	05/13/2000	19:45	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
PETERSBURG	KENT CO.	DE	05/13/2000	20:00	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	06/02/2000	19:20	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	06/26/2000	01:00	EST	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
MARYDEL	KENT CO.	DE	09/19/2000	14:15	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	04/09/2001	20:10	EST	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	07/01/2001	17:30	EST	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
COUNTYWIDE	KENT CO.	DE	09/04/2001	19:15	EST	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
LEIPSIC	KENT CO.	DE	04/28/2002	21:25	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
BLACKISTON	KENT CO.	DE	05/12/2002	17:12	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
DOVER AFB	KENT CO.	DE	05/12/2002	19:09	EST	Thunderstorm Wind	74 kts. M	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	05/14/2002	19:10	EST	Thunderstorm Wind	50 kts. E	0	0	0.00K	0.00K
WOODSIDE	KENT CO.	DE	05/18/2002	07:13	EST	Thunderstorm Wind	61 kts. E	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	06/06/2002	15:55	EST	Thunderstorm Wind	57 kts. E	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	06/06/2002	16:15	EST	Thunderstorm Wind	52 kts. M	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	07/09/2002	20:30	EST	Thunderstorm Wind	52 kts. E	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	07/05/2003	22:30	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BOWERS	KENT CO.	DE	07/05/2003	23:18	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	07/06/2003	21:58	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
KENTON	KENT CO.	DE	07/09/2003	17:05	EST	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	08/12/2003	13:06	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BOWERS	KENT CO.	DE	08/12/2003	13:18	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WYOMING	KENT CO.	DE	08/16/2003	15:10	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	08/30/2003	15:52	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	09/23/2003	06:23	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	10/14/2003	22:20	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	05/15/2004	21:55	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ANDREWSVILLE	KENT CO.	DE	05/25/2004	20:25	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FREDERICA	KENT CO.	DE	06/01/2004	15:58	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	06/10/2004	18:25	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	07/12/2004	15:02	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
LEIPSIC	KENT CO.	DE	07/12/2004	15:10	EST	Tornado	F0	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	07/14/2004	16:24	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	06/06/2005	19:10	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEIPSIC	KENT CO.	DE	06/28/2005	15:20	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SANDTOWN	KENT CO.	DE	07/27/2005	18:55	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K

SMYRNA	KENT CO.	DE	07/04/2006	16:35	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	07/04/2006	17:20	EST	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
MILFORD	KENT CO.	DE	07/04/2006	18:05	EST	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	07/05/2006	13:54	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	07/28/2006	14:12	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	07/28/2006	15:00	EST	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
KENTON	KENT CO.	DE	05/16/2007	17:00	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MILFORD	KENT CO.	DE	05/16/2007	17:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	05/27/2007	22:52	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MAGNOLIA	KENT CO.	DE	06/28/2007	15:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	07/10/2007	14:45	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MARYDEL	KENT CO.	DE	04/28/2008	15:38	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	05/31/2008	14:20	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CHESWOLD	KENT CO.	DE	06/04/2008	15:49	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HOUSTON	KENT CO.	DE	06/14/2008	20:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	06/16/2008	16:22	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	07/06/2008	13:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LEIPSIC	KENT CO.	DE	07/27/2008	14:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MILFORD	KENT CO.	DE	12/12/2008	00:58	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
LITTLE CREEK	KENT CO.	DE	04/06/2009	06:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BLACKISTON	KENT CO.	DE	06/09/2009	17:13	EST-5	Thunderstorm Wind	56 kts. EG	0	0	100.00K	0.00K
VERNON	KENT CO.	DE	06/13/2009	16:00	EST-5	Thunderstorm Wind	70 kts. EG	0	0	100.00K	100.00K
DOVER	KENT CO.	DE	07/25/2009	21:48	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	07/29/2009	16:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAZLETTVILLE	KENT CO.	DE	07/31/2009	15:30	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
OAK GROVE	KENT CO.	DE	07/31/2009	15:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	08/09/2009	18:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	08/09/2009	18:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	06/22/2010	20:58	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	06/24/2010	16:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	06/28/2010	15:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
DOVER	KENT CO.	DE	07/20/2010	13:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SANDTOWN	KENT CO.	DE	02/25/2011	13:45	EST-5	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	06/09/2011	20:55	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
PLYMOUTH	KENT CO.	DE	07/19/2011	13:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	07/19/2011	14:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	07/31/2011	15:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	08/14/2011	10:25	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

DOVER	KENT CO.	DE	08/14/2011	10:50	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	08/19/2011	14:00	EST-5	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
DUPONT MANOR	KENT CO.	DE	08/21/2011	09:35	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	08/21/2011	09:35	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	08/21/2011	09:50	EST-5	Thunderstorm Wind	67 kts. MG	0	0	0.00K	0.00K
SANDTOWN	KENT CO.	DE	06/29/2012	22:57	EST-5	Thunderstorm Wind	61 kts. EG	0	0	50.00K	0.00K
SMYRNA	KENT CO.	DE	07/18/2012	17:07	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	07/18/2012	17:37	EST-5	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
WYOMING	KENT CO.	DE	09/03/2012	14:20	EST-5	Tornado	EF0	0	0	100.00K	0.00K
MARYDEL	KENT CO.	DE	09/08/2012	16:25	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
SMYRNA	KENT CO.	DE	09/08/2012	16:33	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	09/08/2012	16:43	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	09/08/2012	16:48	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	06/13/2013	16:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	02/21/2014	13:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
HAGLETTVILLE	KENT CO.	DE	05/22/2014	15:45	EST-5	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
HAGLETTVILLE	KENT CO.	DE	05/22/2014	15:54	EST-5	Tornado	EF1	0	2	150.00K	0.00K
MARYDEL	KENT CO.	DE	07/02/2014	23:21	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
HARTLY	KENT CO.	DE	07/02/2014	23:29	EST-5	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
SMYRNA	KENT CO.	DE	07/02/2014	23:35	EST-5	Thunderstorm Wind	56 kts. EG	0	0	25.00K	0.00K
CHESWOLD	KENT CO.	DE	07/02/2014	23:38	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	07/02/2014	23:42	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BIG OAK CORNER	KENT CO.	DE	07/08/2014	19:35	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	06/01/2015	18:15	EST-5	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
CANTERBURY	KENT CO.	DE	07/09/2015	19:30	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	02/24/2016	21:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	04/02/2016	22:35	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MARYDEL	KENT CO.	DE	04/07/2016	17:28	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
KENTON	KENT CO.	DE	04/07/2016	17:39	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	06/08/2016	11:00	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	07/18/2016	16:30	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	07/28/2016	16:26	EST-5	Thunderstorm Wind	55 kts. MG	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	08/14/2016	20:50	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	03/01/2017	14:53	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	03/01/2017	14:55	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	03/01/2017	14:57	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	03/01/2017	14:58	EST-5	Thunderstorm Wind	66 kts. MG	0	0	0.00K	0.00K
HAGLETTVILLE	KENT CO.	DE	06/05/2018	18:01	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K

FELTON	KENT CO.	DE	08/31/2018	11:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MILFORD	KENT CO.	DE	08/31/2018	11:36	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MARYDEL	KENT CO.	DE	04/15/2019	02:12	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	04/26/2019	15:58	EST-5	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
CHESNUT GROVE	KENT CO.	DE	05/26/2019	19:40	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
BOWERS	KENT CO.	DE	05/26/2019	20:04	EST-5	Thunderstorm Wind	61 kts. MG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	05/26/2019	21:01	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
WYOMING	KENT CO.	DE	05/26/2019	21:15	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
CANTERBURY	KENT CO.	DE	05/26/2019	21:17	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	05/30/2019	16:02	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
THOMPSONVILLE	KENT CO.	DE	05/30/2019	16:14	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SEVEN HICKORIES	KENT CO.	DE	06/02/2019	18:56	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
WYOMING	KENT CO.	DE	07/17/2019	18:40	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
OAK GROVE	KENT CO.	DE	07/17/2019	18:44	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MASTEN	KENT CO.	DE	08/01/2019	15:58	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	08/01/2019	16:02	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	08/07/2019	16:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	08/07/2019	16:55	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
CAMDEN	KENT CO.	DE	08/07/2019	17:02	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CHESNUT GROVE	KENT CO.	DE	08/22/2019	21:34	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
SMYRNA ARPT	KENT CO.	DE	10/31/2019	22:49	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	10/31/2019	23:02	EST-5	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
HAGLETTVILLE	KENT CO.	DE	02/07/2020	09:35	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	02/07/2020	09:40	EST-5	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
WYOMING	KENT CO.	DE	02/07/2020	09:45	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
PETERSBURG	KENT CO.	DE	02/07/2020	09:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HAGLETTVILLE	KENT CO.	DE	02/07/2020	09:46	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	02/07/2020	09:48	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MASTEN	KENT CO.	DE	02/07/2020	09:51	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	02/07/2020	09:52	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BROOKDALE HGTS	KENT CO.	DE	02/07/2020	09:55	EST-5	Thunderstorm Wind	57 kts. MG	0	0	0.00K	0.00K
BROOKDALE HGTS	KENT CO.	DE	02/07/2020	09:56	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	02/07/2020	10:00	EST-5	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
CHESNUT GROVE	KENT CO.	DE	04/09/2020	12:22	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
PETERSBURG	KENT CO.	DE	04/13/2020	14:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
CANTERBURY	KENT CO.	DE	04/13/2020	14:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	04/13/2020	14:49	EST-5	Thunderstorm Wind	56 kts. MG	0	0	0.00K	0.00K
KITTS HUMMOCK	KENT CO.	DE	04/13/2020	14:50	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K

BROOKDALE HGTS	KENT CO.	DE	04/13/2020	14:50	EST-5	Thunderstorm Wind	69 kts. MG	0	0	0.00K	0.00K
KITTS HUMMOCK	KENT CO.	DE	04/13/2020	14:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
KITTS HUMMOCK	KENT CO.	DE	04/13/2020	14:55	EST-5	Thunderstorm Wind	59 kts. MG	0	0	0.00K	0.00K
CHAPELTOWN	KENT CO.	DE	04/21/2020	13:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MARYDEL	KENT CO.	DE	06/04/2020	21:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BLACKISTON	KENT CO.	DE	06/04/2020	21:13	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MASTEN	KENT CO.	DE	07/01/2020	18:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HOLLANDSVILLE	KENT CO.	DE	07/06/2020	19:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HOLLANDSVILLE	KENT CO.	DE	07/06/2020	19:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	07/21/2020	21:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	07/21/2020	21:32	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
BIG OAK CORNER	KENT CO.	DE	07/22/2020	17:26	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
Totals:								**2**	**58**	**7.431M**	**100.00K**

4.2.4.4 Future Occurrences

According to the NCEI Storms Events Database, there have been 53 years out of 62 years in which recorded severe thunderstorms or tornados have resulted in damages in Kent County (between 1958 and 2020). For the purposes of this Plan Update, a binomial probabilistic model may be applied to determine the annual probability of occurrence for these types of hazard events. The probability (at least one severe thunderstorm or tornado in a year) = 53/62 = 85%.

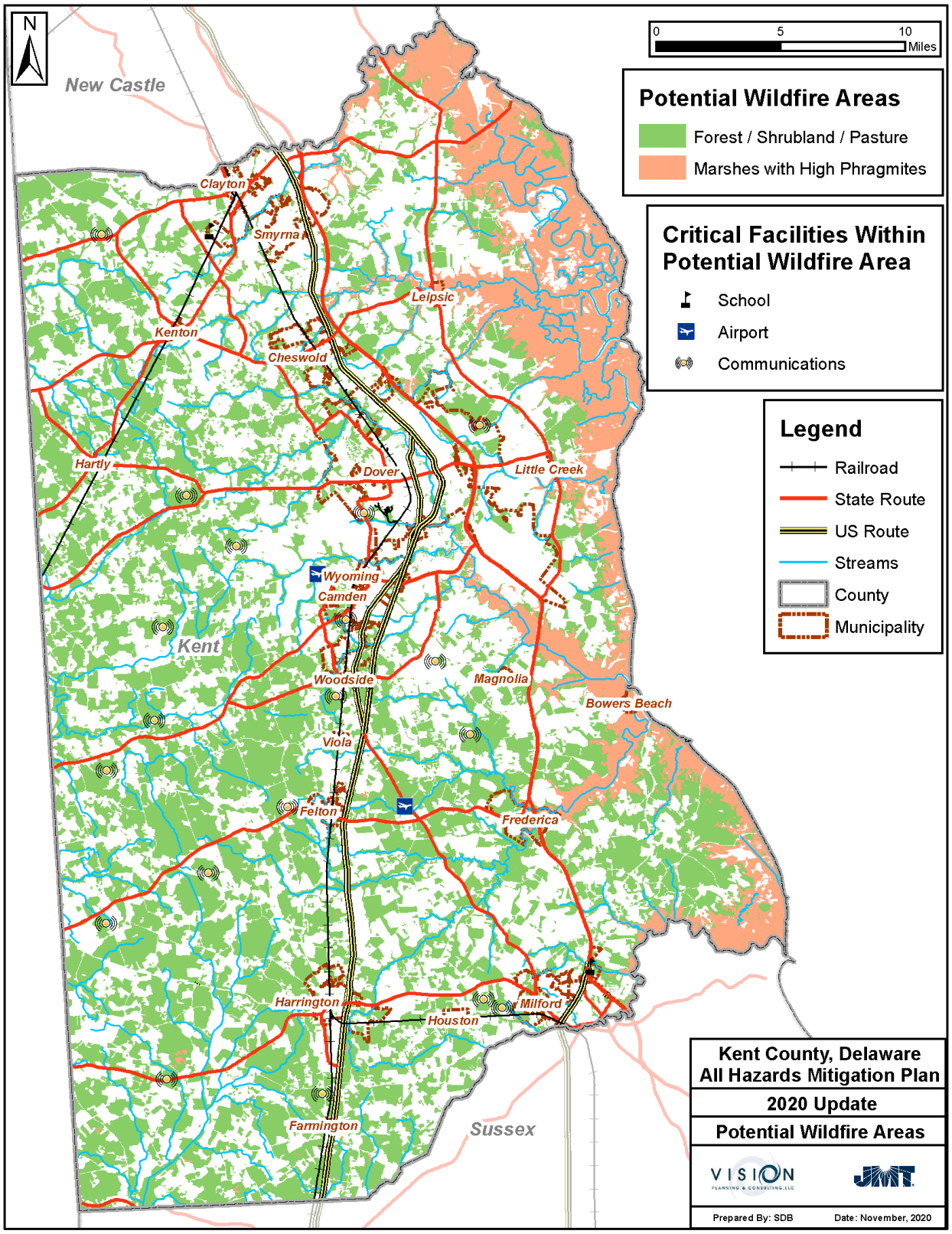
4.2.5 Wildfire

A wildfire is any fire occurring in a wild land area (i.e., grassland, forest, brush land) except for fire under prescription.1 Wildfires are part of the natural management of the Earth's ecosystems, but may also be caused by natural or human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

4.2.5.1 Location and Extent

According to the Delaware Fire Service, the greatest wildfire danger is in those marshes along the Delaware Bay that contain large amounts of phragmites. One such example is the 400 acre fire that occurred at Prime Hook in 2002. Otherwise, the climate, forest types and terrain (flat, interspersed with cropland, ditches, roads, etc.) in Delaware do not promote large wildfires. Most of the wildfires within the state are small, ground fires that are fairly easily extinguished and seldom do much damage. (Austin Short, Delaware Forest Service, austin.short@state.de.us). However, there is one other area where extreme fire behavior can occur and that is in young loblolly pine plantations that grow throughout the state, five to fifteen years of age. During this period of growth in the plantation, tree crowns touch one another and natural lower limb pruning has not yet occurred. A surface fire in such an area can easily turn into an intense crown fire. Figure 4.9 shows the Wildfire potential for Kent County, and is also shown in Appendix D.

Figure 4.9 Kent County Potential Wildfire Areas Map



4.2.5.2 Range of Magnitude

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. Table 4.10 summarizes the range of magnitude for wildfire hazards.

Table 4.10 Range of Magnitude

Severity	Causes	Frequency	Damage Exists
Minimum	Localized brush burning, contained naturally or by emergency response team	Annual	Minor loss of forest/vegetation; no damage to structures
Maximum	Extreme drought conditions prevent extinguishing and containing a fire	None Recorded	Major loss of forest, agricultural land; damage to structures

4.2.5.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 3 recorded wildfires in Kent County between 1958 and 2020, which has resulted in no recorded property or crop damage, and zero injuries and deaths.[42] Table 4.11 shows the past occurrences in the County since 1997.

Table 4.11 Previous Wildfire Occurrences

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								**0**	**0**	**0.00K**	**0.00K**
KENT (ZONE)	KENT (ZONE)	DE	07/06/2002	12:00	EST	Wildfire		0	0	0.00K	0.00K
FARMINGTON	KENT CO.	DE	08/22/2002	13:00	EST	Wildfire		0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	04/17/2005	09:20	EST	Wildfire		0	0	0.00K	0.00K
Totals:								**0**	**0**	**0.00K**	**0.00K**

4.2.5.4 Future Occurrences

Wildfires in Delaware, though rare, have occurred and can be expected to occur again especially during periods of drought. According to the NCEI Storms Events Database, there have been 3 recorded wildfires in Kent County between 1958 and 2020. For the purposes of this Plan Update, a Poisson probabilistic model may be applied to determine the annual probability of occurrence for these types of hazard events. The average annual rate of occurrence, $\lambda = 3/62 = 0.048$. The probability P(at least one wildfire in a year) $= 1 - e^{-\lambda} = 1 - e^{-0.048} = 5\%$.

[42] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Wildfire&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

4.2.6 Drought/Extreme Heat

Drought is a natural climatic condition caused by an extended period of limited rainfall beyond that which occurs naturally in a broad geographic area. High temperatures, high winds, and low humidity can worsen drought conditions, and can make areas more susceptible to wildfire. Drought is a natural climatic condition which occurs in virtually all climates, the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length.[43]

Drought is generally defined by four categories: 1) A *meteorological drought* occurs when there is a deficiency in atmospheric moisture. Depending on pre-drought conditions, a meteorological drought typically has little effect on crops or water resources; 2) A more serious drought is an *agricultural drought*, which occurs when the lack of sufficient moisture starts to inhibit crop growth; 3) Should an agricultural drought last on the order of months, it could develop into a *hydrologic drought*. The socioeconomic drought is the result of water shortages that limit the ability to supply water-dependent products in the marketplace. The hydrologic drought is the most devastating of the three types, as water resources can become significantly depleted and crops can be greatly damaged.

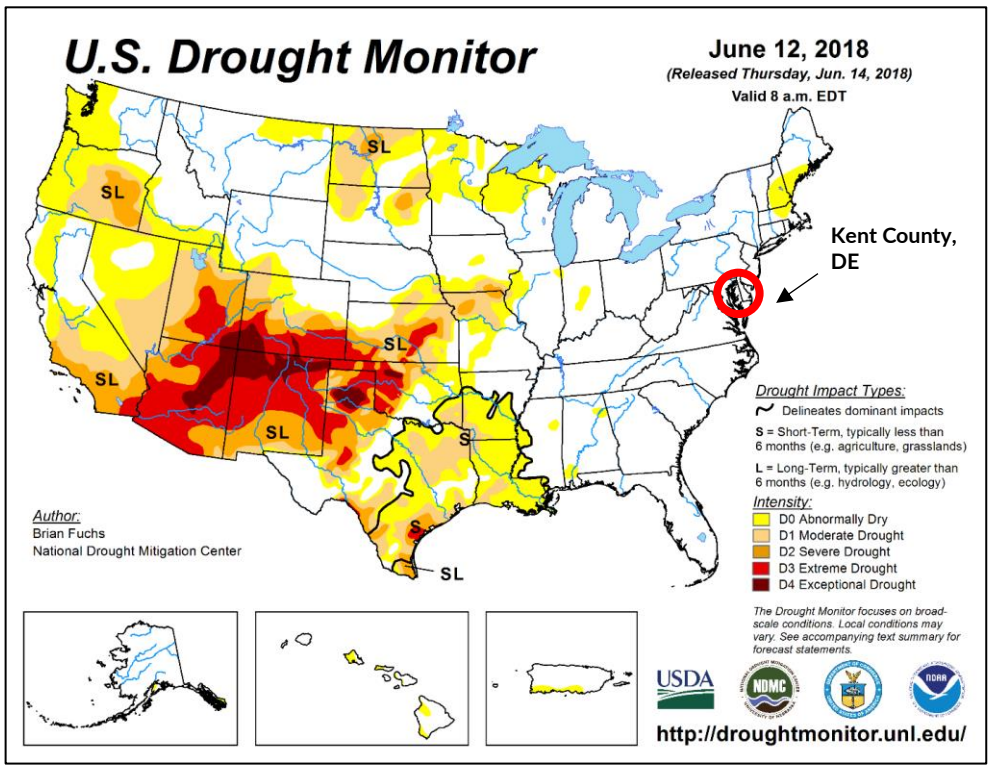
While drought mostly impacts land and water resources, extreme heat can pose a significant risk, including loss of life, to humans, animals, and some plant species as well interruptions in service from electrical utilities due to added stress on grid infrastructure. Extreme heat can be defined as temperatures that hover 10 degrees or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity.[44] Typically, extreme heat is categorized by the term 'heat wave', which is often considered a 3 day or longer period of maximum temperatures greater than or equal to 90°F. Elderly persons, young children, persons with respiratory difficulties, and those who are sick or overweight are more likely to become victims of extreme heat.

4.2.6.1 Location and Extent

Drought and extreme heat are regional hazards, and can impact all area in the county. Extreme heat can affect any location, but can have more severe impacts in through urban areas due to the urban heat island effect. Figure 4.10 shows the U.S. Drought Monitor provided by the National Drought Mitigation Center

[43] Delaware State Hazard Mitigation Plan, 2018
[44] Delaware State Hazard Mitigation Plan, 2018

Figure 4.10 U.S. Drought Monitor



4.2.6.2 Range of Magnitude

As described above, there are four general categories pertaining to the severity of a drought. To further understand drought potential and severity, the Palmer Drought Severity Index (PDSI) is typically used for tracking moisture levels and predicting droughts. The PDSI is an indicator of moisture conditions for prolonged periods of time, and ranges from -4.0 (extreme drought) to +4.0 (extremely moist). A map of current drought PDSI is provided by the National Weather Service (NWS) Climate Prediction Center (CPC): https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml.

4.2.6.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 68 recorded drought/excessive heat events in Kent County between 1997 and 2020, which has resulted in no recorded property, $8M in crop damage, and zero injuries and deaths.[45] Table 4.12 shows the past occurrences in the County since 1997.

Table 4.12 Previous Drought and Excessive Heat Occurrences

Location	St.	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:						0	0	0.00K	8.000M

[45] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Drought&eventType=%28Z%29+Excessive+Heat&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

KENT (ZONE)	DE	06/30/1997	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/31/1998	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/31/1998	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/30/1998	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/31/1998	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	11/30/1998	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	12/14/1998	09:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	12/31/1998	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	05/01/1999	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/01/1999	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/01/1999	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/31/1999	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/01/1999	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/01/1999	00:00	EST	Drought	0	0	0.00K	8.000M
KENT (ZONE)	DE	03/31/2000	23:59	EST	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/31/2000	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	04/30/2001	23:59	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	05/01/2001	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	05/02/2001	11:00	EST	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/01/2001	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	11/01/2001	00:01	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	12/01/2001	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	01/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	02/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K

KENT (ZONE)	DE	03/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	04/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	05/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	11/01/2002	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/01/2005	00:00	EST	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/26/2007	11:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/08/2007	11:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/24/2007	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/01/2007	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/07/2007	11:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/25/2007	10:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/01/2007	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/01/2007	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	11/01/2007	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	12/01/2007	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	01/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	02/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	03/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	04/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K

KENT (ZONE)	DE	05/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/07/2008	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/16/2008	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/01/2008	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/10/2009	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/23/2010	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/27/2010	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/05/2010	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/23/2010	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/21/2011	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
KENT (ZONE)	DE	04/10/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	05/01/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	06/01/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/01/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	08/01/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	09/01/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	10/01/2012	00:00	EST-5	Drought	0	0	0.00K	0.00K
KENT (ZONE)	DE	07/18/2013	09:00	EST-5	Excessive Heat	0	0	0.00K	0.00K
Totals:						**0**	**0**	**0.00K**	**8.000M**

4.2.6.4 Future Occurrences

According to the NCEI Storms Events Database, there have been 14 years out of 23 years in which recorded drought and excessive heat occurrences have resulted in damages in Kent County (between 1997 and 2020). For the purposes of this Plan Update, a binomial probabilistic model

may be applied to determine the annual probability of occurrence for these types of hazard events. The probability P (at least one drought or excessive heat condition in a year) = 14/23 = 61%.

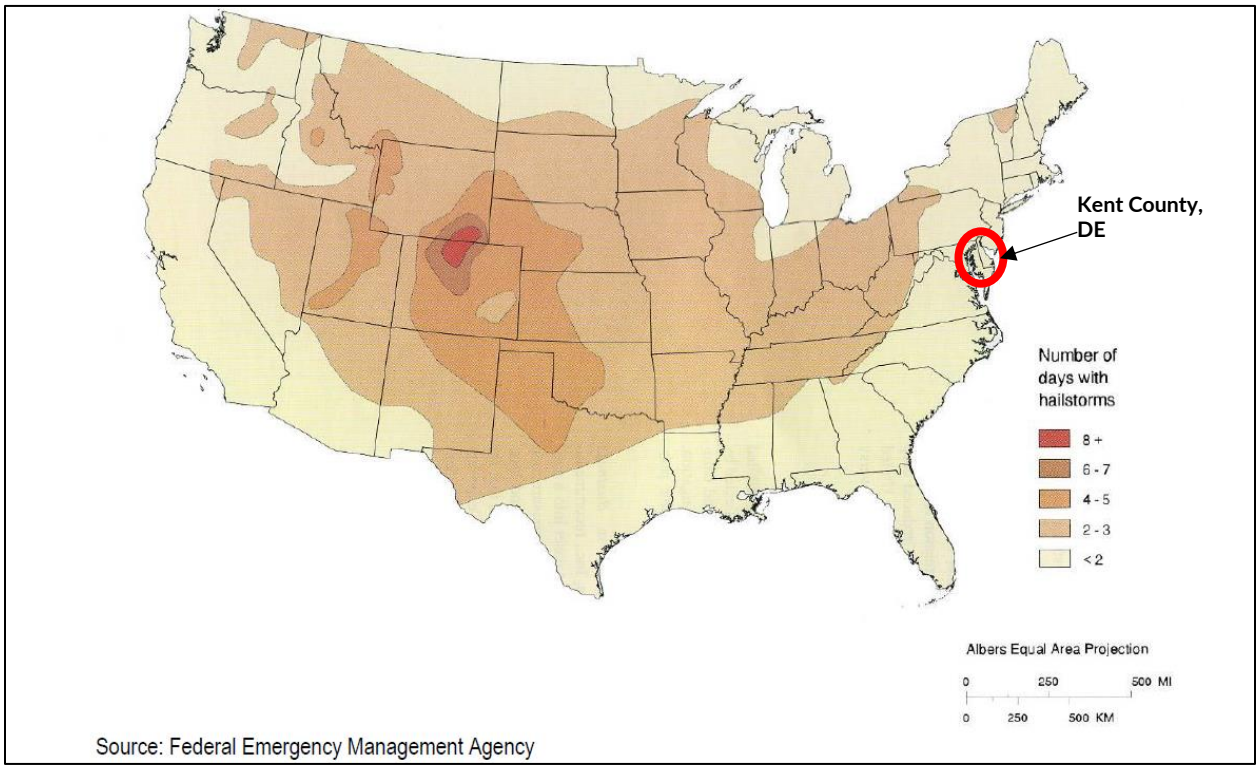
4.2.7 Hail

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.

4.2.7.1 Location and Extent

Although typically a localized event, a hail event can occur in any location in Kent County. The State of Delaware is minimally vulnerable to hailstorms; however, hail does occur in the Mid-Atlantic but is usually not large enough nor widespread enough to cause any significant damage to the built environment. It does, however, have the potential of harming crops in the agricultural areas of Kent County. As shown in Figure 4.11, the county is in the zone of one-to-two number of days with hailstorms annually.

Figure 4.11 Annual Frequency of Hailstorms in the U.S.



4.2.7.2 Range of Magnitude

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) in diameter. 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 relative to elevation above the surface result in increased suspension time and hailstone size.

4.2.7.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 26 recorded drought/excessive heat events in Kent County between 1997 and 2020, which has resulted $105K in property damage, no crop damage, and zero injuries and deaths.[46] Table 4.13 shows the past occurrences in the County since 1997.

Table 4.13 Previous Hail Occurrences

Location	County/Zone	St.	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	0	105.00K	0.00K
KENT CO.	KENT CO.	DE	07/02/1968	15:45	Hail	1.75 in.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	04/19/1969	14:00	Hail	1.50 in.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	03/21/1974	09:15	Hail	1.00 in.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/19/1975	21:00	Hail	1.75 in.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	06/03/1980	15:33	Hail	1.75 in.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	08/11/1983	18:00	Hail	1.75 in.	0	0	0.00K	0.00K
KENT CO.	KENT CO.	DE	04/24/1991	14:00	Hail	1.75 in.	0	0	0.00K	0.00K
Dover	KENT CO.	DE	04/01/1993	18:30	Hail	1.75 in.	0	0	5.00K	0.00K
BLACKISTON	KENT CO.	DE	04/09/1999	18:30	Hail	0.75 in.	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	04/28/2002	21:15	Hail	1.00 in.	0	0	100.00K	0.00K
SMYRNA	KENT CO.	DE	06/06/2002	15:55	Hail	1.50 in.	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	06/06/2002	16:25	Hail	0.75 in.	0	0	0.00K	0.00K
HARTLY	KENT CO.	DE	06/19/2002	14:45	Hail	0.75 in.	0	0	0.00K	0.00K
BOWERS	KENT CO.	DE	06/21/2003	17:05	Hail	0.75 in.	0	0	0.00K	0.00K
FELTON	KENT CO.	DE	07/22/2003	16:15	Hail	0.88 in.	0	0	0.00K	0.00K
WYOMING	KENT CO.	DE	04/24/2006	00:30	Hail	0.75 in.	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	04/24/2006	00:40	Hail	0.75 in.	0	0	0.00K	0.00K

[46]https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Hail&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

DOVER	KENT CO.	DE	09/30/2008	22:22	Hail	0.75 in.	0	0	0.00K	0.00K
HOUSTON	KENT CO.	DE	05/29/2009	16:27	Hail	1.00 in.	0	0	0.00K	0.00K
MILFORD	KENT CO.	DE	05/29/2009	16:40	Hail	1.00 in.	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	06/09/2009	17:13	Hail	0.88 in.	0	0	0.00K	0.00K
HAGLETTVILLE	KENT CO.	DE	06/09/2009	17:40	Hail	0.88 in.	0	0	0.00K	0.00K
SMYRNA	KENT CO.	DE	05/19/2011	13:06	Hail	0.75 in.	0	0	0.00K	0.00K
CLAYTON	KENT CO.	DE	06/11/2011	15:45	Hail	0.88 in.	0	0	0.00K	0.00K
MASTEN	KENT CO.	DE	05/02/2016	21:30	Hail	0.75 in.	0	0	0.00K	0.00K
FREDERICA	KENT CO.	DE	05/12/2018	19:58	Hail	1.00 in.	0	0	0.00K	0.00K
DUPONT MANOR	KENT CO.	DE	05/26/2019	19:17	Hail	0.88 in.	0	0	0.00K	0.00K
(DOV)DOVER AFB	KENT CO.	DE	05/26/2019	19:56	Hail	0.88 in.	0	0	0.00K	0.00K
DOVER ARPT	KENT CO.	DE	06/02/2019	18:58	Hail	0.75 in.	0	0	0.00K	0.00K
BROOKDALE HGTS	KENT CO.	DE	06/29/2019	15:24	Hail	1.00 in.	0	0	0.00K	0.00K
DOVER	KENT CO.	DE	06/29/2019	16:14	Hail	1.00 in.	0	0	0.00K	0.00K
HARRINGTON	KENT CO.	DE	08/01/2019	15:05	Hail	1.00 in.	0	0	0.00K	0.00K
Totals:							**0**	**0**	**105.00K**	**0.00K**

4.2.7.4 Future Occurrences

According to the NCEI Storms Events Database, there have been 26 instances, occurring in 18 years out of 52 years, in which recorded hail events resulted in damages in Kent County (between 1958 and 2020). Either a binomial or Poisson probabilistic model could be applied given the dataset, and both yield similar results. For the binomial model, the probability P (at least one hail event in a year) = 18/52 = 35%. For the Poisson model, the average annual rate of occurrence, λ = 26/52 = 0.5. The probability P (at least one hail event in a year) = $1 - e^{-\lambda} = 1 - e^{-0.5}$ = 39%.

4.2.8 Winter Storms and Freezes

Winter precipitation consists of snow, sleet, and freezing rain. Winter precipitation is often accompanied by low temperatures and can have heavy and/or blowing snow, which can severely

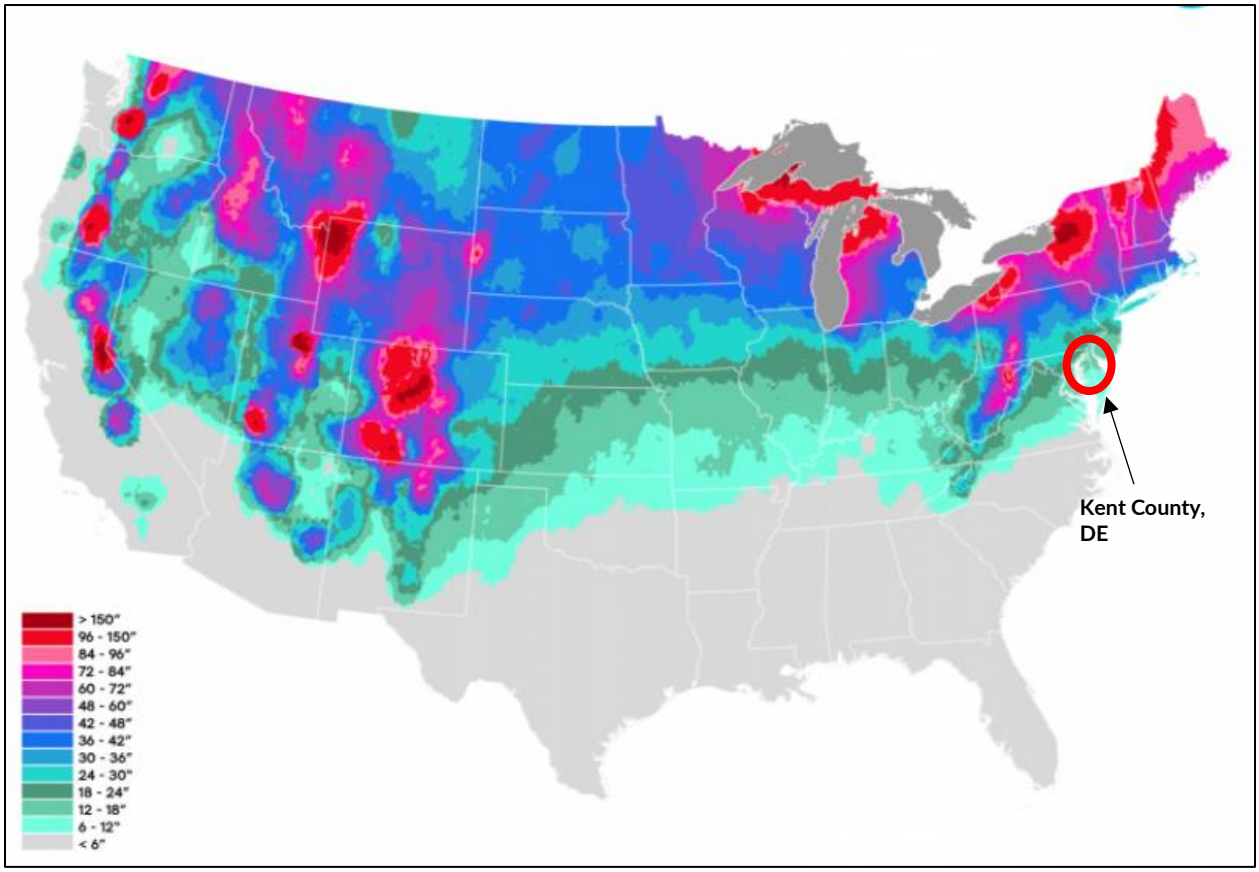
impair visibility and make driving conditions extremely hazardous. Icing from sleet and freezing rain is of particular concern, as even small accumulations of ice can cause a significant hazard.

Significant icing events can be especially devastating to power lines and trees, affecting power and communications to thousands of homes in a single event. Even small accumulations of ice can cause an extreme hazard to motorists and pedestrians by making roads and sidewalks extremely treacherous.

4.2.8.1 Location and Extent

Winter weather is a regional hazard, with county-wide impacts. Winter precipitation constitutes a significant statewide hazard in Delaware between October and April. Kent County averages 13 inches of winter precipitation annually, however, the annual variability of snowfall in Delaware is large and can range from as little as a trace of snow (1997-1998) to 72 inches (2009-2010). In recent history, the three most powerful and costly storms to affect Delaware were the Blizzard of 1996, a storm over President's Day Weekend 2003 (which deposited nearly two feet of snow in many places), and the three storms during the winter of 2009-2010 – the snowiest winter on record for Delaware. Figure 4.12 shows the average annual snowfall across the U.S, and shows Delaware falling in the range of 8-18 inches of snowfall per year.

Figure 4.12 Average Annual Snowfall in U.S.[47]



[47] National Weather Service, available at: https://www.weather.gov/lot/snowclimatology.

4.2.8.2 Range of Magnitude

The range of magnitude for winter storms and freezes are summarized in Table 4.14.

Table 4.14 Range of Magnitude - Winter Storms and Freezes

Severity	Causes	Frequency	Damage Extents
Minimum	Light Snowfall	Annual	Minor traffic disruptions
Medium	Heavy Snowfall; Freezing Rain	1 to 2 years	Road closures; some downed trees and power lines
Maximum	Excess Heavy Snowfall; Severe Icing	2 to 5 years	Substantial road closures; extensive power outages; collapse of structures

4.2.8.3 Past Occurrences

According to the NCEI Storms Events Database, there have been 114 recorded Winter Storm, Winter Weather, Ice Storm, and Frost/Freeze events in Kent County between 1996 and 2020, which has resulted $3.65M in property damage, no crop damage, and zero injuries and six deaths.[48] Table 4.15 shows the past occurrences in the County since 1996.

Table 4.15 Winter Storm, Winter Weather, Ice Storm, Frost/Freeze Past Occurrences

Location	County/Zone	St.	Date	Time	T.Z.	Type	Dth	Inj	PrD	CrD
Totals:							**0**	**6**	**3.650M**	**0.00K**
KENT (ZONE)	KENT (ZONE)	DE	01/06/1996	23:00	EST	Winter Storm	0	0	500.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/02/1996	03:00	EST	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/02/1996	00:15	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/09/1997	10:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/11/1997	01:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/23/1998	16:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/02/1999	22:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/08/1999	09:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/14/1999	04:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/09/1999	12:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/25/2000	02:00	EST	Winter Storm	0	0	0.00K	0.00K

[48]https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Frost%2FFreeze&eventType=%28Z%29+Ice+Storm&eventType=%28Z%29+Winter+Storm&eventType=%28Z%29+Winter+Weather&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2020&county=KENT%3A1&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=10%2CDELAWARE

KENT (ZONE)	KENT (ZONE)	DE	12/05/2002	02:00	EST	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/05/2003	11:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/29/2003	03:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/30/2003	15:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/10/2003	08:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/15/2003	00:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/16/2003	03:00	EST	Winter Storm	0	0	1.300M	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/06/2003	00:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/17/2004	19:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/27/2004	20:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/05/2004	22:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/17/2004	15:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/19/2004	01:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/19/2004	20:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/19/2005	11:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/22/2005	09:00	EST	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/29/2005	21:00	EST	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/07/2005	20:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/28/2005	10:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/01/2005	00:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/08/2005	11:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/09/2005	03:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/25/2006	05:00	EST	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/12/2006	03:00	EST	Winter Storm	0	0	0.00K	0.00K

KENT (ZONE)	KENT (ZONE)	DE	01/21/2007	16:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/25/2007	19:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/07/2007	01:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/13/2007	07:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/25/2007	12:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/07/2007	08:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/16/2007	18:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	04/05/2007	03:00	EST-5	Frost/freeze	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/05/2007	10:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/24/2008	11:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/12/2008	12:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/14/2008	00:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/20/2008	13:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/22/2008	00:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	11/21/2008	18:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/21/2008	03:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/18/2009	17:15	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/27/2009	03:30	EST-5	Winter Storm	0	5	50.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/03/2009	03:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/01/2009	16:30	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/19/2009	00:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/31/2009	04:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/08/2010	01:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/02/2010	20:00	EST-5	Winter Weather	0	0	0.00K	0.00K

KENT (ZONE)	KENT (ZONE)	DE	02/05/2010	15:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/09/2010	18:00	EST-5	Winter Storm	0	0	1.800M	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/25/2010	02:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/16/2010	13:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/11/2011	15:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/17/2011	19:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/26/2011	04:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/01/2011	01:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/09/2011	22:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/21/2011	20:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/04/2012	23:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/09/2012	15:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/21/2012	01:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/11/2012	18:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/25/2013	15:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/28/2013	06:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/01/2013	05:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/02/2013	19:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/25/2013	04:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/08/2013	11:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/10/2014	06:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/25/2014	12:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/04/2014	22:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/09/2014	17:30	EST-5	Winter Weather	0	0	0.00K	0.00K

KENT (ZONE)	KENT (ZONE)	DE	02/12/2014	20:30	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/18/2014	02:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/25/2014	07:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/26/2014	06:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/03/2014	03:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/06/2015	05:55	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/14/2015	03:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/21/2015	13:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/26/2015	07:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/09/2015	20:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/14/2015	13:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/21/2015	14:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/26/2015	05:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/01/2015	09:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/03/2015	13:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/05/2015	08:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/17/2016	11:00	EST-5	Winter Weather	0	1	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/22/2016	14:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/05/2016	01:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/15/2016	03:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/03/2016	20:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/17/2016	00:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/07/2017	05:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	12/09/2017	12:00	EST-5	Winter Weather	0	0	0.00K	0.00K

KENT (ZONE)	KENT (ZONE)	DE	01/04/2018	05:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/06/2018	22:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	03/21/2018	09:00	EST-5	Winter Storm	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	01/12/2019	20:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/01/2019	07:30	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/10/2019	22:00	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/11/2019	01:10	EST-5	Winter Weather	0	0	0.00K	0.00K
KENT (ZONE)	KENT (ZONE)	DE	02/20/2019	08:30	EST-5	Winter Weather	0	0	0.00K	0.00K
Totals:							**0**	**6**	**3.650M**	**0.00K**

4.2.8.4 Future Occurrences

According to the NCEI Storms Events Database, there have been 114 recorded Winter Storm, Winter Weather, Ice Storm, and Frost/Freeze events in Kent County between 1996 and 2020. From this dataset, it can be expected that a winter storm or freeze event will occur in any given year, based on the region's climate and frequency of occurrence.

4.2.9 Erosion

Coastal Erosion is a general term used to describe a variety of shoreline changes such as changing beach topography, loss of sand from beaches or impacts to dunes. Coastal Erosion trends can generally be divided into two categories: long term shoreline change and storm-induced erosion.[49]

4.2.9.1 Location and Extent

Most coastal locations and inland tidal areas in Delaware are experiencing coastal erosion both as a long term trend and in response to storms. Erosion occurs throughout the coastal areas of Kent County Specific locations in Kent County that are experiencing erosion and at risk to future enhanced erosion includes:

- Woodland Beach and Woodland Beach Wildlife Area (northeast coastal part of the county).
- Bombay Hook National Wildlife Refuge (coastal area
- Town of Bowers Beach, South Bowers and surrounding area (coastal area)
- Town of Little Creek and surrounding area
- Kitts Hummock Area (coastal area)
- Ted Harvey Conservation Area (coastal area)
- Pickering Beach and surrounding area (coastal area)
- Big Stone Beach (coastal area)
- Mispillion River, Saint Jones River, Leipsic River Inlets (southeast coastal corner of county)

[49] State of Delaware Hazard Mitigation Plan

- Town of Smyrna (riverine/tidal erosion)
- Town of Leipsic (riverine/tidal erosion)
- Whitehall Landing Area
- City of Dover/Dover AFB (riverine/tidal erosion)
- Town of Milford (riverine/tidal erosion)
- Town of Smyrna and surrounding area (riverine/tidal erosion)

4.2.9.2 Range of Magnitude

An underlying cause of coastal erosion is the rising sea level, which has been underway since the last glacial maximum over 20,000 years ago. This long term rising sea level trend generally causes the shorelines and barrier islands in Delaware to migrate landward and upward in elevation. This is also known as shoreline recession. Where lands have been developed, this inland migration of shorelines and beaches manifests as a narrowing of beaches and loss of sand dunes as the sea encroaches on structures. This long term trend of rising sea level can be seen as causing the long term recession rates listed below for locations throughout Delaware. Figure 4.13 shows the potential range of magnitude in different coastal areas of Delaware.

4.2.9.3 Past Occurrences

Delaware has a long history of monitoring coastal erosion most frequently through field surveys, and through the evaluation of aerial photography. Taking shoreline location surveys at different times of the year, or before or after storms can make the interpretation of these surveys more difficult, and measuring long term coastal erosion requires numerous shoreline surveys taken over a long period of time, preferably during calm periods and at similar times of year.[50] Measuring storm-induced coastal erosion requires surveys before and after a storm event, with care taken to account for the fact that some sand which is moved off the beach during a storm may return naturally in the calmer weeks and months which follow.

Figure 4.13 Rates of Shoreline Erosion in Delaware

DELAWARE	Minimum Shoreline Change Rate (ft/yr)	Maximum Shoreline Change Rate (ft/yr)	Average Shoreline Recession Rate (ft/yr)
Woodland Beach	-2	-7	-4.5
Port Mahon	-9	-12	-10.5
Pickering Beach	-5	-5	-5
Bowers Beach	-2	-2	-2
South Bowers Beach	-8	-8	-8
Big Stone Beach	-5	-6	-5.5
Big Stone Beach to Mispillion Inlet	-10	-13	-11.5
Mispillion Inlet	-9	-11	-10
Slaughter Beach	-2	-2	-2
Slaughter Beach to Fowler	-1	-5	-3
Broadkill Beach	-3	-3	-3
Lewes Beach (near Roosevelt Inlet)	-3	-3	-3

Source: DNREC Delaware Bay Beach Economic Analysis

4.2.9.4 Future Occurrences

Coastal Erosion rates in Delaware are driven by many factors, but the rate of sea level rise may be the factor most directly related to the rate at which a shoreline will move. Future increases in the rate of sea level rise would be expected to exacerbate coastal erosion on nearly all shorelines in Delaware.

[50] Delaware HMP

4.2.10 Dam/Levee Failure

A dam failure is the uncontrolled release of impounded water resulting in downstream flooding, and other impacts that can affect lives and property. Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream of the dam.[51] Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation and maintenance.[52]

A levee (also referred to as dike) failure or breach is a situation which causes the previously contained water to flood the land behind the levee due to the failure.[53] The primary purpose is to provide hurricane, storm, and flood protection relating to seasonal high water, storm surges, precipitation and other weather events.[54] If a levee breaks, scores of properties are quickly submerged in floodwaters and residents may become trapped by this rapidly rising water.[55]

Figure 4.14 Delaware NID Dam Inventory Locations

4.2.10.1 Location and Extent

In Kent County 18 are classified as "High Hazard", one is classified as "Significant Hazard", and two are classified as "Low Hazard". Figure 4.14 shows the Dam locations throughout Delaware, including Kent County.[56] Additional details on dam locations and risk information is provided in Chapter 5.

4.2.10.2 Range of Magnitude

FEMA utilizes a Hazard Potential Classification System for dams that categorizes them as Low, Significant, or High. This hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests.[57] Dam hazard potential definitions, as contained in the Delaware Dam Safety Regulations, are as follows:

- "Hazard potential" means the possible adverse incremental consequences that result from the release of water or stored contents due to failure of the dam or appurtenances. The hazard potential classification of a dam does not reflect in any way on the current condition of the dam and its appurtenant structures (e.g., safety, structural integrity, flood-routing capacity).[58]
- "Low-hazard potential dam" means any dam whose failure or mis-operation is unlikely to cause loss of human life but may cause minor economic and/or environmental losses.[59]

[51] Delaware Hazard Mitigation Plan
[52] Delaware Hazard Mitigation Plan
[53] Delaware Hazard Mitigation Plan
[54] Delaware Hazard Mitigation Plan
[55] Delaware Hazard Mitigation Plan
[56] Delaware Hazard Mitigation Plan
[57] Delaware Hazard Mitigation Plan
[58] Delaware Hazard Mitigation Plan
[59] Delaware Hazard Mitigation Plan

- "Significant Hazard Potential Dam" shall mean any dam whose failure or mis-operation will cause possible loss of life, economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. [60]
- "High Hazard Potential Dam" shall mean any dam whose failure or mis-operation will cause probable loss of human life.[61]

Table 4.16 describes the range of magnitude for a levee failure.

Table 4.16 Range of Magnitude - Levee Failure

Severity	Causes	Damage Extents
Minimum	Brief overtopping of levee system	Minor interior ponding
Medium	Isolated portion of levee system fails (breach)	Damage isolated to immediate area near levee breach
Maximum	Levee overtopped by flood event; failure of levee system (breach) results in complete loss of protection	All municipalities protected by the levee system become vulnerable to historic flood extents

4.2.10.3 Past Occurrences

In Delaware, the most notable dam failure was the Hearns Pond Dam failure on August 12, 2001 near Seaford, DE, as officials had to evacuate 15 patients from a nearby nursing home to the second floor in case the dam at Williams Pond failed. Damage from the dam failure was estimated to be around $1.1 million.[62]

4.2.10.4 Future Occurrences

Only one recorded dam failure has occurred in the past, in 2001 near Seaford, DE. However, future occurrences could become more likely in consideration of factors such as ongoing maintenance and repairs to existing dams, and increased frequency of high intensity / high duration precipitation events.

4.2.11 Earthquake

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock in the Earth's crust, and result from crustal strain, volcanism, landslides, or the collapse of caverns.

4.2.11.1 Location and Extent

Earthquakes 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. Earthquakes are a regional hazard and will likely be felt throughout all of Kent County.

4.2.11.2 Range of Magnitude

Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity

[60] Delaware Hazard Mitigation Plan
[61] Delaware Hazard Mitigation Plan
[62] Delaware Hazard Mitigation Plan

(MMI) Scale based on direct and indirect measurements of seismic effects. Figure 4.15 shows the MMI Scale.

Figure 4.15 Modified Mercalli Intensity Scale

Scale	Description of Effects
I	Not felt except by a very few under especially favorable conditions.
II	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

4.2.11.3 Past Occurrences

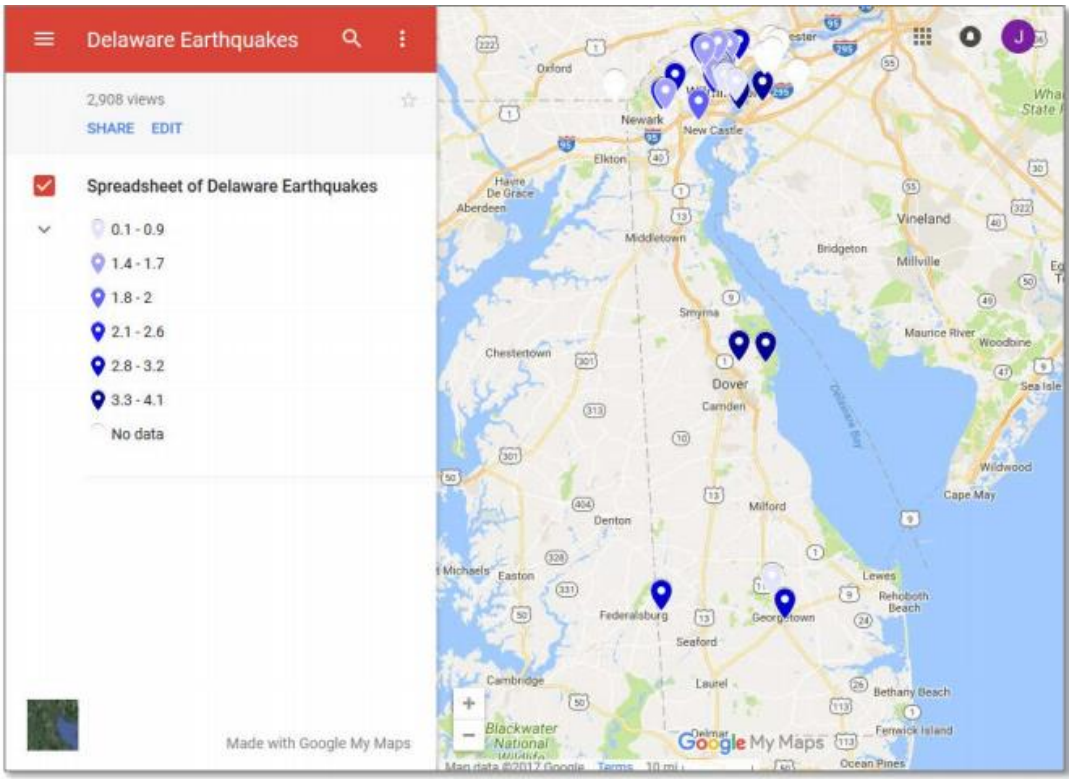
According to the Delaware Geological Survey, 59 earthquakes have been recorded in the State of Delaware during a period from 1871 through 1985.[63] The largest measured earthquake in Delaware was the Dover earthquake of November 30, 2017, which was measured as 4.1 on the Richter scale. Figure 4.16 shows the locations of the epicenter of previous earthquakes to hit in Delaware.

4.2.11.4 Future Occurrences

Earthquakes in Delaware, though rare, have occurred and can be expected to occur again. According to the Delaware Geological Survey, there have been 59 recorded earthquakes in Kent County between 1871 and 2020. For the purposes of this Plan Update, a Poisson probabilistic model may be applied to determine the annual probability of occurrence for these types of hazard events. The average annual rate of occurrence, $\lambda = 59/149 = 0.396$. The probability P (at least one earthquake in a year) $= 1 - e^{-\lambda} = 1 - e^{-0.396} = 33\%$.

[63] Delaware Hazard Mitigation Plan

Figure 4.16 Location and Magnitude of Previous Delaware Earthquakes



4.2.12 Sinkholes, and Landslides

Sinkholes are a natural and common geologic feature in areas with underlying limestone and other rock types that are soluble in natural water.[64] Most limestone is porous, allowing the acidic water of rain to percolate through their strata, dissolving some limestone and carrying it away in solution.[65] Over time, this persistent erosional process can create extensive underground voids and drainage systems in much of the carbonate rocks.[66] Collapse of overlying sediments into the underground cavities produces sinkholes. The three general types of sinkholes are: subsidence, solution, and collapse.[67]

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity.[68] Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, volcanic eruptions, and changes in groundwater levels.[69] There are several types of landslides: rock falls, rock topple, slides, and flows.[70]

[64] State of Delaware Hazard Mitigation Plan
[65] State of Delaware Hazard Mitigation Plan
[66] State of Delaware Hazard Mitigation Plan
[67] State of Delaware Hazard Mitigation Plan
[68] State of Delaware Hazard Mitigation Plan
[69] State of Delaware Hazard Mitigation Plan
[70] State of Delaware Hazard Mitigation Plan

4.2.12.1 Location and Extent

Sinkholes and landslide are not likely to occur within Kent County.

4.2.12.2 Range of Magnitude

Sinkholes and landslides were not analyzed in more detail due to extremely low probability of loss of life or large property damage within the State of Delaware. Given this lack of predictability and infrequent occurrence in the past, it is currently impossible to predict whether landslides or sinkholes will become more or less common in Delaware in the future

4.2.12.3 Past Occurrences

Sinkholes were not known to exist in Delaware prior to 1978. Six have been found in Hockessin Valley since early 1978, Three of which developed during periods of above average precipitation in the spring of 1978 and in the fall to early winter of 1979, while limited evidence suggests that the other three sinkholes also formed during those weather conditions and time periods.[71]

In Delaware, including Kent County, no known landslide incident on any scale has caused damage to any property, though small landslides have been known to occur.[72]

4.2.12.4 Future Occurrences

Due to the relatively low probability of a sinkhole or landslide significantly impacting the State of Delaware or Kent County, future occurrences are unlikely to occur/have significant impacts within the County, although minor future occurrences are possible.

4.2.13 Tsunami

A tsunami is a series of great waves that are created by undersea disturbances such as earthquakes or volcanic eruptions. From the area of disturbance, tsunami waves will travel outward in all directions. Tsunamis can originate hundreds or even thousands of miles away from coastal areas and cause catastrophic damages and loss of life.

4.2.13.1 Location and Extent

In the United States, tsunamis have historically affected the West Coast, though historical evidence does show that tsunamis have affected the Eastern United States, including Delaware.[73] Forty tsunamis and tsunami-like waves have been documented in the Eastern United States since 1600.[74] However, the US National Tsunami Hazard Mitigation Program (NTHMP) has recently increased support for tsunami modelling for the US East Coast.[75]

4.2.13.2 Range of Magnitude

The time between wave crests may be five to 90 minutes and the open ocean wave speed may average 450 miles per hour.[76] As tsunami waves approach shallow coastal waters, they appear normal size and the speed decreases until the waves near the shoreline, where they may grow to

[71] State of Delaware Hazard Mitigation Plan
[72] State of Delaware Hazard Mitigation Plan
[73] State of Delaware Hazard Mitigation Plan
[74] State of Delaware Hazard Mitigation Plan
[75] State of Delaware Hazard Mitigation Plan
[76] State of Delaware Hazard Mitigation Plan

great height and crash into the shore.[77] Most deaths during a tsunami are the result of drowning. Associated risks include flooding, polluted water supplies, and damaged gas lines.[78]

4.2.13.3 Past Occurrences

There has never been a tsunami event to occur in Kent County.

4.2.13.4 Future Occurrences

Due to never having been a tsunami in Kent County or the State of Delaware, future occurrences are unlikely to occur/have significant impacts within the County.

4.2.14 Volcano

A volcano is a vent in the Earth's crust that emits molten rock and steam. They are evidence that the physical makeup of our planet is ever-changing. Volcanoes are relatively site specific, but the molten rock, steam, and other gases they release can have an impact on much larger areas.

4.2.14.1 Location and Extent

There are no volcanoes located in or around Kent County or the State of Delaware. There are more than 500 active volcanoes in the world. More than half of these volcanoes are part of the "Ring of Fire," a region that encircles the Pacific Ocean.

4.2.14.2 Range of Magnitude

The danger area around a volcano covers approximately a 20-mile radius. Some danger may exist 100 miles or more from a volcano. Volcanoes can also cause tsunamis, earthquakes, and dangerous flooding.

Lahar is the mudflow of debris and water caused by a volcano. It is also known as debris flow or volcanic mudflow. Lahar is most often triggered by rainfall washing down the debris from the slopes of volcanoes.

Tephra is the general term used to describe the ash and other materials that are released into the air after a volcanic eruption. Tephra ranges in size from fine powder to larger rock-sized particles. Volcanic ash can contaminate water supplies, cause electrical storms, and collapse roofs, and can affect people hundreds of miles away.

Volcanic explosions, which are directed sideways, are called lateral blasts. Lateral blasts can throw large pieces of rock at very high speeds for several miles. These explosions can kill by impact, burial, or heat and may have enough force to knock down entire forests of trees.

4.2.14.3 Past Occurrences

There has never been a volcano event to occur in Kent County. More than 50 volcanoes in the United States have erupted one or more times in the past 200 years. The most volcanically active regions of the nation are in Alaska, Hawaii, California, Oregon and Washington. The danger area around a volcano covers approximately a 20-mile radius. Some danger may exist 100 miles or more from a volcano.

[77] State of Delaware Hazard Mitigation Plan
[78] State of Delaware Hazard Mitigation Plan

4.2.14.4 Future Occurrences

Since there has never been a volcano in Kent County or the State of Delaware, future occurrences are unlikely to occur/have significant impacts within the County.

4.2.15 Pandemic/Infectious Disease Outbreak

A disease outbreak is the occurrence of disease cases in excess of normal expectancy. The number of cases varies according to the disease-causing agent, and the size and type of previous and existing exposure to the agent. Disease outbreaks are usually caused by an infection, transmitted through person-to-person contact, animal-to-person contact, or from the environment or other media. Outbreaks may also occur following exposure to chemicals or to radioactive materials.[79]

A pandemic occurs when infection from of a new strain of a certain disease, to which most humans have no immunity, substantially exceeds the number of expected cases over a given period of time. Such a disease may or may not be transferable between humans and animals. (Martin & Martin-Granel, 2006). Pandemic can result from the natural spread of infectious disease or from the accidental release of biological agents from health care facilities, research institutions, and industrial operations.

4.2.15.1 Location and Extent

A pandemic/infectious disease outbreak has the potential to occur anywhere in, and spread anywhere throughout, Kent County. Densely populated areas are more vulnerable to communicable disease outbreaks as the speed and likelihood of disease transmission increases in these types of environments.

Vulnerability to communicable diseases also increases with population mobility and increased exposure to individuals from diverse geographic regions. Additionally, the close proximity to major interstate highways, a regional airport, and an extensive rail network increase the vulnerability to the introduction and spread of communicable diseases.

4.2.15.2 Range of Magnitude

Pandemics/Infectious Disease Outbreaks can occur at the local level and be contained, or can be spread to as large as a global pandemic. COVID-19 is an example of global pandemic that spread throughout the world very rapidly.

4.2.15.3 Past Occurrences

Just like many parts of the USA and around the world, Kent County has been hit hard by SARS-CoV-2, commonly known as COVID-19, a novel strain of Coronavirus. As of November 2020, there were 4,100 confirmed cases of COVID-19, and 122 deaths in Kent County as a result of COVID-19. In the State of Delaware, there has been 29,200 cases of COVID-19, and 736 deaths. Those numbers are expected to continue to rise until there is a readily available vaccine for public use, which is expected to be available in 2021.

4.2.15.4 Future Occurrences

The future likelihood of a pandemic/infectious disease outbreak in Kent County is expected to be higher than indicated by the historical occurrence rate alone. Expected increases in likelihood can

[79] World Health Organization, available at: https://www.who.int/teams/environment-climate-change-and-health/emergencies/disease-outbreaks/.

be attributed to several factors, such as: rapid growth in population; increase in interstate and international travel; and subsequent introduction and spread of infectious diseases and/or the emergence of novel diseases (such as COVID-19), and an increased resistance to current treatment strategies.

4.2.16 Terrorism

This section also addresses terrorism-related hazards including contamination, energy release, and disruption of service. The Federal Emergency Management Agency, in its guidance on integrating human-caused hazards into state and local hazard mitigation plans (FEMA Publication 386-7), has established a set of categories that can be applied to the profiling of intentional acts of terrorism.[80] These categories are: contamination; energy release (i.e., explosives, arson, etc.); and disruption of service.[81]

4.2.16.1 Location and Extent

Although unlikely to occur, a terrorist attack can occur anywhere within Kent County, although it is more likely to occur in more populated areas, such as the cities of Dover, Harrington, or Camden.

4.2.16.2 Range of Magnitude

The magnitude of terrorism can range drastically, especially dependent on the type of attack. Table 4.17 identifies and defines the different types of terrorism events.

Table 4.17 Range of Type and Magnitude - Terrorism

Terrorism Event Type	Explanation/Magnitude
Contamination	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 "agriterrorism"), and even the electronic world of computers and information via the Internet and e-mail (as in "cyberterrorism.")
Energy Release	The use of explosive devices, such as conventional bombs, and incendiary operations such as arson attacks. The detonation of an explosive device whether on or near a target has an instantaneous effect, which can be compounded and/or prolonged by the use of multiple devices.
Disruption of Service	The interruption, failure or denial of a service due to terrorist attack, such as the sabotage or designed breakdown of infrastructure as with an attack on transportation facilities, utilities and other public services.
Electromagnetic Pulse	A short burst of electromagnetic energy that may be the result of lighting, switching, solar magnetic disturbance, non-nuclear electromagnetic weapons or nuclear weapons. The effects may cause the failure of electricity and communications and require recovery prolonged efforts.

[80] Delaware State HMP
[81] Delaware State HMP

Agricultural Terrorism	Causing intentional harm to an agricultural product or vandalism of an agricultural/animal related facility is agroterrorism
Cyber Terrorism	Electronic attack using one computer system against another in order to intimidate people or disrupt other systems is a cyber attack. Cyber terrorism may last from minutes to days depending upon the type of intrusion, disruption, or infection

4.2.16.3 Past Occurrences

Due to the relevantly recent, or heightened, focus being placed on managing terrorism and consequences of terrorism in the United States, no historical database is currently available for cataloging acts of terrorism involving chemical, radiological or biological agents.[82] However, at the time of this plan's development, no significant historical occurrences of terrorism were known to have taken place within the State of Delaware planning area.[83]

4.2.16.4 Future Occurrences

Since there are no known past terrorism occurrences in Kent County, it is not likely one will occur, although an occurrence is possible and cannot be ruled out.

4.2.17 Weapons of Mass Destruction

The term "Weapons of Mass Destruction" (WMD) has various definitions, however common to all is the assumption that WMDs may consist of any of the agents discussed above: chemical, biological, radiological, nuclear, explosive or incendiary. The purpose of a WMD is to cause death or serious injury to persons or significant damage to property, typically assumed to be of a scale which has the potential to overwhelm the capabilities of many local and state governments.

4.2.17.1 Location and Extent

Weapons of mass destruction can occur anywhere within Kent County, although it is more likely to occur in more populated areas, such as Dover, Harrington, or Camden.

4.2.17.2 Range of Magnitude

Although chemical, biological, radiological, and nuclear weapons often serve as examples of the range of WMD, many things can be used as a WMD. This became painfully true during the 9/11 attacks when passenger jets were used as missiles. The magnitude and severity of the attack is a function of the weapon used and the amount of people killed or injured. A WMD attack can also become a mass casualty incident, which is when WMD are used to cause death or serious bodily injury to a significant number of people.

4.2.17.3 Past Occurrences

There are no known past occurrences of weapons of mass destruction in Kent County.

4.2.17.4 Future Occurrences

Since there are no known past occurrences of weapons of mass destruction in Kent County, it is not likely one will occur, although an occurrence is possible and cannot be ruled out.

[82] Delaware State HMP
[83] Ibid.

4.2.18 Hazardous Materials (HazMat)

A hazardous materials release is an environmental hazard that pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Hazardous material releases can occur at fixed facilities or in transit; and can include toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)). Most often, the source is from vehicular accidents involving transportation of the hazardous materials. Other sources include the unintentional release from production facilities, and negligence. These types of unintentional releases are often through stored material being leaked into groundwater or surface water systems when storage containers corrode over time.

4.2.18.1 Location and Extent

There are 11 listed hazardous materials or oil and gas facilities sites within Kent County. Of these, five are located in Dover, two in Clayton, and one in Camden. Storage facilities store hazardous materials ranging from heavy metals to chemical manufacturing. In addition to hazardous material storage sites, the Steering Committee expressed concern about the intensification of transporting hazardous materials via truck and rail through the County.

4.2.18.2 Range of Magnitude

Table 4.18 summarizes the range of magnitude for transportation issues related to hazardous materials.

Table 4.18 Range of Magnitude - Transportation Issues Related to HazMat

Severity	Causes	Damage Extents
Minimum	Single truck accidents or local site leak	Minor traffic disruptions; no loss of life
Maximum	Train derailments and material spills	Road closures; injuries and fatalities; release of hazardous chemicals into stream and groundwater systems

4.2.18.3 Past Occurrences

According to the Office of Hazardous Materials Safety's Incident Reports Database, 82 HazMat incidents have occurred in Lent County since 1990.[84] Of these 82 incidents, 73 were highway HazMat incidents, six were rail-related incidents, and 3 were air-related incidents.[85]

4.2.18.4 Future Occurrences

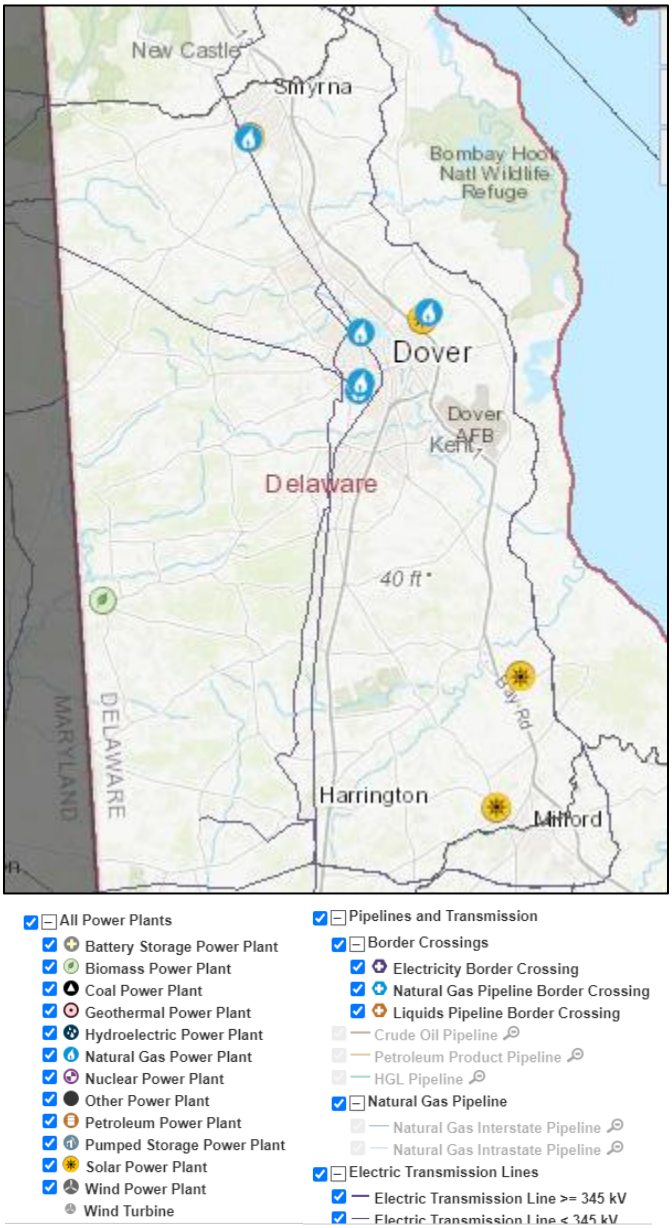
According to the Office of Hazardous Materials Safety Incident Reports Database, there have been 82 recorded hazardous material spill/release events in Kent County between 1990 and 2020. From this dataset, it can be expected that a hazardous material spill/release event will occur in any given year, based on the frequency of occurrence.

[84] https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics
[85] https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics

4.2.19 Energy Pipeline Failures

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 also includes facilities that convert raw natural resources into energy products, as well as the rail network, trucking lines and marine transportation. (U.S. Department of Energy, 2003) Much of this infrastructure is aging, and in addition to 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.

Figure 4.17 Pipelines through Kent County



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 is moved via pipeline as well. (DOE, 2003) Much of this oil pipeline infrastructure is old, requiring regular safety and environmental reviews to ensure its safety and reliability. The potential risk of pipeline accidents is a significant national concern.

The energy infrastructure is vulnerable to physical and cyber disruption, either of which could threaten its integrity and safety. (DOE, 2003) Disruptions could originate with natural events such as geomagnetic storms and earthquakes, or could result from 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.

4.2.19.1 Location and Extent

Energy pipelines cross most of the State of Delaware, including through Kent County. According to the U.S. Energy Information Administration (EIA), Delaware is the smallest energy-producing state, consuming almost 100 times more energy than it produces, and the state's total energy consumption is the third lowest in the nation mainly because of its small population. In 2019, Delaware generated 87% of its electricity from natural gas, up from 28% a decade earlier, while the state's coal-fired generation fell from 59% to about 4% during the same period. Figure 4.17 shows the energy pipelines that span across Kent County.

4.2.19.2 Range of Magnitude

Energy pipelines cross most of the State of Delaware. 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).

4.2.19.3 Past Occurrences

There have been no significant energy pipeline failures within Kent County.

4.2.19.4 Future Occurrences

Although there have been no recorded or significant energy pipeline failures within Kent County, future occurrences are indeed possible as pipelines age, and potential additional pipelines are constructed.

5.0 CHAPTER 5 – VULNERABILITY ASSESSMENT

5.1 Introduction

A high-level, detailed vulnerability assessment was updated for Kent County each of the hazards that have true potential of occurring and causing impacts in Kent County. It is important to note that this vulnerability assessment has been updated to reflect changes in priorities and is based on best available data and represents a base-level assessment for the planning area. Additional work could be done on an ongoing basis to enhance, expand and further improve the accuracy of the baseline established here.

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

Multiple sources were referenced to obtain a comprehensive identification of all potential hazards affecting the County. These include the NCEI, United States Geologic Survey (USGS), US Census of Agriculture, the *2017 State of Delaware Hazard Mitigation Plan*. For all hazards without readily and freely accessible data, information from the *2017 State of Delaware Hazard Mitigation Plan* was referred and included. It is also important to note that in the identification of previous hazard occurrences, data from the NCEI (previously named the NCDC) was utilized where available.

5.2 Explanation of Risk Assessment Methodology

To prepare the Vulnerability Assessment, a variety of sources and analyses were completed. Historic data for each event (where available) were tabulated to determine appropriate probabilistic models to compute probabilities of future occurrences. For spatially specific hazards, such as flooding and wildfires, those hazard areas were obtained from best available data sources (i.e. FEMA DFIRM GIS shapefiles, National Land Cover Dataset). General buildings GIS data was obtained from the County, and was overlain with the hazard areas in GIS to determine the number of structures potentially exposed to these hazards. Critical facilities data was obtained from the HAZUS-MH database as well as County and State database sources, and was also overlain with the hazard areas in GIS to determine which critical facilities are potentially exposed to each hazard.

Results of the HAZUS-MH runs helped inform and were then incorporated into the Vulnerability Assessment development process. Inventory and Vulnerable Assets (including exposure estimates), and loss estimates derived from HAZUS-MH were discussed with the Steering Committee and communities during the Municipality Meeting held on October 28th, 2020, where attendees were provided the opportunity to engage and discuss the Vulnerability Assessment and HAZUS-MH results. Loss estimates were prepared based on historic annualized loss data (where available), and from HAZUS-MH hazard scenario runs (where applicable), for the county and for all jurisdictions (for some hazards). Inventory and Vulnerable Assets (including exposure estimates) and loss

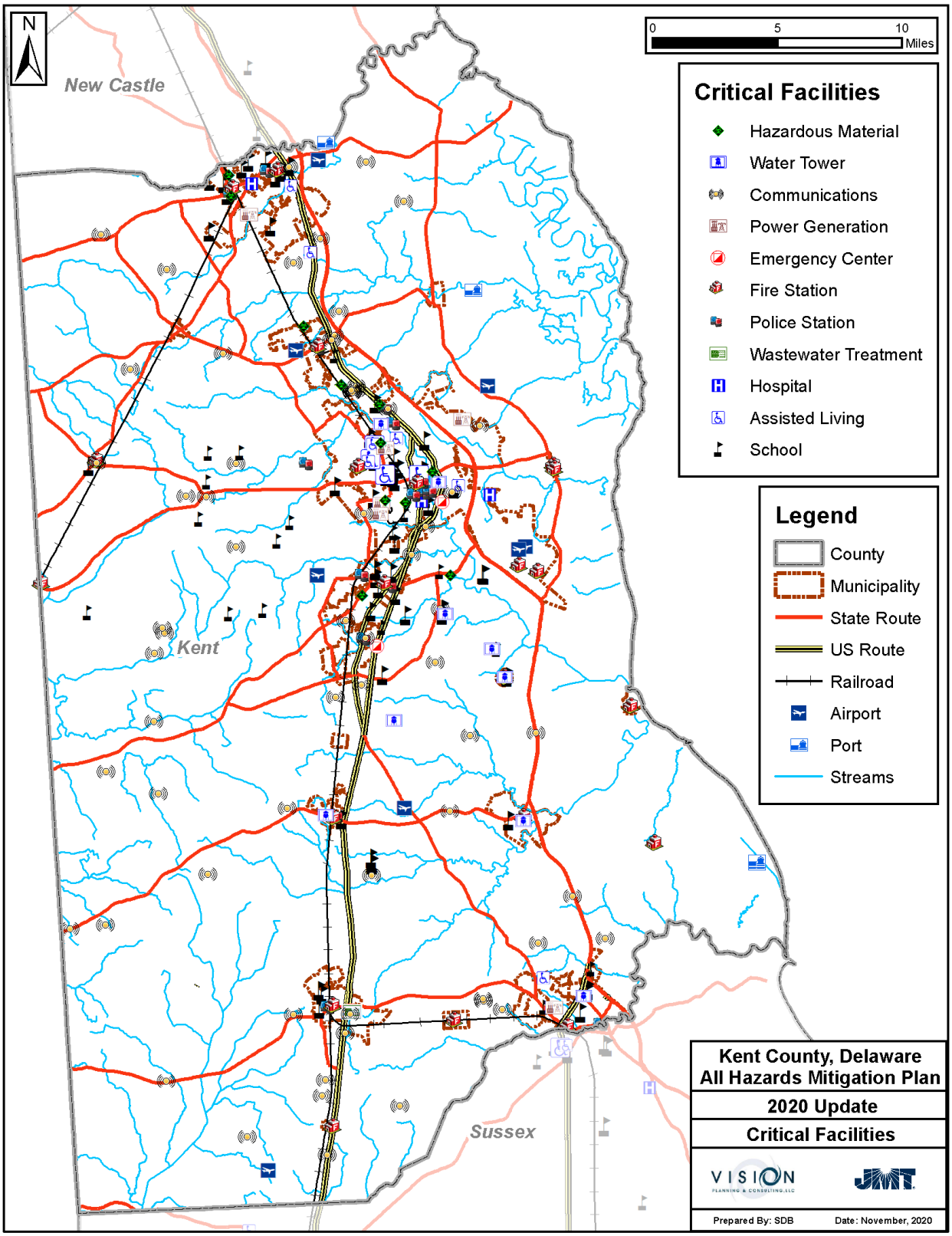
estimates derived from HAZUS-MH was incorporated into this Vulnerability Assessment, where applicable. Full HAZUS-MH results are provided in Appendix F.

Finally, a "risk factor" calculation was also prepared based on the characteristics of each hazard, in order to quantitatively weight and rank each hazard as part of the hazard prioritization effort.

5.3 Critical Facilities

Critical facilities, as defined by the Governor's Office of Homeland Security, are "those systems and assets, whether physical or virtual, so vital that the incapacity or destruction of such may have a debilitating impact on the security, economy, public health or safety, environment, or any combination of these matters, to any Pennsylvania County." For this Plan Update, critical facilities include: airports, emergency response facilities, government buildings, hazardous storage sites, medical facilities, energy pipelines, power plants, wastewater and water treatment facilities, and schools. Figure 5.1 shows the locations of critical facilities in Kent County.

Figure 5.1 Critical Facilities Map



5.4 Vulnerability Assessment

5.4.1 Flood

5.4.1.1 Inventory and Summary of Vulnerable Assets

In order to determine the structures in the County that are vulnerable to flooding, all structures and critical facilities were overlain with the 100-year and 500-year floodplains using GIS tools. The analysis indicated that 2,349 structures and 3 critical facilities are located in the 100-year floodplain, and 3,113 structures and 7 critical facilities are located in the 500-year floodplain in the County. A map of the critical facilities in the 100-year and 500-year floodplains, and a summary of the results by municipality are shown in Table 5.1 and in Appendix F.

Table 5.1 Flooding Exposure by Jurisdiction

Number of Structures and Critical Facilities in 100-Year 500-Year Floodplains				
Municipality	100-year Floodplain		500-year Floodplain	
	No. Structures	Critical Facilities / No.	No. Structures	Critical Facilities / No.
Bowers Beach	323	Fire Station / 1	323	Fire Station / 1
Camden	4	-	4	-
Cheswold	4	-	4	-
Clayton	4	-	11	-
Dover	83	-	135	Haz. Mat. / 1
Farmington	-	-	-	-
Felton	24	-	34	-
Frederica	43	-	50	-
Harrington	25	-	92	WW Treatment / 1 School / 1
Hartly	-	-	-	-
Houston	-	-	-	-
Kenton	-	-	-	-
Leipsic	127	-	148	-
Little Creek	83	Fire Station / 2	153	Fire Station / 2
Magnolia	-	-	-	-
Milford	-	-	-	-
Smyrna	12	-	18	-
Viola	-	-	-	-
Woodside	-	-	-	-
Wyoming	5	-	7	-
Kent County	1612	-	2134	Fire Station / 1
Total	**2349**	**3**	3113	7

5.4.1.2 Estimate of Losses

The total estimated economic damage associated with the 37 flooding events in the period from 1996 to 2020 as reported by NCEI is approximately $1.149 million. The total estimated economic damage associated with the 34 coastal / tidal flood events in the period from 1998 to 2020 as

reported by NCEI is approximately $0.726 million. This equates to an annual economic loss of approximately $81,000.

Table 5.2 provides potential annualized loss estimates from flooding by jurisdiction. These loss estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.2 Potential Annualized Losses from Flooding

Jurisdiction	Assessed Value	Estimated Losses	Loss Ratio
Bowers Beach	$7,182,154	$47,822	0.0067
Camden	$501,113	$1,820	0.0036
CCD Central Kent	$12,515,068	$51,842	0.0042
CCD Dover	$26,091,393	$125,421	0.0048
CCD Felton	$748,624	$2,173	0.0029
CCD Harrington	$3,804,884	$9,456	0.0025
CCD Kenton	$787,557	$4,055	0.0051
CCD Milford North	$9,860,679	$48,347	0.0049
CCD Smyrna	$5,678,818	$27,206	0.0048
Cheswold	---	---	---
Clayton	$24,776	$84	0.0034
Dover	$10,024,425	$44,658	0.0045
Farmington	---	---	---
Felton	---	---	---
Frederica	$732,038	$4,353	0.0059
Harrington	---	---	---
Hartly	---	---	---
Houston	$1	$0	0.0000
Kenton	$10	$0	0.0000
Leipsic	$1,476,303	$6,209	0.0042
Little Creek	$1,086,487	$5,481	0.0050
Magnolia	---	---	---
Milford	$8,075,453	$17,901	0.0022
Smyrna	$1,819,447	$4,937	0.0027
Viola	---	---	---
Woodside	---	---	---
Wyoming	$1,168,544	$4,773	0.0041
TOTAL	**$91,646,903**	**$406,999**	**0.0044**

5.4.1.3 Impact on Future Development

Per discussions with the Steering Committee, for the next few years based on subdivision and land development submissions to the planning commission, no new major developments are anticipated in floodplains or other flood hazard areas.

5.4.1.4 Risk Factor

Risk Factor = 3.3. Table 5.3 summarizes the risk factor calculation.

5.4.2 Hurricanes and Coastal Storms

5.4.2.1 Inventory and Summary of Vulnerable Assets

A summary of the vulnerability to a 1,000-year hurricane event from the HAZUS-MH software analysis is provided here; for full reports of HAZUS-MH output from the 10-year through the 1,000-year events, refer to the Appendices. Table 5.3 below breaks down expected building damage by occupancy type for a 50-Year, 100-Year, 500-Year, and 1000-Year Hurricane event, while Table 5.4 provides exposure estimates and expected damage to critical facilities in Kent County.

Table 5.3 Expected Building Damage by Occupancy

Expected Building Damage by Occupancy				
Occupancy	Minor Damage	Moderate Damage	Severe Damage	Destruction
50-Year Event				
Agriculture	1.20	0.04	0.00	0.00
Commercial	14.25	0.23	0.00	0.00
Education	0.76	0.00	0.00	0.00
Government	0.99	0.00	0.00	0.00
Industrial	4.13	0.01	0.00	0.00
Religion	1.07	0.02	0.00	0.00
Residential	105.05	2.98	0.11	0.00
Total	**127.56**	**3.29**	**0.11**	**0.00**
100-Year Event				
Agriculture	5.36	0.52	0.16	0.00
Commercial	38.98	2.77	0.10	0.00
Education	1.92	0.03	0.00	0.00
Government	2.35	0.03	0.00	0.00
Industrial	11.94	0.48	0.07	0.00
Religion	3.15	0.10	0.00	0.00
Residential	752.95	34.56	0.51	0.69

Total	**816.65**	**38.49**	**0.84**	**0.69**
500-Year Event				
Agriculture	33.43	8.66	3.70	0.35
Commercial	271.82	71.75	9.35	0.03
Education	13.45	2.76	0.16	0.00
Government	18.37	4.82	0.40	0.00
Industrial	71.01	18.77	2.98	0.16
Religion	25.56	4.23	0.27	0.00
Residential	6,512.56	893.64	33.12	79.27
Total	**6,946.19**	**1,004.63**	**49.99**	**79.81**
1000-Year Event				
Agriculture	54.02	20.60	10.36	1.68
Commercial	352.04	153.99	40.29	0.42
Education	16.22	5.68	0.95	0.00
Government	18.96	6.53	1.21	0.00
Industrial	98.82	46.51	12.72	0.78
Religion	33.46	9.94	1.74	0.00
Residential	8,870.86	1,897.21	204.53	306.41
Total	**9,444.39**	**2,140.44**	**271.80**	**309.28**

Table 5.4 Exposure Estimates and Expected Damage to Essential Facilities

Expected Damage to Essential Facilities				
Classification	Total	Probability of at Least Moderate Damage >50%	Probability of Complete Damage >50%	Expected Loss of Use <1
50-Year Event				
EOCs	2	0	0	2

Fire Stations	21	0	0	21
Hospitals	2	0	0	2
Police Stations	16	0	0	16
Schools	80	0	0	80
100-Year Event				
EOCs	2	0	0	2
Fire Stations	21	0	0	21
Hospitals	2	0	0	2
Police Stations	16	0	0	16
Schools	80	0	0	80
500-Year Event				
EOCs	2	0	0	2
Fire Stations	21	0	0	21
Hospitals	2	0	0	2
Police Stations	16	0	0	16
Schools	80	0	0	71
1000-Year Event				
EOCs	2	0	0	2
Fire Stations	21	0	0	21
Hospitals	2	0	0	2
Police Stations	16	0	0	16
Schools	80	0	0	51

5.4.2.2 Estimate of Losses

The total estimated economic damage associated with the 4 hurricane events in the period from 1996 to 2020 as reported by NCEI is approximately $8.5 million. This equates to an annual economic loss of approximately $354,000. For reference, HAZUS-MH estimates economic losses resulting from a 1,000-year hurricane event to be approximately $500 million. Table 5.5 provides

potential loss estimates determined through HAZUS-MH, for 50-Year, 100-Year, 500-Year, and 1000-Year hurricane events. Full HAZUS-MH results for hurricanes are provided in Appendix F.

Table 5.5 Estimation of Losses from Hurricanes

Estimation of Economic Losses					
	Residential	Commercial	Industrial	Others	Total
50-Year Event					
Property Damage	17,421.69	301.14	47.23	76.92	17,846.97
Business Interruption Losses	46.82	1.50	0.00	0.25	48.57
Total Losses	**17,468.50**	**302.64**	**47.23**	**77.17**	**17,895.54**
100-Year Event					
Property Damage	54,516.45	938.91	185.63	284.05	55,925.05
Business Interruption Losses	1,317.65	20.39	1.02	2.60	1,341.66
Total Losses	**55,834.10**	**959.31**	**186.65**	**286.65**	**57,266.71**
500-Year Event					
Property Damage	227,729.76	11,578.09	3,892.24	4,479.05	247,679.13
Business Interruption Losses	12,652.98	4,922.47	260.14	3,149.84	20,985.42
Total Losses	**240,382.73**	**16,500.56**	**4,152.37**	**7,628.89**	**268,664.56**
1000-Year Event					
Property Damage	408,558.47	26,937.20	10,620.16	9,712.93	455,828.77
Business Interruption Losses	35,586.21	8,152.58	687.64	3,792.15	48,218.57
Total Losses	**444,144.67**	**35,089.78**	**11,307.80**	**13,505.08**	**504,047.34**

Table 5.6 provides potential annualized loss estimates for coastal wind, by jurisdiction. These loss estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.6 Potential Annualized Losses from Coastal Wind by Jurisdiction

Jurisdiction	Estimated Losses	Loss Ratio
Bowers Beach	$296	0.000151
Camden	$65,887	0.000095

CCD Central Kent	$501,094	0.000135
CCD Dover	$625,933	0.000090
CCD Felton	$115,294	0.000137
CCD Harrington	$270,947	0.000137
CCD Kenton	$79,347	0.000078
CCD Milford North	$186,014	0.000127
CCD Smyrna	$242,770	0.000073
Cheswold	$8,418	0.000078
Clayton	$23,309	0.000056
Dover	$431,697	0.000065
Farmington	$63	0.000138
Felton	$1,527	0.000137
Frederica	$6,498	0.000133
Harrington	$18,097	0.000109
Hartly	$91	0.000081
Houston	$1,876	0.000165
Kenton	$277	0.000078
Leipsic	$305	0.000146
Little Creek	$585	0.000094
Magnolia	$2,807	0.000146
Milford	$63,420	0.000097
Smyrna	$55,980	0.000060
Viola	$689	0.000123
Woodside	$672	0.000123
Wyoming	$26,490	0.000091
TOTAL	**$2,730,424**	**0.000093**

5.4.2.3 Impact on Future Development

All new residential and commercial structures are required to be constructed per the International Building Code. Therefore, the impact to future development due to high wind events is expected to be minimized, although strong coastal wind events may result in wind damage along the coastal areas of the County. Hurricanes and Coastal Storms also intensify the rate of erosion, so with more coastal storms, the more erosion rates will be accelerated, unless mitigated.

5.4.2.4 Risk Factor

Risk Factor = 2.9. Table 5.3 summarizes the risk factor calculation.

5.4.3 Severe Thunderstorms and Tornados

5.4.3.1 Inventory and Summary of Vulnerable Assets

Wind impacts and associated damages from severe thunderstorms and tornados are generally greatest on utility transmission lines, specifically overhead electric power lines and communication lines, and older structures that were built prior to uniform code standards for wind loadings. Because it cannot be predicted where a tornado may touch down, all buildings and facilities are considered

to be exposed to this hazard and could potentially be impacted. It is also not possible to estimate the number of residential, commercial, and other buildings or facilities that may experience losses.

Severe thunderstorms and tornados can also impact important county and local assets, such as damage or disruption to transportation and utility systems in Kent County. Lightning and high winds associated with severe thunderstorms and tornados can knock out the electrical power grid in parts of the County, and in major events, throughout the entire county. This can result in loss of power for businesses and residences for potentially up to several days, dependent on the severity of the event.

5.4.3.2 Estimate of Losses

The total estimated economic damage associated with the 168 severe thunderstorm and tornado events in the period from 1958 to 2020 as reported by NCEI is approximately $7.431 million. This equates to an annual economic loss of approximately $120,000.

Table 5.7 provides potential annualized loss estimates thunderstorm wind by jurisdiction. These loss estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.7 Potential Annualized Losses from Thunderstorm Wind by Jurisdiction

Jurisdiction	Total Exposure	% of Total Exposure	Estimated Losses
Bowers Beach	$7,182,154	0.219	$194
Camden	$73,141,732	2.227	$1,972
CCD Central Kent	$444,420,828	13.530	$11,981
CCD Dover	$628,957,377	19.149	$16,956
CCD Felton	$109,659,741	3.339	$2,957
CCD Harrington	$179,225,267	5.183	$4,589
CCD Kenton	$115,083,828	3.504	$3,103
CCD Milford North	$124,164,839	3.780	$3,347
CCD Smyrna	$231,377,241	7.044	$6,237
Cheswold	$16,991,783	0.518	$459
Clayton	$52,294,064	1.592	$1,410
Dover	$844,922,049	25.724	$22,778
Farmington	$1,300,648	0.040	$35
Felton	$21,167,271	0.644	$570
Frederica	$10,837,285	0.330	$292
Harrington	$59,117,411	1.800	$1,594
Hartly	$983,149	0.030	$27
Houston	$5,452,527	0.166	$147
Kenton	$3,322,168	0.101	$89
Leipsic	$2,459,068	0.075	$66
Little Creek	$2,361,793	0.072	$64
Magnolia	$3,135,862	0.095	$84
Milford	$111,284,044	3.388	$3,000
Smyrna	$215,816,547	6.571	$5,819
Viola	$2,160,536	0.066	$58

Woodside	$2,997,870	0.091	$81
Wyoming	$23,586,371	0.718	$636
TOTAL	$3,284,595,900	100.0	$88,589

Table 5.8 provides potential annualized loss estimates thunderstorm wind by jurisdiction. These loss estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.8 Potential Annualized Losses from Tornado by Jurisdiction

Jurisdiction	Total Exposure	% of Total Exposure	Estimated Losses
Bowers Beach	$7,182,154	0.219	$100
Camden	$73,141,732	2.227	$1,014
CCD Central Kent	$444,420,828	13.530	$6,160
CCD Dover	$628,957,377	19.149	$8,719
CCD Felton	$109,659,741	3.339	$1,520
CCD Harrington	$179,225,267	5.183	$2,360
CCD Kenton	$115,083,828	3.504	$1,595
CCD Milford North	$124,164,839	3.780	$1,721
CCD Smyrna	$231,377,241	7.044	$3,207
Cheswold	$16,991,783	0.518	$236
Clayton	$52,294,064	1.592	$725
Dover	$844,922,049	25.724	$11,713
Farmington	$1,300,648	0.040	$18
Felton	$21,167,271	0.644	$293
Frederica	$10,837,285	0.330	$150
Harrington	$59,117,411	1.800	$820
Hartly	$983,149	0.030	$14
Houston	$5,452,527	0.166	$76
Kenton	$3,322,168	0.101	$46
Leipsic	$2,459,068	0.075	$34
Little Creek	$2,361,793	0.072	$33
Magnolia	$3,135,862	0.095	$43
Milford	$111,284,044	3.388	$1,543
Smyrna	$215,816,547	6.571	$2,992
Viola	$2,160,536	0.066	$30
Woodside	$2,997,870	0.091	$41
Wyoming	$23,586,371	0.718	$327
TOTAL	$3,284,595,900	100.0	$45,532

5.4.3.3 Impact on Future Development

All new residential and commercial structures are required to be constructed per the International Building Code. Therefore, the impact to future development due to high wind events is expected to

be minimized, although strong coastal wind events may result in wind damage along the coastal areas of the County.

5.4.3.4 Risk Factor

Risk Factor = 2.5. Table 5.3 summarizes the risk factor calculation

5.4.4 Wildfire

5.4.4.1 Inventory and Summary of Vulnerable Assets

In order to determine the structures in the County that are potentially vulnerable to wildfires, all structures and critical facilities were overlain with forested / shrub and scrubland / pasture areas / woody wetlands (high phragmite concentration areas along coast) from the National Land Cover Dataset using GIS tools. The analysis indicated that 15,265 structures and 24 critical facilities are located in these potential wildfire prone areas in the County. A map of the critical facilities in potential wildfire areas, and a summary of the wildfire exposure results by municipality are presented in in Table 5.9 and in Appendix D.

Table 5.9 Wildfire Building and Critical Facility Exposure by Jurisdiction

Number of Structures and Critical Facilities in Wildfire Areas		
Municipality	No. Structures	Critical Facilities / No.
Bowers Beach	-	-
Camden	90	-
Cheswold	10	-
Clayton	19	School / 1
Dover	811	Communications / 2
Farmington	1	-
Felton	27	-
Frederica	22	-
Harrington	76	-
Hartly	5	-
Houston	8	-
Kenton	3	-
Leipsic	1	-
Little Creek	16	-
Magnolia	10	-
Milford	66	School / 1
Smyrna	43	-
Viola	10	-
Woodside	9	-
Wyoming	41	-
Kent County	13997	Airports / 2
		Communications / 18
Total	**15265**	**24**

Assets most vulnerable to wildfire include residential buildings in forested areas, as well as buildings, critical facilities, and infrastructure located in an urban-forest interface. Wildfires can also cause impacts and impede emergency services. 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. Impacts of Wildfires can be expected to cause severe to extensive localized damage to the community and important community assets, depending on the extent of the fire and the duration.

5.4.4.2 Estimate of Losses

No significant economic damages were recorded in the 3 events between 1958 and 2020 as recorded by NCEI. However, given the number of potentially exposed properties to wildfires based on the GIS analysis, the total economic exposure can be reasonably estimated to be greater than $1 billion.

5.4.4.3 Impact on Future Development

The Steering Committee expressed concern that new homes, particularly high-value homes, are being constructed in forested areas, increasing the potential for wildfire impacts. The problem is two-fold; first, there is a higher probability of a wildfire impacting residential property, and secondly, new homes are being constructed in areas that may be difficult for emergency services to access during a fire event.

5.4.4.4 Risk Factor

Risk Factor = 2.1. Table 5.3 summarizes the risk factor calculation

5.4.5 Drought/Extreme Heat

5.4.5.1 Inventory and Summary of Vulnerable Assets

The main impact of droughts is agricultural damage due to water supply shortages. Kent County has approximately 822 farms and 182,396 acres of farmland with an annual market value of approximately $391,304,000.86. An extended drought can also lead to water shortages due to extensive water withdraws and a lack of recharge. This can lead to drying of farmlands and loss of crops and production for that period of time.

Extreme heat is a natural hazard that does not necessarily impact and/or damage infrastructure, but rather an invisible hazard that impacts people and can be very dangerous – sometimes even fatal – to human health. Extreme heat events most often result in increased hospitalizations for heat-related illness, such as stroke, as well as cardiovascular and respiratory disorders. This can sometimes put strain on local hospitals, emergency services, and other community assets. Those most vulnerable to extreme heat, including in Kent County, are vulnerable populations, including, but not necessarily limited to, the frail elderly; pregnant woman; people living with chronic sensory, mobility, or cognitive impairments; and individuals dependent upon assistive devices or complex medical regimens in order to survive.[87]

86 United State Department of Agriculture. 2017 Census of Agriculture: Kent County Delaware County Profile, available at https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Delaware/cp10001.pdf.

87 National Center for Disaster Preparedness 2020, Vulnerable Populations, available at https://ncdp.columbia.edu/research/vulnerable-populations/#:~:text=One%20measure%20of%20the%20strength,a%20cruel%20fact%3A%20disasters%20discriminate.

In Kent County, these vulnerable populations, specifically the elderly, may be located in coastal communities, Additionally, specific recreation events held during a period of extreme heat can be of concern, for example, outdoor events taking place during the summer at Dover Speedway.

5.4.5.2 Estimate of Losses

The total estimated economic damage associated with the 68 drought or excessive heat events in the period from 1997 to 2020 is approximately $8 million. This equates to an annual economic loss of approximately $348,000. Table 5.10 provides potential annualized loss estimates for drought by jurisdiction. These loss estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.10 Potential Losses from Drought by Jurisdiction

Jurisdiction	Total Exposure	% of Total Exposure	Estimated Losses
CCD Central Kent	$110,973,070	8.054	$37,900
CCD Dover	$168,612,596	12.237	$57,585
CCD Felton	$179,812,282	13.050	$61,410
CCD Harrington	$235,572,333	17.096	$80,453
CCD Kenton	$132,051,022	9.583	$45,098
CCD Milford North	$360,440,289	26.158	$123,098
CCD Smyrna	$190,452,535	13.822	$65,044
TOTAL	**$1,377,914,128**	**100.0**	**$470,588**

5.4.5.3 Impact on Future Development

As future development increases in Kent County, water supply systems should be evaluated for maximum capacity during drought conditions to ensure adequate water resources are available under increased demand and decreased supply.

5.4.5.4 Risk Factor

Risk Factor = 2.8. Table 5.3 summarizes the risk factor calculation

5.4.6 Hail

5.4.6.1 Inventory and Summary of Vulnerable Assets

Hail has the potential to cause property damage, most notably to siding, roofs, and windows, as well as crop damage. Residential buildings are a very vulnerable assets due to a large percentage using Vinyl siding on their exteriors, while hail can also tear of roofs and break windows. A large hailstorm can also damage and/or disrupt the County's market value in regard to crop production. Hail can also damage vehicles and cause dangerous road conditions in Kent County.

5.4.6.2 Estimate of Losses

A total of $105,000 in economic damages were recorded in the hail events between 1958 and 2020 as recorded by NCEI. Approximate annual loss estimates are therefore $1,700.

5.4.6.3 Impact on Future Development

It is important to restrict construction, and to protect homes, businesses and other structures in areas prone to hail. Specific statutes should be included within other county plans and local

ordinances to protect existing infrastructure from the impacts of hail events. Sussex County, just to the south of Kent County, and one of the 18 counties studied in The Heinz Center's evaluation, is known to experience an average annual hail rate of three (3) to four (4) feet per year.

5.4.6.4 Risk Factor

Risk Factor = 1.6. Table 5.3 summarizes the risk factor calculation.

5.4.7 Winter Storms and Freezes

5.4.7.1 Inventory and Summary of Vulnerable Assets

Primary impacts from winter weather include power outages due to downed trees and power lines, and infrastructure impacts due to road closures. Approximately 439 miles of State and Federal highways, and approximately 2,096 miles of secondary and municipal roads are located in Kent County.

Community assets most exposed to the impacts of winter storms and freezes are the transportation system, emergency services, and schools. If snow is falling at a faster rate than snow removal operations, the transportation system can be severely impacted and become very dangerous for those traveling by vehicle. Road conditions can become very slippery and can be icy and parts, which can result in vehicles sliding off of the roadway potentially resulting in injuries or deaths. Visibility is also a big concern associated with winter storms, as the harder the snow falls, the less distance one can see with the human eye. Impacts and impediments within the transportation system and road networks also severely impacts emergency services, including police, fire, and ambulance emergency response. A third community impact vulnerable to the impacts of winter storms and freezes is schools. Due to the transportation network impediments, and for safety concerns, schools are often cancelled for winter storms and freezes until the road networks and school facilities are cleared of snow and are safely prepared to accept students again.

5.4.7.2 Estimate of Losses

According to NCDC, the total estimated economic damage associated with the 114 winter storms or freeze events in the period from 1996 to 2020 is approximately $3.65 million. This equates to an annual economic loss of approximately $152,000. Table 5.11 provides potential annualized loss estimates for winter storms by jurisdiction. These loss estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.11 Potential Annualized Losses from Winter Storm by Jurisdiction

Jurisdiction	Total Exposure	% of Total Exposure	Estimated Losses
Bowers Beach	$7,182,154	0.219	$199
Camden	$73,141,732	2.227	$2,024
CCD Central Kent	$444,420,828	13.530	$12,294
CCD Dover	$628,957,377	19.149	$17,400
CCD Felton	$109,659,741	3.339	$3,034
CCD Harrington	$179,225,267	5.183	$4,710
CCD Kenton	$115,083,828	3.504	$3,184
CCD Milford North	$124,164,839	3.780	$3,435
CCD Smyrna	$231,377,241	7.044	$6.401

Cheswold	$16,991,783	0.518	$471
Clayton	$52,294,064	1.592	$1,447
Dover	$844,922,049	25.724	$23,375
Farmington	$1,300,648	0.040	$36
Felton	$21,167,271	0.644	$585
Frederica	$10,837,285	0.330	$300
Harrington	$59,117,411	1.800	$1,636
Hartly	$983,149	0.030	$27
Houston	$5,452,527	0.166	$151
Kenton	$3,322,168	0.101	$92
Leipsic	$2,459,068	0.075	$68
Little Creek	$2,361,793	0.072	$65
Magnolia	$3,135,862	0.095	$86
Milford	$111,284,044	3.388	$3,079
Smyrna	$215,816,547	6.571	$5,971
Viola	$2,160,536	0.066	$60
Woodside	$2,997,870	0.091	$83
Wyoming	$23,586,371	0.718	$652
TOTAL	**$3,284,595,900**	**100.0**	**$90,867**

5.4.7.3 Impact on Future Development

New development is required to adhere to international building codes, which specify design standards for snow loadings. Therefore, the impact of winter weather on new structures is generally low. In order to accommodate the increased population associated with new development, it must be ensured that emergency response services, such as road clearing crews, are adequate.

5.4.7.4 Risk Factor

Risk Factor = 2.8. Table 5.3 summarizes the risk factor calculation

5.4.8 Erosion

5.4.8.1 Inventory and Summary of Vulnerable Assets

Vulnerable assets include homes, buildings, and other properties located along Kent County's Shoreline. It is possible that homes currently located a safe distance away from the shoreline can become more and more vulnerable to being destroyed to due erosion as the rate of erosion continues to increase, slowly bring the structure closer and closer to the ocean.

Delaware's "Beaches 2000" Report anticipates that "at some point in the future, the economic justification for a particular course of [erosion management] action considered optimal today will change because the local shoreline has changed due to sea level rise.

5.4.8.2 Estimate of Losses

If coastal erosion risk mitigation efforts were to cease, the estimated coastal erosion loss for the State of Delaware would be $16,822,000.[88] Due to a lack of availability of data, Kent County-specific loss estimates for erosion were not determined at this time.

5.4.8.3 Impact on Future Development

Future increases in the rate of the rate of erosion and sea level rise would be expected to exacerbate coastal erosion on nearly all shorelines in Delaware. Delaware's "Beaches 2000" Report states that "many scientists now agree that an increase in the rate of sea level rise and, hence, an increase in the rate of shoreline migration will happen

5.4.8.4 Risk Factor

Risk Factor = 1.9. Table 5.3 summarizes the risk factor calculation

5.4.9 Dam/Levee Failure

5.4.9.1 Inventory and Summary of Vulnerable Assets

No additional data or events since the previous Plan Update have occurred affecting estimated impacts resulting from a dam failure. Nearly 3,500 people and 881 structures are exposed to dam failure hazards, making people and property the most vulnerable community assets in the event of a dam/levee failure. Table 5.12 summarizes the estimated exposure of people and structures to dam failure in Kent County.

Table 5.12 Estimated Exposure of People to High Hazard Dam Failure[89]

Dam Name	Nearest Downstream City/Town	Estimated People at Risk	Estimated Structures at Risk	Structure Estimated Value
Silver Lake Dam	Dover	735	245	$54,806,500
Moores Lake Dam	Dover	9	3	$671,100
Silver Lake Dam	Milford	477	61	$13,645,700
Wyoming Lake Dam	Dover	432	144	$32,312,800
Voshell Pond Dam	Camden	78	26	$5,816,200
Haven Lake Dam	Milford	545	90	$20,133,000
Garrisons Lake Dam	Leipsic	146	30	$6,711,000
Derby Pond Dam	Voshell Mill	114	34	$7,605,800
Blairs Pond Dam	Milford	414	78	$17,448,600
Coursey Pond Dam	Frederica	12	4	$894,800
Mccauley Pond Dam	Frederica	9	3	$671,100
Cartanza/EZ Farms Dam	Little Creek	276	92	$20,580,400
City of Harrington Sewage Lagoon	Harrington	105	35	$7,829,500
Wheatley Pond Dam	Smyrna	48	16	$3,759,200
Duck Creek Pond Dam	Smyrna	36	12	$2,684,400

[88] 2018 State of Delaware Hazard Mitigation Plan
[89] Ibid.

Lake Como Dam	Smyrna	19	4	$894,800
Mudmill Pond Dam	Greensboro, MD	6	2	447,400
Andrews Lake Dam	Frederica	3	1	$223,700
Totals:		3,467	881	$197,079,700

5.4.9.2 Estimate of Losses

As stated above, nearly 3,500 people and 881 structures are people are potentially exposed to dam failure hazards. Loss estimates would be dependent on which dam(s) would fail. If all were to simultaneously fail, potential loss estimates would be estimated at $197,079,700.

5.4.9.3 Impact on Future Development

FEMA developed a program titled "RiskMAP" in 2014, illustrating the potential impact of future flood events. Municipalities should make available to developers and homeowners this best available data, which may be found at FEMA's website: https://www.fema.gov/risk-mapping-assessmentand-planning-risk-map Although the RiskMAP flood extents are not official floodplain limits at the time of this Plan Update, homeowners and mortgage lenders should use the data to understand the true risk posed by flooding when evaluating flood insurance policies.

5.4.9.4 Risk Factor

Risk Factor = 1.7. Table 5.3 summarizes the risk factor calculation.

5.4.10 Earthquake

5.4.10.1 Inventory and Summary of Vulnerable Assets

The HAZUS-MH software was utilized to determine loss estimates and damages to essential facilities. For the 0.2% chance per year earthquake event, an estimated $90,000 in damages would occur, and no critical facilities would suffer damages beyond those classified as negligible. Earthquakes can affect many different community assets, and can damage and disrupt buildings, transportation systems, and utility systems. Expected building damage is provided in Table 5.12, , while Table 5.13 shows expected damage by occupancy Table 5.14 shows expected damage to critical facilities, and Table 5.15 shows expected damage to utility system facilities.

Table 5.13 Expected Building Damage by Occupancy

Expected Building Damage by Occupancy					
	None	Slight	Moderate	Extensive	Complete
Agriculture	315.44	12.51	3.57	0.46	0.02
Commercial	2835.11	120.00	41.19	5.36	0.34
Education	143.19	5.67	1.89	0.23	0.02
Government	178.52	6.92	2.29	0.26	0.02
Industrial	750.83	29.69	10.20	1.21	0.07

Other Residential	9236.43	631.65	239.21	7.59	0.12
Religion	262.30	10.25	3.38	0.57	0.05
Single Family	46,577.18	77.24	388.22	57.87	5.56
Total	**60,299**	**2,138**	**690**	**74**	**6**

Table 5.14 Potential Damage to Critical Facilities from Earthquakes per Jurisdiction

Potential Damage to Critical Facilities from Earthquakes per Jurisdiction							
Jurisdiction	Total # of Critical Facilities	1% chance per year			0.2% chance per year		
		Moderate Damage	Slight Damage	Negligible Damage	Moderate Damage	Slight Damage	Negligible Damage
Bowers Beach	1	0	0	1	0	0	1
Camden	9	0	0	9	0	0	9
CCD Central Kent	5	0	0	5	0	0	5
CCD Dover	17	0	0	17	0	0	17
CCD Felton	2	0	0	2	0	0	2
CCD Harrington	1	0	0	1	0	0	1
CCD Kenton	2	0	0	2	0	0	2
CCD Milford North	1	0	0	1	0	0	1
CCD Smyrna	1	0	0	1	0	0	1
Cheswold	1	0	0	1	0	0	1
Clayton	3	0	0	3	0	0	3
Dover	24	0	0	24	0	0	24
Farmington	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Felton	3	0	0	3	0	0	3
Frederica	2	0	0	2	0	0	2
Harrington	5	0	0	5	0	0	5
Hartly	1	0	0	1	0	0	1
Houston	1	0	0	1	0	0	1
Kenton	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Leipsic	1	0	0	1	0	0	1
Little Creek	1	0	0	1	0	0	1
Magnolia	2	0	0	2	0	0	2
Milford	5	0	0	5	0	0	5
Smyrna	8	0	0	8	0	0	8
Viola	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Woodside	1	0	0	1	0	0	1
Wyoming	3	0	0	3	0	0	3
TOTAL	**100**	**0**	**0**	**100**	**0**	**0**	**100**

Table 5.15 Expected Utility System Facility Damage

Expected Utility System Facility Damage					
System	# of Locations				
	Total #	W/ at least Moderate Damage	W/ Complete Damage	With functionality >50%	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	2	0	0	2	2
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	6	0	0	6	6
Communication	7	0	0	7	7
Expected Utility System Pipeline Damage					
Potable Water	4,689	19	5		
Waste Water	2,814	10	2		
Natural Gas	78	0	0		
Oil	0	0	0		

5.4.10.2 Estimate of Losses

The HAZUS-MH software was utilized to determine loss estimates and damages to essential facilities. For the 0.2% chance per year earthquake event, an estimated $90,000 in damages would occur, and no critical facilities would suffer damages beyond those classified as negligible. As indicated in the 2018 State of Delaware HMP, Table 5.16 shows the total annualized expected losses from earthquake events by CCD within the State.

Table 5.16 Estimated Earthquake Loss by Jurisdiction[90]

Jurisdiction	Estimated Loss
CCD Central Kent	10,133
CCD Dover	21,737
CCD Felton	2,340

[90] 2018 State of Delaware Hazard Mitigation Plan

CCD Harrington	4,885
CCD Kenton	3,430
CCD Milford North	3,878
CCD Smyrna	11,560
Kent Toal	57,093

5.4.10.3 Impact on Future Development

Risk to future development is no different than risk to existing infrastructure, property, or citizen health. Where development is planned, emergency services should be adjusted as necessary to accommodate an increased population.

5.4.10.4 Risk Factor

Risk Factor = 1.7. Table 5.3 summarizes the risk factor calculation.

5.4.11 Sinkholes, and Landslides

Delaware has had no adverse effects (damages) ever documented that were due to a landslide or sinkhole. Due to the relatively low probability of a sinkhole or landslide significantly impacting or Kent County, a risk factor was determined, although no further analysis or vulnerability assessment will be conducted for this hazard at this time.

If a sinkhole were to occur in Kent County, vulnerable assets would include lives and property, including building located overtop and in the vicinity of the sinkhole.

5.4.11.1 Risk Factor

Risk Factor = 1.3. Table 5.3 summarizes the risk factor calculation.

5.4.12 Tsunami

Delaware has had no adverse effects (damages) ever documented that were due to a tsunami. Due to the relatively low probability of a tsunami significantly impacting or Kent County, a risk factor was determined, although no further analysis or vulnerability assessment will be conducted for this hazard at this time.

5.4.12.1 Risk Factor

Risk Factor = 1.6. Table 5.3 summarizes the risk factor calculation.

5.4.13 Volcano

Due to the relatively low probability of a volcanic event significantly impacting or Kent County, a risk factor was determined, although no further analysis or vulnerability assessment will be conducted for this hazard at this time.

5.4.13.1 Risk Factor

Risk Factor = 1.0. Table 5.3 summarizes the risk factor calculation.

5.4.14 Pandemic/Infectious Disease Outbreak

5.4.14.1 Inventory and Summary of Vulnerable Assets

Property and structures will most likely not be impacted by a pandemic/infectious disease outbreak. Dependent on the severity, public health is the concern those vulnerable populations can be considered more vulnerable to this hazard than non-vulnerable populations. These vulnerable population include elderly, those with pre-existing health conditions, homeless, etc.

Another community asset that becomes very vulnerable during a pandemic/disease outbreak is the healthcare system, including hospitals, hospices/nursing homes, doctors offices, and medical personnel and associated staff. Hospitals and nursing homes, often made up of vulnerable populations, can become overwhelmed with sick patients, and lose the ability to accept new patients, while limiting the resources needed to care for those already there. Once hospitals and healthcare facilities are no longer able to accept or appropriately care for its community, a pandemic/infectious disease outbreak will continue to worsen and spread.

5.4.14.2 Estimate of Losses

Loss estimations for Kent County were not determined for this hazard.

5.4.14.3 Impact on Future Development

This hazard will likely have no impact on future development.

5.4.14.4 Risk Factor

Risk Factor = 2.3. Table 5.3 summarizes the risk factor calculation.

5.4.15 Terrorism

Due to the relatively low probability of a weapons of mass destruction event significantly impacting or Kent County, a risk factor was determined, although no further analysis or vulnerability assessment will be conducted for this hazard at this time.

5.4.15.1 Risk Factor

Risk Factor = 1.6. Table 5.3 summarizes the risk factor calculation.

5.4.16 Weapons of Mass Destruction

Due to the relatively low probability of a weapons of mass destruction event significantly impacting or Kent County. A risk factor was determined, although no further analysis or vulnerability assessment will be conducted for this hazard at this time.

5.4.16.1 Risk Factor

Risk Factor = 1.7. Table 5.3 summarizes the risk factor calculation.

5.4.17 Hazardous Materials (HazMat)

5.4.17.1 Inventory and Summary of Vulnerable Assets

Based on the best available data provided as part of the inventory database within the HAZUS-MH software, there are 11 listed hazardous material storage/production sites in Kent County. Assessing vulnerability to a hazardous materials (HazMat) release on a countywide scale can consist of a number of 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 Kent County focuses on the first three of these factors, and a comprehensive study was undertaken to document information for 15 identified hazardous material sites from State of Delaware exposure data. High consequence events were then selected (high material toxicity and population density), and ALOHA11 was used to calculate the potential area of impact. Affected population (based on Census 2010) and exposure value (HAZUS-MH) was then reported across selected events.

Table 5.17 shows hazardous materials facilities and potential exposure estimates to a HazMat release. It is important to note that a site is considered different from a facility. If a facility houses more than one hazardous material, it is treated as a separate entry in this table, partially due to the fact that potential population at risk and projected clean-up area could vary depending on the chemical. This explains the difference between there being 11 HazMat sites, but 15 Hazmat facilities. Table 5.17 provides HazMat facility names, general location, chemical name, potential population at risk, and the size of the clean up area. These exposure estimates were determined during the 2015 Plan Update, and validated and carried forward to this 2020 Update.

Table 5.17 Hazardous Materials Facilities and Potential Exposure Estimates

Facility Name	City	Chemical Name	Potential Residential Population at Risk	Clean-up Area (square kms)
Hirsh Industries	Dover	Certain Glycol Ethers	4,095	29.431
Reichhold, Inc.	Cheswold	1,3-Butadiene	2,808	64.687
Reichhold, Inc.	Cheswold	Butyl Acrylate	2,069	51.094
Reichhold, Inc.	Cheswold	Vinyl Acetate	2,046	27.273
Reichhold, Inc.	Cheswold	Acrylonitrile	1,106	8.174
Playtex Products, Inc.	Dover	Chlorine	17	0.038
Hirsh Industries	Dover	N-Butyl Alcohol	5	0.008
Reichhold, Inc.	Cheswold	Acrylic Acid **Solid	3	0.019
General Clothing Co., Inc.	Smyrna	Toluene	8	0.021
Camdel Metals Corporation	Camden	Trichloroethylene	1	0.011
NRG Energy Center	Dover	Hydrochloric Acid	0	0.027
NRG Energy Center	Dover	Sulfuric Acid	0	0.012
NRG Energy Center	Dover	Mercury Compounds	0	0.011
Reichhold, Inc.	Cheswold	N-Methylolacrylamide	0	0.000
Reichhold, Inc.	Cheswold	Formaldehyde	0	0.000

5.4.17.2 Estimate of Losses

Typical annual costs associated with hazardous materials incidents are approximately $20,000, mainly arising from spill clean-up and spill spread prevention.

5.4.17.3 Impact on Future Development

The impact of hazardous material- related incidents will mainly be to emergency management resource allocation and personnel.

5.4.17.4 Risk Factor

Risk Factor = 2.3. Table 5.3 summarizes the risk factor calculation.

5.4.18 Energy Pipeline Failures

5.4.18.1 Inventory and Summary of Vulnerable Assets

If an energy pipeline failure were to occur in a populated area or in a near a community, homes and other structures can be damaged or destroyed (especially in the event of an explosion). This hazard can also cause public health issues, depending on what is being transported through the pipeline. Energy Pipelines failures can also result in negative environmental impacts, dependent on the nature and size of the spill.

5.4.18.2 Estimate of Losses

Due to a lack of data availability, loss estimations for Kent County were not determined for this hazard.

5.4.18.3 Impact on Future Development

New development near pipelines puts more people and buildings at risk to pipeline releases or failures while also increasing the likelihood of damaging the pipeline. If new development near a pipeline lacks appropriate planning, operation, maintenance, and emergency response efforts can be impeded. New development along a pipeline should be designed so that emergency vehicles have access to the pipeline, while buildings and fences should not block emergency access to a pipeline.

5.4.18.4 Risk Factor

Risk Factor = 1.7. Table 5.3 summarizes the risk factor calculation.

5.4.19 Other Hazards

Though communities in the State of Delaware recognize that the state is vulnerable to other hazards such as wildfire, erosion, sinkholes, landslides and tsunamis, a high-level detailed risk assessment was not completed for Kent County due to the low level of risk and/or vulnerability for these hazards within the area as a whole as compared with other hazards.

5.5 Hazard Vulnerability Summary

5.5.1 Methodology

To aid in prioritization efforts in terms of planning needs and mitigation strategy, each of the hazards was assigned a “risk factor”. The risk factor is essentially a weighted calculation based on five variables associated with each hazard: 1) probability; 2) impact; 3) spatial extent; 4) warning time; and 5) duration. An index was then assigned to each variable depending on level: “1” – low to “4” – high. These variables, levels, and indices associated with each are summarized in Table 5.18. For

probability specifically, highly likely indicates a 100% chance to occurring in a given year; likely probability indicates a 75% chance top occurring in a given year; possible probability indicates at least a 50% percent of occurring in a given year; and unlikely probability indicates less than a 25% chances of occurring in a given year.

Table 5.18 Risk Factor Calculation Matrix

Probability		Impact		Spatial Extent		Warning Time		Duration	
Weight – 30%		Weight – 30%		Weight – 20%		Weight – 10%		Weight – 10%	
Level	Index	Level	Index	Level	Index	Level	Index	Level	Index
Unlikely	1	Minor	1	Negligible	1	>24 Hrs	1	<6 Hours	1
Possible	2	Limited	2	Small	2	12-24 Hrs	2	<24 Hours	2
Likely	3	Critical	3	Moderate	3	6-12 Hrs	3	<1 Week	3
Highly Likely	4	Catastrophic	4	Large	4	<6 Hrs	4	>1 Week	4

The risk factor for each hazard was then calculated using the following equation:

Risk Factor = (0.3)(Probability Index) + (0.3)(Impact Index) + (0.2)(Spatial Extent Index) + (0.1)(Warning Time Index) + (0.1)(Duration Index)

5.5.2 Hazard Ranking Results

Table 5.19 presents the results of applying the risk factor calculation to each hazard.

Table 5.19 Hazard Risk Factors and Ranking

Hazard	Probability Index	Impact Index	Spatial Extent Index	Warning Time Index	Duration Index	Risk Factor
Flood	4	4	3	1	2	3.3
Hurricanes/Coastal Storms	2	4	4	1	2	2.9
Winter Storms/Freezes	4	2	3	1	3	2.8
Drought/Extreme Heat	3	2	4	1	4	2.8
Severe Thunderstorms/Tornados	4	2	1	4	1	2.5
Pandemic	2	2	3	1	4	2.3
Hazardous Materials	2	3	1	4	2	2.3
Wildfire	1	2	2	4	4	2.1
Coastal Erosion	2	2	2	1	2	1.9
Earthquake	1	1	4	2	1	1.7
Weapons of Mass Destruction	1	2	2	3	1	1.7
Energy Pipeline Failures	1	2	1	4	2	1.7
Dam/Levee Failure	2	1	1	4	2	1.7
Hail	2	1	1	4	1	1.6
Tsunami	1	1	4	1	1	1.6
Terrorism	1	2	1	4	1	1.6

Sinkholes and Landslides	1	1	1	4	1	1.3
Volcano	1	1	1	1	1	1.0

Based on the results of the risk factor analysis it was determined that the top five hazards that impact Kent County are: 1) Flooding; 2) Hurricanes and Coastal Storms; 3) Winter Storms and Freezes; 4) Drought and Extreme Heat; and 5) Severe Thunderstorms and Tornados.

5.5.3 Potential Loss Estimates

Table 5.20 presents the results a summary table of potential loss estimates for each hazard based on the analyses conducted in the hazard profiling.

Table 5.20 Potential Loss Estimates

Hazard	Number of Exposed Structures	Number of Exposed Critical Facilities	Annual Economic Loss Estimate
Flood	3,113	7	$81,000
Hurricanes/Coastal Storms	2,722	0	$500 million[1]
Winter Storms/Freezes	N/A	N/A	$152,000
Drought/Extreme Heat	N/A	N/A	$348,000
Severe Thunderstorms/Tornados	N/A	N/A	$120,000
Pandemic	N/A	N/A	Not Determined
Hazardous Materials	N/A	11	$20,000
Wildfire	15,265	24	>$1 Billion[2]
Coastal Erosion	Not Determined	Not Determined	Not Determined
Earthquake	0[4]	0[4]	$90,000[3]
Weapons of Mass Destruction	Not Determined	Not Determined	Not Determined
Energy Pipeline Failures	N/A	N/A	Not Determined
Dam/Levee Failure	8,000[5]	Not Determined	Not Determined
Hail	N/A	N/A	$1,700
Tsunami	Not Determined	Not Determined	Not Determined
Terrorism	Not Determined	Not Determined	Not Determined
Sinkholes and Landslides	Not Determined	Not Determined	Not Determined
Volcano	Not Determined	Not Determined	Not Determined

Note 1: 1,000-year hurricane event (as opposed to annual loss estimate)
Note 2: approximate total economic exposure (as apposed to annual loss estimate)
Note 3: 0.2% annual chance earthquake scenario (as opposed to annual loss estimate)
Note 4: only negligible damage reported to structures and critical facilities
Note 5: population (as opposed to number of structures)

5.5.4 Future Development and Vulnerability

As part of this Plan Update, the Steering Committee repeatedly expressed concern that new homes, particularly high-value homes, are being constructed in forested areas, as well as areas vulnerable to coastal storms and erosion, increasing the potential for these hazard impacts. These hazards like will not cause problems countywide, although the vulnerability for those areas at risk may continue to increase.

6.0 CHAPTER 6 – DOCUMENT REVIEW AND CAPABILITY ASSESSMENT

6.1 CFR Requirements for Plan Integration

CFR 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.

CFR Requirement §201.6(b)(3) Review and incorporate, if appropriate, existing plans, studies, reports, and technical information.

6.2 Introduction

This Chapter of the Plan discusses the capability of Kent County and participating municipal jurisdictions to implement hazard mitigation activities. The capability assessment helps identify existing gaps, conflicts and/or shortcomings that may need to be addressed through future mitigation actions and helps to ensure that proposed mitigation actions are practical, while considering the County's and municipalities' capacity to implement these actions.

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. As in any planning process, it is important to try 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. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given the fiscal, technical, administrative, and political framework of the community.

The capability assessment completed for Kent County serves as 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 this HMP Update. It not only helps establish the goals and objectives for Kent County to pursue under this Plan Update, but also ensures that those goals and objectives are realistically achievable under given local conditions.

This capability assessment comprises three components:

1. Plan Integration and Document Review - an inventory of select County planning and regulatory tools and a review and incorporation of existing plans and other technical information as appropriate;
2. County Roles and Emergency Response Capabilities and Responsibilities; and
3. Municipal Capability Assessment - an analysis of municipal capacity from a planning, policy, staffing, response, and training standpoint.

Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. 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.

Sections of this document review have been derived from the 2015 plan and updated where applicable.

6.3 Plan Integration and Document Review

The purpose of a plan/ordinance review as part of this planning process was tri-fold:

- To identify existing County-level initiatives;
- To provide an inventory and review of sample plans and ordinances and identify sections in these documents that address hazard mitigation related issues; and
- To provide a platform to integrate plans and other documents so recommendations and strategies are not contradictory to one another.

Plans and ordinances that assist with minimizing impacts of hazards on Kent County's residents through preventative measures include zoning ordinances, subdivision and land development ordinances, floodplain management ordinances, comprehensive plans, etc. Preventative measures are important for local communities to focus on for hazard mitigation efforts, as one of the most cost-effective means of reducing the probability of future losses to residents. Table 6.1 and Table 6.2 break down the document review for two other County Plans/Ordinances.

6.3.1 Plan #1: Kent County Comprehensive Plan

Table 6.1 Kent County Comprehensive Plan 2018 Review

Plan Topic	Page Number	Item Type	Current Clause	Comment
Economic Development	--	Recommendation	---	Include a recommendation for encouraging businesses to develop COOP Plans
Community Facilities	4-23	Recommendation	Major capital improvements to the wastewater system over the next five years include: Wastewater plant improvements to meet environmental standards, and provide adequate emergency power generation capability;	Incorporate into hazard mitigation activities.
	4-26	Recommendation	Update the Public Safety Strategic Plan.	Incorporate into hazard mitigation activities.
	4-26	Recommendation	Monitor the need for additional paramedic units specifically in the Smyrna, Dover, and Magnolia areas.	Incorporate into hazard mitigation activities.
	4-26	Recommendation	Design and implement a Public Safety check-in program for elderly and possibly disabled residents.	Incorporate into hazard mitigation activities.

	4-26	Recommendation	Pursue discussions with potential service provider partners and identify potential funding sources to support an expanded community EMS mission including: • Increasing access to care in underserved areas; • Providing telephone advice to 9-1-1 callers instead of resource dispatch; • Using community paramedics or other specially trained EMS practitioners for • management of high healthcare system utilizers or patients at risk for hospital • admission or readmission, chronic disease management, preventive care, or post discharge follow-up visits;	Incorporate into hazard mitigation activities.
	4-26	Recommendation	Work with DNREC to identify specific uses such as borrow pits that could negatively impact public water supplies and develop relevant restrictions specific to the uses.	Incorporate into hazard mitigation activities.
	4-27	Recommendation	Pursue an ongoing program of enhancements to the County's Geographic Information System.	Incorporate into hazard mitigation activities.
	4-27	Recommendation	Maintain and continually upgrade the existing sanitary sewer conveyance system of pipes, manholes, pump stations, and the wastewater treatment facility to help ensure trouble-free operation, including a funding strategy implementing a routine infrastructure replacement program while exploring new technologies and techniques of wastewater treatment, disposal, and re-use, and maintaining superior environmental standards.	Incorporate into hazard mitigation activities.
	4-27	Recommendation	Improve the efficiency of the existing sewer system by increasing the capacity through reduction of infiltration and inflow of stormwater and illicit discharges into the sewer network.	Incorporate into hazard mitigation activities.
	4-27	Recommendation	Continue coordination efforts with State agencies (Kent Conservation District and DNREC) to limit and manage stormwater runoff in the most efficient and effective manner while respecting natural features and constraints.	Incorporate into hazard mitigation activities.
	4-27	Recommendation	Continue participation in the Stormwater Regulatory Advisory Committee and Clean Water Council to develop a watershed approach to stormwater that assesses design in context of broader stormwater conveyance limitations within the watershed and better identifies and addresses the effect any land development has on the community by making provisions for incorporating future watershed studies and/or TMDL requirements.	Incorporate into hazard mitigation activities.

	4-27	Recommendation	Establish a permitting process for land grading, similar to the building permit process, to enable efficient and effective inspection and enforcement action.	Incorporate into hazard mitigation activities.
Conservation	5-13	Recommendation	Maintain existing environmental standards (wetland protection, floodplain standards, stream buffers, impervious cover limitations) to protect people, property, and the environment.	Incorporate into hazard mitigation activities.
	5-13	Recommendation	Carefully weigh the costs and benefits of infrastructure investment in areas anticipated to be inundated by sea level rise.	Incorporate into hazard mitigation activities.
	5-13	Recommendation	Increase the width of non-disturbance areas surrounding wetlands, waterbodies, and conveyance systems, including tax ditches, to an average of 100 feet for 80% of the area, to be buffered with a minimum width buffer of 50 feet and, if previously\ cleared of vegetation, require such riparian buffer be replanted with native species prevalent in riparian areas.	Incorporate into hazard mitigation activities.
	5-14	Recommendation	Review existing ordinances for efficacy in meeting federally required Total Maximum Daily Load (TMDL) requirements and make changes where appropriate.	Incorporate into hazard mitigation activities.
	5-14	Recommendation	Consider requiring groundwater impact assessments for subdivision and land development projects located in source water assessment areas, excellent recharge areas, and wellhead protection areas and ensure such projects are forwarded to DNREC for advice and comment.	Incorporate into hazard mitigation activities.
Historic Preservation	6-5	Recommendation	Enact ordinances that require the documentation, protection and/or preservation of important cultural and historic resources within the County.	Edit to include protecting historic properties from the impacts of natural hazards.
Land Use	7-13	Recommendation	Develop in areas with adequate infrastructure and public services while protecting the natural resources and rural character of the County.	Incorporate into hazard mitigation activities.
Transportation	--	Recommendation	---	Include a recommendation that identifies frequently flooded roads and transportation routes in the County
	--	Recommendation	---	Include a recommendation to explore options to mitigate potential HazMat incidents on County and State Roads

	--	Recommendation	---	Include a recommendation for enacting traffic calming measures to reduce the number of transportation accidents.
Community Design	9-11	Recommendation	Revise the Cluster Development standards to include additional specific standards for natural resource protection, buffering, and preservation of viewscapes, as well as ensure that proposed cluster developments do not result in any greater impact than a conventional development.	Incorporate into hazard mitigation activities.
	9-11	Recommendation	Ensure that subdivision and street design meet the needs of emergency vehicles while at the same time respecting the pedestrian scale of development.	Incorporate into hazard mitigation activities.
Intergovernmental Coordination	10-4	Recommendation	Continue providing permitting and inspection services as well as zoning and subdivision ordinance administration as requested by municipalities.	Incorporate into hazard mitigation activities.

6.3.2 Plan #2 Kent County Floodplain Management Ordinance 2014

Table 6.2 Kent County Floodplain Management Ordinance Review

Plan Topic	Item #	Page #	Current Clause
§188-3. Administration			
Administration	§188-3	19	The Director of Planning Services is hereby appointed to administer and implement these regulations and is referred to herein as the Floodplain Administrator
Inspections	§188-3	26	The Floodplain Administrator shall make periodic inspections of development permitted in special flood hazard areas, at appropriate times throughout the period of construction in order to monitor compliance.
§188-4. Requirements in All Special Flood Hazard Areas			
Subdivision and Developments	§188-4.	28	All subdivision and development proposals shall be consistent with the need to minimize flood damage and are subject to all applicable standards in these regulations. Subdivision within the floodplain is prohibited in accordance with Chapter 187 Subdivision and Land Development.
	§188-4.	28	All subdivision and development proposals shall have utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.
	§188-4.	28	All subdivision and developments proposals shall have adequate drainage provided to reduce exposure to flood damage.

	§188-4.	28	
Protection of Water Supply and Sanitary Sewage Systems	§188-4.	28	New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems.
	§188-4.	28	New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into systems and discharges from systems into floodwaters.
Buildings and Structures	§188-4.	28	All new construction of buildings and structures, including placement of manufactured homes and substantial improvements to existing buildings and structures, that are to be located, in whole or in part, in special flood hazard areas shall meet the following requirements: • Be designed (or modified) and constructed to safely resist flood loads. • Be constructed by methods and practices that minimize flood damage. • Use flood damage-resistant materials below the elevation of the lowest floor. • Have electrical systems, equipment and components, and heating, ventilating, air conditioning, and plumbing appliances, plumbing fixtures, duct systems, and other service equipment located at or above the elevation of the lowest floor.
Fill	§188-4.	30	Disposal of fill, including but not limited to rubble, construction debris, woody debris, and trash, shall not be permitted in special flood hazard areas.
Historic Structures	§188-4.	30	Repair, alteration, or rehabilitation of historic structures shall be subject to the requirements of these regulations unless a determination is made that compliance with these regulations will preclude the structure's continued designation as a historic structure and a variance is granted in accordance with §188-8 and such variance is the minimum necessary to preserve the historic character and design of the structure
Gas or Liquid Storage Tanks	§188-4.	31	Above-ground tanks in special flood hazard areas shall be elevated and anchored a minimum of 18 inches above the base flood elevation or shall be anchored at- grade and designed and constructed to prevent flotation, collapse, or lateral movement
	§188-4	31	Underground tanks in special flood hazard areas shall be anchored to prevent flotation, collapse or lateral movement resulting from hydrostatic loads, including the effects of buoyancy, during conditions of the base flood.
§188-5. Requirements in Special Flood Hazard Areas Other Than Coastal High Hazard Areas			
Residential Structures and Residential Portions of Mixed Use Structures	§188-5	32	(a) The lowest floor (including basement) shall be elevated to 18 inches above the base flood elevation. (b) In areas of shallow flooding (Zone AO), the lowest floor (including basement) shall be elevated at least to 18 inches above the highest adjacent grade as the depth number specified in feet on the Flood Insurance Rate Map; or at least 2 feet plus 18 inches if a depth number is not specified; adequate drainage paths shall be provided to guide floodwaters around and away from the structure.
Enclosures Below the Lowest Floor	§188-5	33	Enclosures below the lowest floor shall be used solely for parking of vehicles, building access, crawlspaces, or limited storage.
Dry Floodproofing Requirements	§188-5	34	Be designed to be dry floodproofed such that the structure is watertight with walls and floors substantially impermeable to the passage of water to the level of the base flood elevation plus 18

			inches.
§188-6. Requirements in Coastal High Hazard Areas			
Residential and Nonresidential Structures	§188-6	38	Buildings and structures shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift).
	§188-6	38	Basement floors that are below grade on all sides are prohibited.
§188-7. Areas Within the Limit of Moderate Wave Action/Coastal A Zones			
Areas Within the Limit of Moderate Wave Action/ Coastal A Zones	§188-7	40	Where a Limit of Moderate Wave Action is delineated on the FIRM, special flood hazard areas that are subject to wave heights between 1 ½ feet and 3 feet shall be designated as Coastal A Zones.

6.4 Building Codes

Building codes set construction standards for the minimum acceptable level of safety for buildings in a community. Building codes are also important in mitigating the impact of non-flood hazards on new buildings. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. These standards should typically include criteria to ensure that the foundation will withstand flood forces and that all portions of the building subject to damage are above or otherwise protected from flooding.

6.5 Stormwater Management

Stormwater management regulations address the runoff of stormwater from new developments onto other properties and into floodplains. Development outside a floodplain can contribute significantly to flooding problems; when land is developed, the natural ground cover is replaced, and runoff is increased. Thus, in order to prevent stormwater from flooding roads and buildings, storm sewers and ditches are constructed to transport the water effectively.

Stormwater management regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage systems. The goal is to ensure minimal increases in the rate of stormwater discharge after development, in comparison to the site's conditions prior to development.

6.6 The NFIP and Community Rating System

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when 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. Participation in the NFIP is voluntary for local governments, but the program is promoted by FEMA and DEMA as a first basic step for implementing and sustaining an effective hazard mitigation program. It is therefore used as a key indicator for measuring local capability as part of this assessment.

In order 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 will 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 key 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 important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community. As of August 10, 2020, FEMA Region 3 is the first in the country to have wall-to-wall coverage in digital maps – a big step forward in ensuring the safety of local communities from flooding. FEMA Region 3, which includes Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and Washington, D.C. leads the country in providing up-to-date flood hazard information to local communities. Table 6.3 summarizes NFIP participation for each of Kent County's municipalities below.

Table 6.3 NFIP Participation in Kent County

Jurisdiction	NFIP Entry Date	Current Effective Map
Kent County	3/15/78	06/20/18
Bowers Beach	7/02/80	7/7/14
Camden	9/16/81	7/7/14
Cheswold	1/07/77	7/7/14
Clayton	6/01/77	7/7/14
Dover	9/16/82	7/7/14
Farmington	Not in NFIP	--
Felton	1/7/77	7/7/14
Frederica	1/02/81	7/7/14
Harrington	6/1/77	6/20/18
Hartly	Not in NFIP	--
Houston	Not in NFIP	--
Kenton	Not in NFIP	--
Leipsic	9/29/78	7/7/14
Little Creek	1/17/79	7/7/14
Magnolia	5/5/03	(NSFHA)
Milford	6/1/77	3/16/15
Smyrna	6/1/77	7/7/14
Viola	Not in NFIP	--
Woodside	Not in NFIP	--
Wyoming	3/16/81	5/5/03

An additional indicator of floodplain management capability is the number of participants in the *Community Rating System* (CRS). The CRS is administered by FEMA's National Flood Insurance Program (NFIP). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities as extra measures, that provide protection from flooding that go beyond the minimum requirements of the NFIP, adding extra local measures to provide protection from flooding. The incentives are in the form of premium discounts. There are 18 creditable CRS mitigation activities available to communities. These activities are assigned a range of point values. A community receives a CRS classification based upon the credit points it receives for its activities. It can take on a wide range of activities that reduce flood losses. These activities include but are not limited to better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class. Class ratings, which run from 10 to 1, are tied to flood insurance premium reductions. Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. As class ratings improve (decrease), the percent reduction in flood insurance premiums for NFIP policy holders in that community increases.

Community participation in the CRS is voluntary. Any community that is 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 greatly 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.

As of October 1, 2020, there were over 1,700 communities in the United States that were in the CRS. The State of Delaware had 11 CRS communities participating, however there are currently no communities in Kent County that belong to CRS.

6.7 NWS - StormReady

StormReady is a nationwide program that helps communities better protect citizens during severe weather, encourages communities to take a proactive approach to improving local hazardous weather operations, and provides guidance to emergency managers on how to improve hazardous weather operations. There are five StormReady entities in Delaware as of October 1, 2020, including All 3 Counties, one Community, and one Supporter.

6.8 Kent County Government Structure

Kent County Levy Court is the highest executive power that exists in Kent County, Delaware. It is charged with overseeing the daily operations of Kent County government. The Levy Court is composed of seven elected Commissioners, six of whom are elected from the districts in which they reside and the seventh is elected at-large to represent the entire County. The Levy Court was established when the Delaware General Assembly enacted legislation that called for taxes to be levied on all land-owners in Delaware. Duties grew to include property assessment, real estate transfers and granting land applications. The Levy Court further took responsibility for appointing assessors and establishing assessment fees, constructing sewage systems, determining streetlight placement and any other topics of public interest. It also provides library and ambulance service, in addition to financial assistance to local service organizations. The Levy Court is continuously expanding the services the County provides to its constituents. The Levy Court is committed to serving the public and ensuring that the best possible decisions are made for the enhancement of Kent County residents.

The Kent County Department of Administration consists of the County Administrator's Office, Economic Development Office, Information Technology Office, Personnel Office, and Facilities Management Division. These offices support the seven elected Levy Court Commissioners as well as other County departments and elected County offices by administering all County functions relating to employees and infrastructure. The Department of Administration is headed by the County Administrator who is the chief appointed officer of the County. His duties include advising Levy Court Commissioners on issues affecting Kent County and managing the day to day operations of county government. The County Administrator supervises all appointed department managers, provides direct oversight for the Information Technology, Economic Development, and Personnel offices, and coordinates the activities of all departments on behalf of Levy Court. The Department of Administration also provides for the security and general maintenance of all County buildings.

The County's organizational chart is provided in Figure 6.1 while Figure 6.3 shows the Levy Court Districts.

Figure 6.1 Kent County Government Organizational Structure

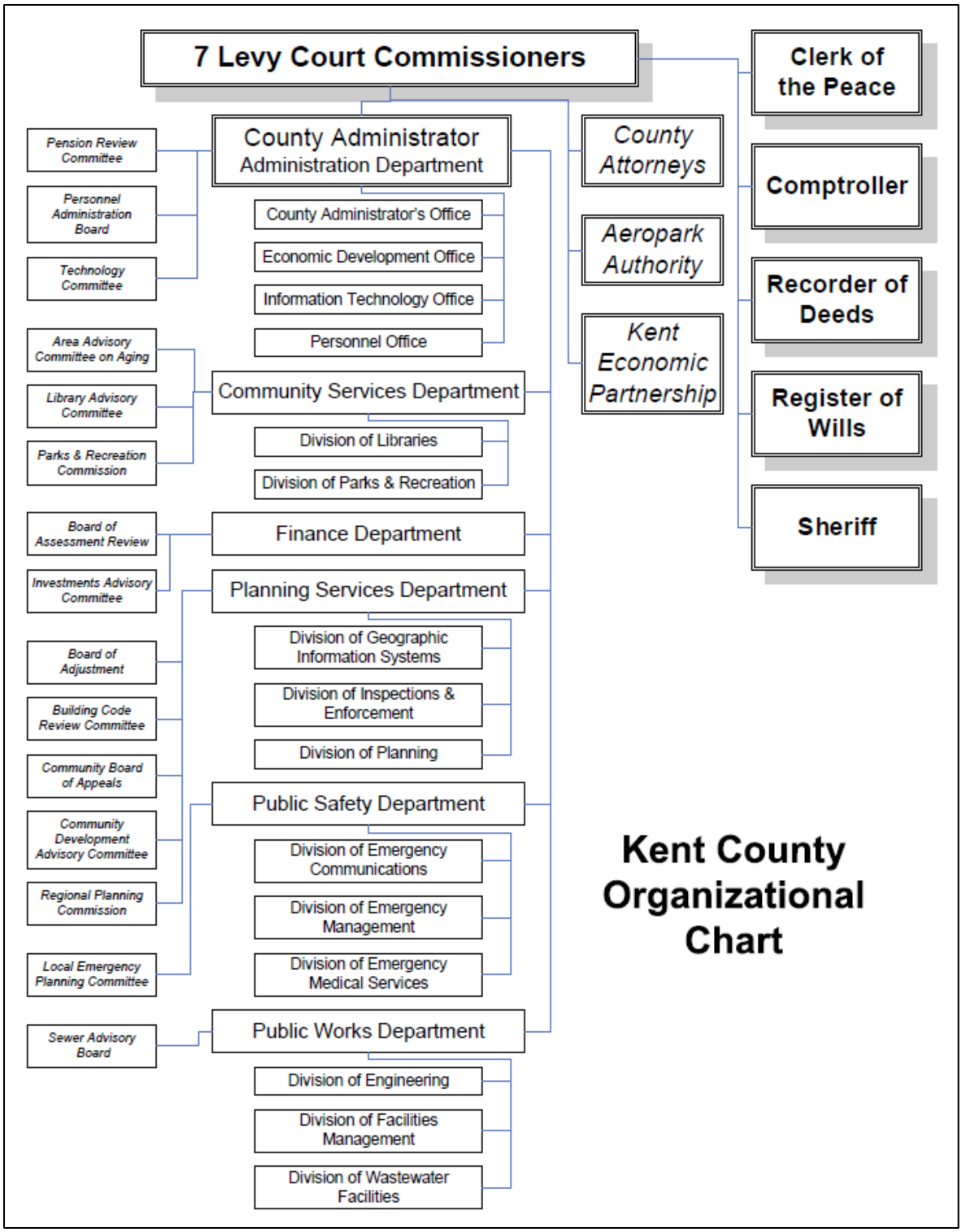
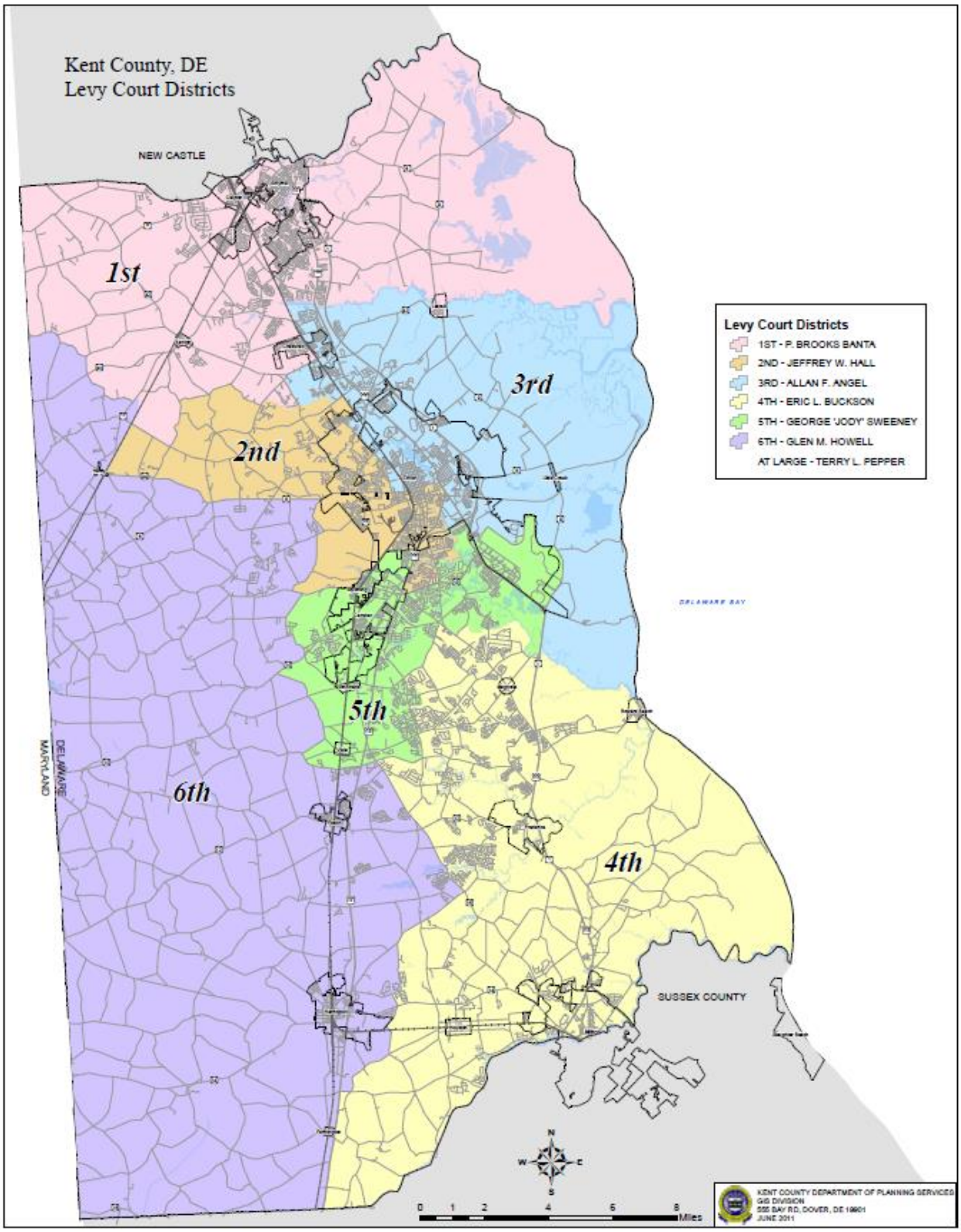


Figure 6.3 Levy Court Districts



6.9 County Staffing and Training Capabilities

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. Other phases include preparedness, response, and recovery. In reality, each phase is inter-connected 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. As a result, the Capability Assessment Questionnaire asked several questions across a range of emergency management considerations in order to assess the jurisdictions - a key to the successful implementation of hazard mitigation actions.

In terms of staffing for flood related projects, the County does not have an official floodplain administrator/CRS coordinator. Table 6.4 identifies the various types of training received by county and municipal personnel.

Table 6.4 Municipal Training Capabilities

Jurisdiction	GIS	Floodplain Management/ NFIP	Building Inspection/ Code Administration
Bowers Beach	unknown	unknown	unknown
Camden	-	x	x
Cheswold	-	x	-
Clayton	unknown	unknown	unknown
Dover	x	x	x
Farmington	unknown	unknown	unknown
Felton	unknown	unknown	unknown
Frederica	-	x	X
Harrington	-	x	X
Hartly	unknown	unknown	unknown
Houston	unknown	unknown	unknown
Kenton	-	-	-
Leipsic	-	-	-
Little Creek	x	x	x
Magnolia	-	-	-
Milford	x	x	x
Smyrna	x	x	x
Viola	unknown	unknown	unknown
Woodside	unknown	unknown	unknown
Wyoming	-	-	-

Kent County government consists of six Departments, with eleven divisions, many of which are responsible for planning and responding to natural hazard events that occur within the County. The primary Departments/Divisions, and Offices that plan for, and respond to, natural hazard events include:

6.9.1 Kent County Department of Public Safety

The Department of Public Safety consists of the Division of Emergency Communications, the Division of Emergency Management, and the Division of Emergency Medical Services. This department administers all public safety-related functions for the County, including: operating the 24 hour, seven day a week centralized dispatch center for fire, ambulance, and rescue; informing the public of dangers that threaten the wellbeing of the citizens of the County; coordinating activities in the event of extraordinary emergencies; and ensuring high quality emergency medical care through advanced life support services.

6.9.1.1 Emergency Communications Division

The Emergency Communications Division, also known as Kent Center, is the true first responder to all emergencies. Their role is to act as a vital and critical link between public safety agencies and the citizens they protect and serve. The Communications Center provides countywide 911 emergency call-taking, dispatching, and centralized communications services to 19 volunteer fire departments and 2 EMS agencies.

The Kent County 911 Center is dedicated to providing the highest quality 911 Service and committed to ensuring the prompt dispatch of the emergency services in times of need.

6.9.1.2 Emergency Medical Services

The Emergency Medical Services Division is responsible for delivery of advanced life support services to residents and visitors to the County. The Division ensures high quality emergency medical care through quality assurance reviews, continual in-service training and updates, and public education. It also assists volunteer ambulance companies to provide a total medical system.

6.9.1.3 Emergency Management Division

The Emergency Management Division provides planning and preparedness for, and coordination of, response activities for events that threaten the health and safety of County residents and visitors and that may damage property and effect the economy within the County. The Division of Emergency Management staff is on call 24 hours a day for response to any emergency or disaster that may occur.

Department services are as follows:

1. Coordinate the County's effort to safeguard life and property by preparing for and carrying out emergency operations.
2. Prevent, minimize, repair, and recover from injury and damage which may result from man-made or natural disasters.
3. Assist with the maintenance of continuity of government under emergency conditions.
4. Work with the Delaware Homeland Security Terrorism Preparedness Working Group to manage the Homeland Security programs in Delaware, including establishing the State's strategic plans, the acquisition of equipment and services, and the required training and exercising needed to be prepared for the next attack on America.
5. Support the DE Radiological Emergency Plan (REP), Delaware Emergency Management Agency (DEMA) in emergency operations during a radiological release that may affect Kent County.
6. Work with the Local Emergency Planning Committee (LEPC) in support of the Superfund Amendments Reauthorization Act (SARA Title III) in its emergency preparedness operations in time of a hazardous material release or spill from a fixed or mobile facility that may affect Kent County and its citizens.

7. Compile and maintain records of inventories of facilities that produce, store, or sell hazardous materials in the county and to supply information to the first responders and to supply the SARA information to the citizens of the county upon request.
8. Prepare for and participate in all drills, tabletop exercises, and full-scale exercises in order to enhance the emergency preparedness of the Kent County Emergency Operations Center and its respondents.

6.9.2 Kent County Emergency Operations Center

The Kent EOC is the central facility from which all County emergency efforts may be coordinated and directed. It is the essential location for large-scale emergency response and recovery and should have the capability to direct and control all County emergency operations. As part of its preparedness activities and continuity of operations, the County has designated an EOC and an alternate EOC and ensured that the EOC is prepared for activation.

The following locations are designated as the County's EOC and alternate EOC:

- Primary: Kent County Emergency Services, 911 Public Safety Boulevard, Dover, DE
- Alternate: Dover Police Department 400 South Queen Street, Dover, DE

The EOC may be activated immediately by the President of Levy Court, Director of Emergency Management, or their designated representatives upon the decision that an emergency currently exists or may soon exist. The President of Levy Court is responsible for the full activation (Delta Level) of the EOC. Any lesser level activation is a decision of the Director of Emergency Management or their designee. The EOC will be deactivated upon the decision of the President of Levy Court, or designated representative, for a Delta activation, or the Director of Emergency Management or their designee for Alpha through Charlie activations. The different EOC activation levels are as follows:

- Level "A" Alpha Activation - This level is the normal daily operations with no activity in the Center other than daily routine tasks
- Level "B" (Bravo) Activation – Requires the Division of Emergency Management personnel to monitor on a daily basis the activities as a result of a particular incident that could be County-wide or localized to a specific area of the County. Added monitoring may include, but not be limited to, monitoring the local TV stations for news updates, conference calls with DEMA, tracking incident reporting to the 911 Center for calls related to the incident, meeting with staff for updates, etc. This level would not require personnel from other Departments or agencies to respond.
- Level "C" (Charlie) Activation – This Level of activation will have selected respondents come to the EOC. Those who respond would depend on the anticipated emergency or incident and what resources may be needed to properly manage the incident. Those activated should be able to provide services and support over and above that which would be expected during a normal operating day.
- Level "D" (Delta) Activation – A Level "D" Activation would be used when an incident would affect all or most of the county or when the situation was deemed to be serious and possibly result in the services and support of most or all designated respondents being needed. A major hurricane or snowfall would most likely require a Level "D" Activation. This level would probably last for several hours or days. All resources that have been identified in the Emergency Operations Plan would be subject to being called in during the emergency.

6.9.3 Local Police, Fire, and EMS Organizations

Table 6.5 and Table 6.6 outlines the emergency organizations for Kent County and the typical respondents to the EOC. The Emergency Dispatch Center, located adjacent to the County EOC, is responsible for coordinating the activities between the County EOC and the 19 fire departments, one volunteer ambulance company, and eight police departments (not including the State Police, who respond to the EOC), within the County:

Table 6.5 Kent County Fire Departments

Fire Departments	
• Bowers Fire Company (40)	• Harrington Fire Company (50)
• Camden-Wyoming Fire Company (41)	• Hartly Fire Company (51)
• Carlisle Fire Company (42)	• Houston Fire Company (52)
• Cheswold Fire Company (43)	• Leipsic Fire Company (53)
• Citizens Hose Fire Company (44)	• Little Creek Fire Company (54)
• Clayton Fire Company (45)	• Magnolia Fire Company (55)
• Dover Fire Department (46)	• Marydel Fire Company (56)
• Farmington Fire Company (47)	• South Bowers Fire Company (57)
• Felton Fire Company (48)	• Dover AFB Fire Company (58)
• Frederica Fire Company (49)	

Table 6.6 Kent County Police Departments

Police Departments	
• Capitol Police	• Frederica
• Camden	• Harrington
• Cheswold	• Kenton
• Clayton	• Milford
• Delaware State University Police	• Smyrna
• Dover	• Viola
• Felton	• Wyoming
EMS Agencies	
• St. Francis EMS (63)	
• Smyrna American Legion Ambulance - EMS (64)	

6.10 Municipal Capability Assessment

A Capability Assessment questionnaire was developed during the initial planning process and was distributed to local government officials. A copy of the questionnaire is included in Appendix D of this Plan. The survey asked specific questions about existing local plans, policies, programs, or ordinances that contribute to and/or hinder the community to carry them out. A series of questions were asked concerning each jurisdiction's technical and administrative capabilities to implement mitigation actions. The survey provided an extensive inventory of existing local plans, policies, programs and ordinances. 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. This information was shared at the Committee meeting and has been incorporated into the overall Capability Assessment.

In addition to the results of the Capability Assessment, an inventory of some previously completed hazard mitigation projects in Kent County is included as part of this assessment. This inventory provided information on past mitigation efforts taken in Kent County to reduce the effect of identified hazards. Documenting past mitigation measures can also serve to help assess the degree to which local governments are willing to adopt future mitigation actions.

The findings of the capability assessment are summarized in this Plan Update to provide insight into the capacity of Kent County and jurisdictions with the effect of identified hazards. Table 6.7 provides a summary of the local plans and programs in place for Kent County that were received from the municipalities to assess the degree to which local governments are willing to adopt future mitigation actions.

6.10.1 Municipal Plans and Ordinance

Table 6.7 Relevant Municipal Plans and Programs in Place

Jurisdiction	HMP	DRP	CLUP	FMP	SMP	EOP	COOP	REP	SARA	TRANS	CIP	REG-PL	HPP	ZO	SO	FDPO	NFIP	CRS	BC
Kent County	X	X	X	X		X	X	X	X			X		X	X	X	X		X
Bowers Beach						X	X		X					X		X	X		X
Camden	X		X	X	X	X			X	X			X	X	X	X	X		X
Cheswold	X		X	X		X			X		X			X		X	X		X
Clayton			X	X					X					X	X	X	X		X
Dover	X		X	X		X			X	X	X	X	X	X	X	X	X		X
Farmington									X					X					X
Felton	X		X	X		X			X					X	X				X
Frederica			X						X							X	X		X
Harrington			X						X			X		X	X	X	X		X
Hartly									X					X					X
Houston									X					X	X				X
Kenton			X						X										X
Leipsic									X					X		X	X		X
Little Creek	X		X	X					X					X		X	X		X
Magnolia									X					X	X				X
Milford	X		X						X							X	X		X
Smyrna			X			X			X	X	X	X	X	X	X	X	X		X
Viola			X						X										X

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

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
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

6.10.2 Municipal Policies and Incentives

Municipalities were asked what, if any, restrictions or incentives they had in place to protect properties or mitigate damages in potentially at-risk areas from natural hazards. Results are provided in Table 6.8.

Table 6.8 Municipal Plans and Policies

Municipality	Freeboard Requirement	New/ Improved Development Restrictions	Floodplain Filling Restrictions	Critical Facility Protection	Cluster Development Incentives
Kent County	At County level				
Bowers	unknown	unknown	unknown	unknown	unknown
Camden	✓	✓	✓	✓	-
Cheswold	✓	-	-	-	-
Clayton	unknown	unknown	unknown	unknown	unknown
Dover	-	-	-	✓	-
Farmington	unknown	unknown	unknown	unknown	unknown
Felton	-	✓	✓	✓	-
Frederica	✓	-	-	-	-
Hartly	unknown	unknown	unknown	unknown	unknown
Harrington	-	✓	✓	✓	-
Houston	unknown	unknown	unknown	unknown	unknown

Municipality	Freeboard Requirement	New/ Improved Development Restrictions	Floodplain Filling Restrictions	Critical Facility Protection	Cluster Development Incentives
Kenton	-	✓	-	-	-
Leipsic	✓	-	-	-	-
Little Creek	-	-	✓	✓	-
Magnolia	-	-	-	-	-
Milford	✓	-	-	-	-
Smyrna	✓	✓	✓	-	-
Viola	unknown	unknown	unknown	unknown	unknown
Woodside	unknown	unknown	unknown	unknown	unknown
Wyoming	-	-	-	-	-

6.10.3 Properties of Concern

Municipalities were asked to self-report their number of critical facilities in the floodplain. For comparative purposes, the number of parcels in the floodplain and the number of current flood insurance policies has been included in Table 6.9 below.

Table 6.9 Structures of Concern

Municipality	Critical Facilities in Floodplain*	Parcels in Floodplain	Flood Insurance Policies**
Kent County	3	1612	581
Bowers	1	323	104
Camden	None	4	14
Cheswold	None	4	3
Clayton	None	4	3
Dover	None	83	144
Farmington	None	-	None
Felton	None	24	5
Frederica	None	43	8
Hartly	None	25	None
Harrington	None	None	9
Houston	None	None	None
Kenton	None	None	None
Leipsic	1	127 (50-60%)	Unknown
Little Creek	2	83	17
Magnolia	None	None	1
Milford	1	Approx. 104	42
Smyrna	None	12	28
Viola	None	None	None
Woodside	None	None	None

Municipality	Critical Facilities in Floodplain*	Parcels in Floodplain	Flood Insurance Policies**
Wyoming	None	5	5
Other	None	None	None

A more recent RL structure listing is provided in Table 6.10. A request for this information was sent to the State NFIP Coordinator, who then sent the request to FEMA. The following most-up-to-date RL data was provided back by FEMA on March 3, 2021. A FIMA Routine Use Letter regarding the Kent County Privacy Act Request for FEMA's Repetitive Loss Information, is provided in Appendix E.

Table 6.10 FEMA Repetitive Loss Information for Kent County, DE (as of 3/3/2021)

Row Labels	Max of Community Number	Count of Occupancy 1	Sum of Cumulative Building Payment ($)	Sum of Cumulative Contents Payment ($)	Sum of Total Losses	Sum of Total Paid ($)
Bowers, Town Of	100002	11	412,105.94	67,851.28	29	47,9957.2
Business-Non Res	100002	1	169,585.48	13,981.56	3	1,835.67
Other-Non Res	100002	2	24,441.09	18,664.13	7	43,105.22
Single Family	100002	8	218,079.37	35,205.59	19	2,532.85
Dover, City Of	100006	1	0	18,096.04	2	18,096.04
Other-Non Res	100006	1	0	18,096.04	2	18,096.04
Frederica, Town Of	100009	1	11,096.45	0	2	11,096.45
Single Family	100009	1	11,096.45	0	2	11,096.45
Harrington, City Of	100010	1	241,741.15	0	2	241,741.2
2-4 Family	100010	1	241,741.15	0	2	241,741.2
Kent County *	100001	23	712,828.81	122,669.47	74	835,498.3
Other-Non Res	100001	1	1,298.34	12,190.27	2	13,488.61
Single Family	100001	22	711,530.47	11,0479.2	72	822,009.7
Little Creek, Town Of	100015	1	9,239.72	2,381.43	2	11,621.15
Other-Non Res	100015	1	9,239.72	2,381.43	2	11,621.15
Milford, City Of	100042	5	644,179.43	10,054.02	15	654,233.5
Business-Non Res	100042	2	331,134.26	8,816.42	9	339,950.7
Other-Non Res	100042	2	306,083.97	0	4	30,608.4
Single Family	100042	1	6,961.2	1,237.6	2	8,198.8
Smyrna, Town Of	100017	1	31,218.36	25,898.65	4	57,117.01
Single Family	100017	1	31,218.36	25,898.65	4	57,117.01
Grand Total	100042	44	2,062,409.86	246,950.89	130	2,309,361

6.10.4 Municipal Staff Capabilities

Several Municipalities stated that while they did not have a dedicated staff person for certain positions, that those responsibilities were handled by other personnel. Table 6.11 displays the staffing capabilities for the Municipalities.

Table 6.11 Municipal Staffing Capabilities

Municipality	Floodplain Admin	Building Inspector	Site Plan Reviewer	Surveyor	GIS Specialist	Emergency Services
Bowers	unknown	unknown	unknown	unknown	unknown	✓
Camden	✓	✓	✓	-	-	✓
Cheswold	-	✓	✓	-	-	✓
Clayton	unknown	unknown	unknown	unknown	unknown	✓
Dover	unknown	unknown	unknown	unknown	unknown	✓
Farmington	unknown	unknown	unknown	unknown	unknown	✓
Felton	✓	-	-	-	-	✓
Frederica	✓	✓	✓	✓	✓	✓
Hartly	unknown	unknown	unknown	unknown	unknown	✓
Harrington	✓	✓	✓	-	-	✓
Houston	unknown	unknown	unknown	unknown	unknown	✓
Kenton	-	✓	✓	-	-	✓
Leipsic	-	✓	✓	-	-	✓
Little Creek	-	✓	✓	-	-	✓
Magnolia	-	-	-	-	-	✓
Milford	✓	✓	✓	-	✓	✓
Smyrna	✓	✓	✓	✓	✓	✓
Viola	unknown	unknown	unknown	unknown	unknown	✓
Woodside	unknown	unknown	unknown	unknown	unknown	✓
Wyoming	-	-	-	-	-	✓

6.11 Conclusion

Kent County has the initiative and drive to implement mitigation actions for a variety of hazards affecting the County, however there are still challenges to hazard mitigation at both the County and local levels. The capability of local governments in Kent County varies greatly from jurisdiction to jurisdiction. However, much of this variation can be accounted for when assessing the size of each jurisdiction. These challenges come in the form of insufficient funds available for action implementation; lack of training or education on various hazards, technologies, policies, or laws; limited emergency response staffing; insufficient or limited data and information available for various analyses; and the absence of meaningful and productive partnerships with both public and private stakeholders. Mitigation Actions have been developed to address these limitations and are discussed in the following chapter.

Municipalities have the opportunity to integrate these hazard mitigation actions into already existing planning mechanisms. The 12 municipalities that have comprehensive plans can integrate these actions into different aspects of the plans. Growth management techniques, such as buffering, can be integrated into the future land use strategy, while different housing programs can be created to

retrofit publicly subsidized affordable housing to reduce damage after a disaster occurs. These actions can also be integrated through municipal floodplain or zoning ordinances, which can be utilized to limit the density of development in high hazard areas, and/or through a municipal SALDO, for example, by reviewing the placement of roads, residential lots, public facilities within subdivisions that can increase natural hazard risks and evacuation/emergency access points. Every municipality in Kent County has a floodplain ordinance, ten municipalities in have individual zoning ordinances, and five have SALDOs. Hazard mitigation actions could also be integrated through any of the eight stormwater management plans in the County, and/or through existing building codes and design construction standards.

This All Hazard Mitigation Plan provides the vehicle to begin this process. However, in order 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 achievable mitigation actions (as listed in this Plan Mitigation Strategy) that will facilitate continued intergovernmental coordination not only across the county, but with state and federal agencies as well.

7.0 CHAPTER 7 – MITIGATION STRATEGY

CFR §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.*

7.1 Update Summary Process

The mitigation strategy serves as the long-term road map to reduce the potential losses, vulnerabilities and shortcomings identified in the risk assessment chapter. A typical mitigation strategy includes a list of goals and objectives, and mitigation actions to address the goals and objectives, that are then prioritized, based on the community's requirements. Specific mitigation actions are developed through consultation and information exchange with the County and communities, and by taking into account community assets, such as infrastructure, transportation, businesses. Actions and implementations that are developed are a representation of the entire engagement process, as each point of engagement leads to developing a effective, appropriate, and cost-effective mitigation strategy. Several sources of information to help ultimately inform the mitigation strategy was provided Committee member and community representatives throughout the planning process. For example, the Town of Cheswold identified newer flooding issues, which now align with the County's updated flood maps, creating a backbone to seeing the implementation of this specific action through. The mitigation strategy in this Plan comprises the following five subsections:

- Hazard Mitigation Goals and Objectives
- Identification and Analysis of Mitigation Actions
- Compliance with the NFIP
- Prioritization and Implementation of Mitigation Actions (County level)
- Multi-jurisdictional Mitigation Actions (municipal level)
- Status of Past Actions

7.2 Mitigation Goals

For the purposes of this Plan, goals are defined as general policy guidelines or broad statements that represent a vision for a community. The goals for this planning process have been developed in close coordination with the Steering Committee, based on the findings of the HIRA, the mitigation capability assessment, as well as the 2015 plan. The goals are also designed to serve as the basis for the mitigation actions at the county and municipal levels. Each mitigation action (in the next section) is linked to one or more goals and objectives in this chapter.

The goals have been formulated in the areas of: local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness. Although not considered a 'primary type' of mitigation actions, it may also be important to identify emergency response or operational preparedness actions, some of which are included in this mitigation strategy.

Vision – "Protect the residents, their property, and reducing related costs of disaster response, recovery, and minimize the disruption that any disaster will cause to the community."

Goal 1: Kent County and participating municipalities will maximize the use of data, analyses, and studies to develop sound mitigation policies and projects.

Goal 2: Kent County and participating municipalities will continue to improve communication with: the public; local agencies; municipalities; and state partners, to better protect lives and property from the potential impacts of natural hazards.

Goal 3: Kent County and participating municipalities will improve stormwater management practices in order to reduce flood-related impacts in concert with DNREC, DelDOT, and the Kent Conservation District.

Goal 4: Kent County and participating municipalities will identify various funding sources to help implement projects designed to reduce the impact of natural hazards.

Goal 5: Kent County and participating municipalities will continue to adopt, implement, and enforce local codes to help reduce the impacts of natural hazards.

Goal 6: Kent County will continue to work with municipalities to provide education and technical assistance with the implementation of mitigation-related projects.

Goal 7: Kent County and its municipalities will support the implementation of cost-effective mitigation-related projects such as: acquisition, elevation, and floodproofing projects for residential and non-residential structures.

Goal 8: Kent County and its municipalities will support the implementation of cost-effective critical facilities and infrastructure mitigation-related projects.

Goal 9: Kent County and its municipalities will support the implementation of cost-effective mitigation-related emergency management/public safety related projects.

7.3 Identification and Analysis of Mitigation Techniques

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.*

In formulating the Mitigation Strategy, the Steering Committee explored four mitigation categories for attaining the plan's goal and objectives. They include: local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness. Emergency response or operational preparedness actions are also included in this plan where relevant. This includes the four categories recognized by FEMA, as well as one additional category for ease of organization. These categories formed the basis of the mitigation actions in the Plan Update. Descriptions of these categories and examples for each category are included below:

1. Local Plans and Regulations

   These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built. Examples include: comprehensive plans, land use ordinances, subdivision regulations, development review, building codes and enforcement, NFIP community rating system, capital improvement programs, open space preservation

plans, stormwater management regulations, and master plans, and other local plans and regulations.[91]

2. Structure and Infrastructure Projects

   These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards. Many of these types of actions are projects eligible for funding through the FEMA HMA program. Examples include: acquisitions and elevations of structures in flood prone areas, utility undergrounding, structural retrofits, floodwalls and retaining walls, detention and retention structures, culverts, and safe rooms.[92]

3. Natural Systems Protection

   These are actions that minimize damage and losses and also preserve or restore the functions of natural systems. Examples include: sediment and erosion control, stream corridor restoration, forest management, conservation easements, wetland restoration and preservation.

4. Education and Awareness Programs

   These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions. Examples include: radio or television spots, websites with maps and information, real estate disclosure, presentations to school groups or neighborhood organizations, mailings to residents in hazard-prone areas, StormReady, and Firewise communities.

Mitigation actions have been developed for the entire County as well as for each municipality. While some actions may apply to more than one jurisdiction, most actions are specific to each jurisdiction.

The mitigation actions that were developed were based on results from the risk assessment, the mitigation capability analysis, input from the Steering Committee, actions that have been completed in the past, recent past hazard occurrences, and feedback from the municipal workshop, worksheets, and questionnaires. The mitigation actions that have been developed can be implemented through a variety of local tools such as changes in ordinances and policies, capital improvements budgets, and applying for grant funding.

7.3.1 Continued Compliance with NFIP

Requirement §201.6(c)(3)(ii): *[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.*

[91] Federal Emergency Management Agency. Local Mitigation Planning Handbook https://www.fema.gov/media-librarydata/1590070172371-48e87ca446838ba81afc2aca995940bc/FEMA_Local_Mitigation_Planning_Handbook_508.pdf
[92] Ibid.

We understand that while FEMA is the official administering agency for NFIP participation, it is the community's responsibility to have the capability and to serve as a resource for flood mitigation activities. Kent County is a participant in the NFIP and is committed to continuing compliance with the NFIP via three basic components of the NFIP:

1) Floodplain identification and mapping risk;
2) Responsible floodplain management; and
3) Flood insurance.

After discussions with the Steering Committee, and a survey sent to County and Local Floodplain Coordinators, GIS Specialists, and County's Office of Planning, the following information is included (Table 7.1) to document how the County currently addresses and will continue to address NFIP compliance and requirements in the future. This was also sent to all municipal representative/floodplain coordinators to identify the responsibilities at the municipal level, which vary from jurisdiction to jurisdiction. All municipal NFIP Questionnaire responses are included in Appendix C. Individual municipalities are responsible for fulfilling NFIP requirements and can request county assistance, while the county is responsible at the county level and for unincorporated areas.

Table 7.1 NFIP Questionnaire

Flood Identification and Mapping	County	Municipalities
Does the County/Municipality make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?	Yes	Yes
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?	Yes	Some
Are Letters of Map Revisions (LOMRs) reviewed and signed by County/Municipality officials.	Yes	Yes
If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?	No	Some
Does the County/Municipality provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?	Yes	No
Does the County/Municipality maintain records of approved letters of map change?	Yes	No
Does the County/Municipality assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?	Yes	Yes
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?	Yes	Yes
Do all proposed developments require plans to go through the County/Municipality subdivision approval process or to acquire a building permit for new structures?	Yes	Some
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?	No	Some
Flood Insurance		
Is the County/Municipality committed to educating residents about the value and availability of flood insurance?	Yes	---

Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?	No	Some
Does the County/Municipality assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?	Yes	Some
When was the last Community Assistance Visit conducted and, as of that date, was the County found to meet the requirements for continued participation in the NFIP?	Yes	Some

County NFIP responsibilities include:

- Making the Flood Insurance Rate Map and Flood Insurance Studies available to the public.
- Reviewing and signing Letters of Map Revisions (LOMRs).
- Providing advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications
- Maintaining records of approved letters of map change
- Assisting residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain.
- Enforcing restrictions on floodplain use through the subdivision and building permit process.
- Requiring all proposed developments to go through the County subdivision approval process or to acquire a building permit for new structures.
- Educating residents about the value and availability of flood insurance.
- Assisting residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications.
- Meeting the requirements for continued participation in the NFIP.

Municipal NFIP responsibilities include:

- Making the Flood Insurance Rate Map and Flood Insurance Studies available to the public.
- Reviewing and signing Letters of Map Revisions (LOMRs).
- Requiring developers to submit a LOMR submission to FEMA if during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain.
- Assisting residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain.
- Enforcing restrictions on floodplain use through the subdivision and building permit process.
- Requiring all proposed developments to go through the County subdivision approval process or to acquire a building permit for new structures.
- Requiring all new structures to be at least 1.5 feet above the 100-year base flood elevation.
- Meeting the requirements for continued participation in the NFIP.

Communities that participate in the NFIP are required to adopt flood maps and local requests for map updates; adopt and enforce minimum floodplain management regulations that help mitigate the effects of flooding on new and improved structures in the Special Flood Hazard Area; offer property owners flood insurance as a protection against flood losses in exchange for floodplain management regulations that reduce future flood damages; and perform community assistance and monitoring activities.

Currently, 15 municipalities in Kent County participate in the NFIP. Table 7.2 indicates those communities and effective map dates.

Table 7.2 Municipalities Effective Map Dates[93]

Municipality	Effective Map Date	Municipality	Effective Map Date
Bowers Beach	07/07/2014	Houston	---
Camden	07/07/2014	Kenton	---
Cheswold	07/07/2014	Leipsic	07/07/2014
Clayton	07/07/2014	Little Creek	07/07/2014
Dover	07/07/2014	Magnolia	07/07/2014
Farmington	---	Milford	03/16/2015
Felton	07/07/2014	Smyrna	07/07/2014
Frederica	07/07/2014	Viola	---
Harrington	06/20/2018	Woodside	07/07/2014 (Not in NFIP)
Hartly	---	Wyoming	05/05/2003
Kent County		06/20/2018	

7.4 Mitigation Action Plan

Once the mitigation actions and implementation plan were finalized, the Steering Committee developed specific criteria to prioritize the actions. The Steering Committee agreed on three criteria which involved addressing the following questions to determine the level (high, medium, and low) for the social, administrative, and economic considerations for each action. These priorities were translated into points and facilitated the ranking and identification of high priority projects as shown in Table 7.3.

Social Considerations – Life/Safety Impact

- Will the project have minimal/direct/or significant impact on the safety of businesses, residents, and properties?
- Will the proposed action adversely affect one segment of the population?
- Will the project be a proactive measure to reducing flood risk?

Administrative Considerations – Administrative/Technical Assistance

- Is there sufficient staff currently to implement the project?
- Is training required for the staff to implement this project?

Economic Considerations – Project Cost

- What is the approximate cost of the project?

Table 7.3 Evaluation Criteria for Action Prioritization

Criteria	Points	High	Points	Medium	Points	Low
Life/Safety Impact	10	Significant impact on public safety for businesses, residents, and/or properties	6	Direct impact on businesses, residents, and/ or properties	2	Minimal/negligible impact on businesses, residents, and/or properties
Administrative/ Tech. Assistance	5	No additional staff or technical support needed to implement action	3	Some administrative and technical support	1	Significant administrative and technical support

[93] https://www.fema.gov/cis/DE.html

				needed to implement action		needed to implement action
Project Cost	5	Low cost (<$25,000)	3	Moderate cost ($25,000-$100,000)	1	High cost to implement (>$100,000)

It should be noted that this Plan does not include a prioritization of projects within a category, i.e., there is no ranking of projects listed within the Structure and Infrastructure mitigation category. Points were then assigned to each action and totaled as shown in Table 6.4 and Table 6.5. For the purposes of funding, a benefit-cost analysis will be conducted. The projects would be prioritized as individual municipalities prepare applications for specific funding agencies for particular projects.

The overall timeline for the completion of projects is dependent on available funding and involvement and commitment by the municipality. The tables that follow identify County-level and municipal-level mitigation actions. The projects are described, refer to the hazard(s) mitigated, lead agency for implementation, timeline, and possible funding sources. It is important to note that each participating jurisdiction must have at least one mitigation action for the hazards that which affect their community. Although some municipalities may not haver specific action for every hazard that may affect them, county actions will also be attributed to municipalities, allowing the municipalities to refer to and implement county-based actions within their jurisdiction.

7.4.1 Active Mitigation Actions

This section identifies the mitigation actions from the 2015 Plan that are being carried forward to this Plan Update, indicating that these actions are: not started, in progress, or ongoing. In addition to actions being carried forward, this section also identifies new mitigation actions that were specifically developed for this 2020 Update.

7.4.1.1 County Mitigation Actions

Table 7.4 shows the new county mitigation actions that have been developed as part of this plan update.

Table 7.4 New County Mitigation Actions

New County Mitigation Actions											
	Action	Hazard Mitigated	Lead Agency for Implementation	Life/ Safety Impact	Admin/ Tech Assistance	Project Cost	Total	Possible Funding Source	Approximate Cost ($)	Project Timeline	Action Category
				Action Prioritization							
1	Conduct annual workshops/regular trainings and exercises with key Emergency Management stakeholders (municipal EM officials, local floodplain coordinators, local elected officials, etc.) and municipalities to educate them on various types of mitigation projects they could be undertaken to reduce risks to specific hazards.	All Hazards	Emergency Management Division	6	3	3	12	HMA Grants; Staff Time	25,000-100,000	Ongoing	Education Awareness Programs
2	Continue to digitize data and records or other files into tables, databases, or GIS format for future use and analysis.	All Hazards	GIS	2	3	5	10	Staff Time, County Funds	<25,000	Ongoing	Education Awareness Programs
3	Develop an Emergency Preparedness, Training, and Exercise Plan that includes a regular maintenance plan and an annual budget.	All Hazards	Emergency Management Division	2	3	5	10	HMA Grants; Staff Time	<25,000	1-2 years	Local Plans and Regulations
4	Develop and distribute educational and informational materials twice a year, to include information on each of the county's hazards and how to prepare before, during, and after hazard events.	All Hazards	Emergency Management Division	6	3	3	12	Staff Time; County Funds	25,000-100,000	Ongoing	Education Awareness Programs
5	Establish/Continue to maintain pre-disaster debris contracts and develop debris removal MOUs with appropriate local, county, and state agencies.	All Hazards	Emergency Management Division/Planning Department	6	3	5	14	Staff Time, County Funds	<25,000	Ongoing	Emergency Response/ Operational Preparedness
6	Develop and implement operational strategies and a Cistern Plan for dealing with rural water supply during protracted drought events.	Drought	Emergency Management Division	2	3	1	6	Staff Time, County Funds	>100,000	1-2 years	Local Plans and Regulations
7	Continue to enhance and develop mutual aid agreements with neighboring counties and state partners for response and recovery efforts.	All Hazards	Emergency Management Division	6	3	5	14	Staff Time, County Funds	<25,000	Ongoing	Local Plans and Regulations
8	Conduct emergency response training exercises for specific hazard events at least twice a year.	All Hazards	Emergency Management Division	6	3	3	12	HMA Grants, Staff Time; County Funds	25,000-100,000	Ongoing	Education Awareness Programs

New County Mitigation Actions

	Action	Hazard Mitigated	Lead Agency for Implementation	Life/ Safety Impact	Admin/ Tech Assistance	Project Cost	Total	Possible Funding Source	Approximate Cost ($)	Project Timeline	Action Category
				Action Prioritization							
9	Maintain requirements to continue recognition as a Storm Ready Community (by the National Weather Service StormReady® Program).	All Hazards	Emergency Management Division	2	3	5	10	Staff Time, County Funds	<25,000	Ongoing	Education Awareness Programs
10	Utilize FEMA's Integrated Public Alert and Warning System (IPAWS) for sudden onset hazards such as tornados, thunderstorms, or flash floods.	All Hazards	Emergency Management Division	10	3	5	18	Staff Time, County Funds	<25,000	Ongoing	Structure and Infrastructure Projects
11	Coordinate with County PIO, municipalities, and other stakeholders to develop a "pre-approved' set of releases to be disseminated to the public in a timely manner in the event of an emergency.	All Hazards	Emergency Management Division/ PIO	6	3	3	12	Staff Time, County Funds	25,000-100,000	1-2 years	Education Awareness Programs
12	Encourage local businesses and local industry owners to develop a business continuity plan and provide educational materials to assist business owners with the creation of appropriate continuity strategies.	All Hazards	Emergency Management Division Economic Development	2	3	5	10	Staff Time, County Funds	<25,000	3-5 years	Education Awareness Programs
13	Increase public awareness on wildfires by providing outreach and education on urban/wildland interface and increasing buffers and defensible spaces to reduce vulnerability.	Wildfire	Emergency Management Division	2	3	5	10	Staff Time, County Funds	<25,000	Ongoing	Education Awareness Programs
14	Continue to explore options to obtain and store personal protective equipment to protect essential workers and emergency service agencies during an infectious disease outbreak.	Infectious Disease	Emergency Management Division	10	3	3	16	Staff Time, County Funds	25,000-100,000	3-5 years	Emergency Response/ Operational Preparedness
15	Continue to educate county residents and emergency personnel on the potential risk of an infectious disease outbreak, and on safety and mitigation techniques to follow before, during, and after an infectious disease outbreak.	Infectious Disease	Emergency Medical Services Division	6	3	3	12	Staff Time, County Funds	25,000-100,000	Ongoing	Education Awareness Programs
16	Utilize tracking reports during the annual review process to the status of county and municipal mitigation actions, and to identify potential barriers or hindrances to implementation of hazard mitigation activities and projects.	All Hazards	Emergency Management Division Municipalities	2	3	5	10	Staff Time, County Funds	<25,000	Ongoing	Education Awareness Programs
17	Continue to educate homeowners on the potential risk of earthquakes and on safety techniques to follow during and after an earthquake.	Earthquake	Emergency Management Division	2	3	5	10	Staff Time, County Funds	<25,000	Ongoing	Education Awareness Programs
18	Continue to conduct routine inspections, regular maintenance, and annual tests on all emergency communications equipment, public address systems, hazard alert sirens, as well as the County's emergency generators, to ensure effective operation during an emergency event.	All Hazards	Public Safety Department	6	1	3	10	Staff Time, County Funds	25,000-100,000	Ongoing	Structure and Infrastructure Projects
19	Ensure reconstruction activities are compliant with NFIP substantial damage/improvement requirements and existing codes.	Flood	Planning Department	6	3	5	14	Staff Time, County Funds	<25,000	Ongoing	Local Plans and Regulations
20	Work with the PIO to distribute DE DPH issued advisories regarding public and private drinking water supply sources, and pass along boil water advisories, also issued by DE Dept. of Public Health, immediately after an inundating flood event.	Flood	Emergency Management Division PIO	6	3	3	12	Staff Time, County Funds	25,000-100,000	Ongoing	Natural Systems Protection

New County Mitigation Actions											
	Action	Hazard Mitigated	Lead Agency for Implementation	Life/ Safety Impact	Admin/ Tech Assistance	Project Cost	Total	Possible Funding Source	Approximate Cost ($)	Project Timeline	Action Category
				Action Prioritization							
21	Promote and offer Community Emergency Response Team (CERT) training/classes to increase the number of citizen responders in the municipalities.	All Hazards	Emergency Management Division	2	3	5	10	Staff Time, County Funds	<25,000	1-2 years	Education Awareness Programs
22	Work with Delaware Dept. of Health and Social Services to Identify at-risk populations (elderly, homeless, persons with physical or mental disabilities) to various hazards and maintain records of vulnerable populations and the types of assistance needed before, during, and/or after a hazard.	All Hazards	Emergency Management Division; Smart911;	6	3	3	12	Staff Time, County Funds	25,000-100,000	1-2 years	Education Awareness Programs
23	Conduct annual training/exercises for Emergency Operations Center and Department Operations Center personnel on how to continuously staff the centers through a protracted disaster.	All Hazards	Emergency Management Division	10	3	5	18	Staff Time, County Funds	<25,000	Ongoing	Education Awareness Programs
24	Continue to evaluate and remove trees throughout the County's park system that are at risk of falling during storms and high wind events	Thunderstorm Coastal Storm/Hurricane; Winter Storm; Tornado	Parks and Recreation	2	3	5	10	Staff Time, County Funds	<25,000	Ongoing	Emergency Response/ Operational Preparedness
25	When updating other relevant county plans and ordinances, consider integrating hazard mitigation considerations to reduce risk to natural hazards throughout the County.	All Hazards	All Departments	2	3	5	10	County Funds. Staff Time	<25,000	Ongoing	Local Plans and Regulations
26	Continue to provide natural resource preservation and land use planning initiatives that ensure natural resource areas that provide hazard mitigation benefits, remain open spaces, to retain the natural benefits they provide.	Flood; Storm Surge; All Hazards	Planning Department	6	5	3	14	Staff Time; County Funds	25,000-100,000	Ongoing	Natural Systems Protection
27	Conduct a study to identify specific mitigation measures/projects that can be implemented to protect the aging sewer infrastructure against flood impacts. see what can be done to protect an aging sewer infrastructure against flooding (something to that nature)	Flood	Department of Public Works	6	1	3	10	Staff Time, County Funds	25,000-100,000	2-3 years	Structure and Infrastructure Projects
28	Upon completion of a study to protect the aging sewer infrastructure against flood impacts, develop an implementation plan to ensure the implementation recommended results.	Flood	Department of Public Works	6	1	1	8	Staff Time, County Funds	>100,000	4-5 years	Structure and Infrastructure Projects

Table 7.5 shows actions from the 2015 plan that are being carried forward to this plan update. Any actions that were not given a final disposition (completed, cancelled, etc.) by the County, have been included in this list as not started, in progress, or ongoing.

Table 7.5 County Mitigation Actions Carried Forward

County Mitigation Actions Carried Forward from 2015 Plan													
	Action	Status	Notes	Hazard Mitigated	Lead Agency for Implementation	Life/Safety Impact	Admin/Tech Assistance	Cost Ranking	Total	Possible Funding Source	Approximate Cost ($)	Project Timeline	Action Category
						Action Prioritization							
1	Update Kent County Emergency Operations Plan.	In Progress	Updated EOP is nearing completion (Final deliverables expected around Nov. 1, 2020)	All Hazards	Division of Emergency Management	6	3	3	12	Staff Time, County Funds	25,000-100,000	>1 year	Local Plans and Regulations
2	Repair sewer pump stations throughout the County.	Ongoing	Station 13 and others were improved. Other mitigation actions have been implemented where necessary (sandbags, retaining wall)	Flood	Dept. of Public Works	6	1	1	8	Staff Time, County Funds	>100,000	Ongoing	Structure and Infrastructure Projects
3	Use GIS and existing location information reported under SARA Title III to identify hazardous materials handlers/waste sites in the mapped floodplain.	Not Started	State maintains these GIS layers, unknown if they have been mapped in relation to the floodplain.	Hazardous Materials, Flood	Division of Emergency Management	2	3	5	10	Staff Time, County Funds	<25,000	1-2 years	Education Awareness Programs
4	Continue to encourage the adoption of protective measures and the preparation of a flood response plan for hazardous materials sites.	Ongoing/ Not Started	Consistently encouraging adoption of protective measures; Flood Response Plan not started.	Hazardous Materials, Flood	Division of Emergency Management	6	3	5	14	Staff Time, County Funds	<25,000	Ongoing	Local Plans and Regulations
5	Continue to improve public outreach and communication efforts regarding actions in cases of an emergency—utilize website, training, newsletters, brochures, Reverse 9-1-1, etc.	Ongoing	Many outreach events per year – Preparedness Day, etc.	All Hazards	Division of Emergency Management	6	3	3	12	Staff Time, County Funds	25,000-100,000	Ongoing	Education Awareness Programs
6	Utilize the Critical Facilities Inventory to identify critical facilities that may be in need of implementing mitigation recommendations.	Not Started	This has not been started	Flood	Division of Emergency Management	6	3	5	14	Staff Time, County Funds	<25,000	1-2 years	Structure and Infrastructure Projects
7	Study and recommend solutions to alleviate the periodic flooding threat at the following locations: 1) Tank Farm Pipeline and Storage outside Little Creek, 2) Jonathan's Landing, 3) Treadway Tower in Dover,4) McGlynns Tavern in Dover, 5) Warehousing facility at the corner of Mckee and Scarborough, and 6) General's Green - Microtel in Dover.	Ongoing	Discussions have been held at municipal levels.	Flood	Division of Emergency Management; Conservation District	6	3	3	12	Staff Time, County Funds	25,000-100,000	2-3 years	Structure and Infrastructure Projects
8	Work with municipalities to develop cost effective acquisition, elevation, and wet/dry floodproofing projects for all municipalities, as necessary.	Ongoing	Working with municipalities on an ongoing and as needed basis.	Flood	Division of Emergency Management, Conservation District	10	3	3	16	Staff Time, County Funds	25,000-100,000	Ongoing	Structure and Infrastructure Projects

County Mitigation Actions Carried Forward from 2015 Plan

	Action	Status	Notes	Hazard Mitigated	Lead Agency for Implementation	Life/Safety Impact	Admin/Tech Assistance	Cost Ranking	Total	Possible Funding Source	Approximate Cost ($)	Project Timeline	Action Category
						Action Prioritization							
9	Implement the 25 specific recommendations by the Delaware Sea Level Rise Advisory, as feasible and as necessary	Not Started	This has not knowingly been started.	Flood (Sea Level Rise)	Division of Emergency Management	6	1	1	8	Staff Time, County Funds	>100,000	4-5 years	Local Plans and Regulations
10	Continue to encourage all relevant municipalities to the greatest extent possible, to use the LIMWA (Limited Wave Action) to adjust mitigation projects to a higher elevation level in A Zones, for sea level rise and better protection.	Ongoing	County does not mandate this, but offers incentives to encourage usage	Flood (Sea Level Rise)	Division of Emergency Management	6	3	5	14	Staff Time, County Funds	>25,000	Ongoing	Education Awareness Programs
11	Develop outreach programs to promote the importance of strengthening public and private structures against severe wind damage by encouraging wind engineering measures and construction techniques, such as structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles.	Ongoing	Building code requires much of this for new construction. County permits for some towns as well.	Tornado; Coastal Storms	Division of Emergency Management	6	3	5	14	Staff Time, County Funds	>25,000	Ongoing	Education Awareness Programs
12	Ensure annual training in, and compliance with, all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.	Ongoing	Conducted through LEPC for SARA Title III requirements.	Hazardous Materials	Division of Emergency Management	6	3	3	12	Staff Time, County Funds	25,000-100,000	Ongoing	Education Awareness Programs

7.4.1.2 Municipal Mitigation Actions

Table 7.6 below lists both actions from the 2015 plan that are being carried forward to this plan update for each municipality, as well as actions that are newly developed for the plan update based on responses to the municipal survey, hazard areas identified by the municipalities, and discussions during the municipal workshop. Any actions that were not given a final disposition (completed, cancelled, etc.) by the county, and all actions included in this list have been identified as new, in progress, ongoing, not started, or carried forward.

Table 7.6 New and Carried Forward Municipal Mitigation Actions

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
Municipal Mitigation Actions							
Bowers Beach							
Flood	Elevate Route 18 (Main Street) from the highway to town sign (approximately 1/4 mile).	Town of Bowers Beach DelDOT	3-4 years	<100,000	Carried Forward	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Flood, Storm Surge	Work with DNREC to develop a Coastal Resiliency Plan to reduce losses from coastal hazards and integrate the Action Plan with Kent County Hazard Mitigation Plan.	Town of Bowers Beach	1-2 years	<25,000	Carried Forward	HMA Grants; Staff Time	Local Plans and Regulations
Flood, Storm Surge	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Bowers Beach	1-2 years	25,000-100,000	Carried Forward	Staff Time, Municipal/County Funds, FMA Funds	Local Plans and Regulations
Flood	Reuse pipe size and improve outfall on Hubbard Avenue adjacent to the Creek.	Division of Emergency Management	3-4 years	>100,000	Carried Forward	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Flood, Hurricane	Fix jetty wall on Murderkill River prior to beach restoration.	DelDOT	3-4 years	>100,000	Carried Forward	PDM Funds; Municipal Funds	Structure and Infrastructure Projects
Camden							
All Hazards	Purchase satellite cell phones for use by key personnel during emergencies.	Town Administration	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Emergency Response/ Operational Preparedness
All Hazards	Conduct emergency response training exercises once every two years.	Town Administration, Police Department, Fire Department and EMTs	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, EMPG Funds	Emergency Response/ Operational Preparedness
All Hazards	Encourage residents who depend on electric power for essential medical devices (i.e., ventilators and IV pumps) to register in the 9-1-1 system.	Town Administration, Police Department	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Education Awareness Programs
All Hazards	Request an annual presentation by a DEMA representative on local disaster planning.	Town Administration	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Education Awareness Programs
Flood	Investigate flooding and drainage related issues at the intersection of Main Street and South Street.	Town Administration	1-2 years	>25,000-100,000	Ongoing	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
Flood	Replace the undersized stormwater drain on South Street.	Town Administration	3-4 years	>100,000	Ongoing	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Cheswold							
Flood	Work with DelDOT to investigate flooding related issues on US Route 13 south of 42.	Town Administration	Ongoing	25,000-100,000	Ongoing	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Clayton							
Flood, Dam Failure	Inspect dam at Wheatley's Pond and identify strategies for repairing or retrofitting this dam based on the results of this inspection.	Homeowners Association/Town of Clayton, DNREC Dam Safety Program	Ongoing	25,000-100,000	Not Started	Staff Time, Municipal Funds	Structure and Infrastructure Projects
All Hazards	Develop relocation plan for non-essential personnel (i.e., finance, law, public works, etc.) in the event that the City/County building is unusable.	Town Administration	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Establish a tracking mechanism to track the progress of hazard mitigation projects to help with future plan updates.	Town Administration	Ongoing	<25,000	New Action	Staff Time, Municipal Funds	Local Plans and Regulations
Dover							
Wind, Winter Storm, Hurricane, Tornado	Consider relocating the electric distribution system to protect against long-term outages.	City of Dover Electric Department	Ongoing	>100,000	Carried Forward	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood	Upgrade undersized stormwater infrastructure within Meeting House Branch drainage basin to prevent flooding.	City of Dover	3-4 years	>100,000	New Action	FMA Funds, Staff Time	Structure and Infrastructure Projects
Flood	Incorporate "green" infrastructure within all drainage basins to reduce stormwater runoff quantity and improve stormwater runoff quality.	City of Dover	Ongoing	>100,000	New Action	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
Flood	Obtain and remediate properties within the floodplain so the natural floodplain is rehabilitated.	City of Dover	Ongoing	<25,000	New Action	Staff Time, FMA Funds	Natural Systems Protection
Electrical Outage	Upgrade 7 of 15 substations with digital relays to reduce recovery from outages and increase reliability.	City of Dover	2-3 years	>100,000	New Action	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood, Storm Surge	Work with the County to conduct a detailed flood vulnerability study for the entire City.	City of Dover	3-4 years	25,000-100,000	Carried Forward	Staff Time, Municipal Funds/County Funds, FMA Funds	Local Plans and Regulations
Farmington							
All Hazards	Purchase and install outdoor surveillance security system at the town hall once retrofitted.	Town of Farmington	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects
All Hazards	Retrofit town hall to serve as an emergency shelter and evacuation point.	Town of Farmington	3-4 years	<100,000	Ongoing	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
Flooding	Work with the Conservation Department and the County to define water flow areas in reference to developing a mitigation strategy for flooding near the new development on Farmington Road	Town of Farmington	2-3 years	25,000-100,000	New Action	Staff Time, Municipal /County Funds, FMA Funds	Structure and Infrastructure Projects
Felton							
All Hazards	Provide property owners in Felton with brochures and other material regarding potential flood hazards.	Town of Felton	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
Flood	Work with Delaware DOT to identify areas of frequent roadway flooding on Church Street and develop mitigation strategies.	Town of Felton	1-2 years	<25,000	New	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
All Hazards	Revise the Emergency Water Plan (updated in 1999 by the Delaware Rural Water Association)	Town of Felton	1-2 years	<25,000	New	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Provide property owners in Felton with brochures and other material regarding potential flood hazards.	Town of Felton	1-2 years	<25,000	New	Staff Time, Municipal Funds	Education Awareness Programs
All Hazards	Update the Emergency Operation Plan for the Town of Felton in conjunction with the local fire service and police.	Town of Felton, Police and Fire Departments.	1-2 years	<25,000	New	Staff Time, Municipal Funds, EMPG Funds	Local Plans and Regulations
Flood	Investigate flooding and drainage issues on Courtney Lane.	Town of Felton	1-2 years	25,000-100,000	New	Staff Time, FMA Funds	Structure and Infrastructure Projects
Frederica							
Flood	Provide property owners in Frederica with brochures and other material regarding potential flood hazards.	Town of Frederica	1-2 years	<25,000	In Progress	Staff Time, Municipal Funds	Education Awareness Programs
Flood, Storm Surge	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Frederica	1-2 years	25,000-100,000	In Progress	Staff Time, Municipal Funds, FMA Funds	Local Plans and Regulations
Harrington							
Drought	Purchase generator for wells.	Town Administration	1-2 years	25,000-100,000	Not started	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood	Retrofit sewer lines to limit groundwater inflow into treatment plant.	Public Works, Town Administration	3-4 years	>100,000	Not Started	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Fire	Integrate 500,000 gallon and 250,000 gallon water towers.	Public Works, Town Administration	2-3 years	>100,000	Ongoing	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood, Drought	Dig a new well to increase redundancy of water supply system.	Public Works, Town Administration	2-3 years	>100,000	Not Started	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Flooding	Improve drainage along Dip Brown's Branch, Jacksons, and City tax ditches by installing storm drains where necessary; partnering with Heritage Manor subsidized housing development for drainage improvement; and partnering with Kent Conservation District for tax ditch maintenance.	City of Harrington in partnership with Kent Conservation District.	2-3 years	>100,000	New Action	Staff Time, FMA Funds	Structure and Infrastructure Projects

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
Hartly							
Drought	Work with the Kent County on public outreach programs designed to promote hazard education and awareness and identify a variety of techniques for residents and businesses.	Town of Hartly	Ongoing	<25,000	Ongoing	Staff Time, Municipal/County Funds	Education Awareness Programs
Houston							
All Hazards	Develop an Emergency Operations Plan in cooperation with the Houston Fire Company.	Town of Houston	1-2 years	<25,000	Not Started	Staff Time; EMPG Funds	Local Plans and Regulations
All Hazards	Work with DEMA and the County to provide residents with informational brochures regarding disaster preparedness.	Town of Houston/ Delaware Emergency Management Agency	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
Kenton							
Hazardous Materials	Work with the LEPC to develop a hazardous materials site inventory.	Town Administration	Ongoing	<25,000	Not Started	Staff Time, Municipal Funds	Local Plans and Regulations
Hazardous Materials	Identify strategies to mitigate risks associated with the transportation and storage of hazardous materials in and around the Town of Kenton.	Town Administration	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood	Evaluate stormwater management system as it relates to tertiary roads.	Town Administration	3-4 years	25,000-100,000	Ongoing	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
All Hazards	Retrofit the Kenton Municipal Building (public shelter) to be more resilient to all hazards.	Town Administration	3-4 years	>100,000	Carried Forward	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
All Hazards	Work with the County/State to find funding and establish a schedule to provide training/certification opportunities in GIS and in building inspection/code enforcement for the Town of Kenton.	Town Administration	Ongoing	<25,000	New	Staff Time, Municipal Funds	Local Plans and Regulation
Leipsic							
All Hazards	Develop an Emergency Operation Plan for the Town of Leipsic in conjunction with the local fire service, county, and state police.	Town of Leipsic/ local Fire Service/ State Police	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, EMPG Funds	Local Plans and Regulations
All Hazards	Develop an emergency preparedness and response brochure specific to the Town of Leipsic for all residents that contains information on shelters, evacuation procedures and emergency contact information.	Town of Leipsic	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
All Hazards	Continue to increase the number of trained volunteer citizen emergency responders.	Town of Leipsic	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
All Hazards	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Leipsic	1-2 years	25,000-100,000	In Progress / Ongoing	Staff Time, Municipal Funds, FMA Funds	Local Plans and Regulations

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
Flood	Install a bulkhead at the Leipsic River.	Town of Leipsic	3-4 years	>100,000	Cancelled	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
Flood	Rehab the Leipsic tax ditch to aid in flood control plans.	Town of Leipsic	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood/ Coastal Storms	Work with the State to bulkhead the private docks in Leipsic, to provide flood protection and so emergency vessels docked in Leipsic can be safely docked during coastal storm events.	Town Council	3-5 years	>100,000	New	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Little Creek							
All Hazards	Develop method to address mosquitoes and possible West Nile Virus outbreak.	Division of Emergency Management	Ongoing	<25,000	Not Started	Staff Time, Municipal Funds, PEHP Funds	Emergency Response/ Operational Preparedness
All Hazards	Improve facilities at the Town's Fire Hall to support the use of the building as a Town shelter. Establish a decontamination facility within the Fire Hall to include shower and wet room equipment.	Town of Little Creek	3-4 years	>100,000	Carried Forward	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
Flood, Coastal Erosion	Relocate flood-prone structures when elevation is not a cost-effective alternative.	Kent County and Town of Little Creek	Ongoing	>100,000	Ongoing	Staff Time, Municipal Funds, FMA/PDM Funds	Structure and Infrastructure Projects
Flood	Elevate flood-prone structures.	Kent County and Town of Little Creek	Ongoing	>100,000	Ongoing	Staff Time, Municipal Funds, FMA/PDM Funds	Structure and Infrastructure Projects
Flood, High Wind, Snow Load	Dry floodproof historic residential structure to reduce risk from (hazard) only when other techniques that would mitigate to the BFE would cause the structure to lose its status.	Kent County and Town of Little Creek	Ongoing	>100,000	Ongoing	Staff Time, Municipal Funds, Historic Preservation Funding Sources	Structure and Infrastructure Projects
Flood, High Wind, Snow Load	Retrofit existing structure/building to reduce risk from (hazard). (i.e. foundation, load-bearing wall, beam, column, building envelope, structural floor and roof, connections between these).	Kent County and Town of Little Creek	Ongoing	>100,000	Ongoing	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
Flood, High Wind, Snow Load	Retrofit non-structural elements of buildings to reduce risk from (hazard) (i.e. bracing of building contents to prevent damage or elevation of heating and ventilation systems).	Kent County and Town of Little Creek	Ongoing	>100,000	Ongoing	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
Flood	Target hazard-prone properties, i.e., repetitive flood loss properties (FEMA repetitive loss and severe repetitive loss lists) through sponsorship of FEMA HMGP, FMA, PDM, RFC, and SRL grant programs.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	RL/SRL Funds, Staff Time	Education Awareness Programs
All Hazards	Pursue 5 percent initiative funding to procure warning systems that provide real time warning of impending hazards.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
All Hazards	Pursue 5 percent initiative funding to install generator “quick-connects” to critical facilities.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Pursue 5 percent initiative funding to install generators to critical facilities.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Pursue 5 percent Initiative Funding to improve public outreach and communication efforts regarding hazard mitigation — utilizing websites, training, newsletters, brochures, etc.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Pursue 5 percent initiative funding to evaluate building codes in support of future adoption and/or mitigation.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Pursue 5 percent initiative funding to assist in mitigating damage from trees during high wind events such as hurricanes, snow load and ice accumulation.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Pursue 5 percent initiative funding to assist in obtaining elevation certificates for all residences in town to determine which residences are most vulnerable to flooding.	Kent County and Town of Little Creek	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Local Plans and Regulations
Magnolia							
Flood	Work with DelDOT to address the flooding issues along West Walnut Street.	Town Administration DelDOT	Ongoing	25,000-100,000	New Action	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
Milford							
Flood	Develop a riparian buffer standard for building setbacks along the Mispillion River and other waterways.	Town Administration	1-2 years	>25,000	Ongoing	Staff Time, Municipal Funds	Natural Systems Protection
All Hazards	Obtain back-up emergency radio system.	Town Administration	1-2 years	>25,000	Ongoing	Staff Time, Municipal Funds	Structure and Infrastructure Projects
All Hazards	Update reverse notification system.	Town Administration	1-2 years	>25,000	Ongoing	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects
Smyrna							
All Hazards	Develop security badge system for use by all Town of Smyrna employees.	Town Administration	1-2 years	>25,000	Ongoing	Staff Time, Municipal Funds, EMPG Funds	Local Plans and Regulations
All Hazards	Install security partitions at customer service counters in the lobby of Town hall.	Town Administration	1-2 years	<25,000	Completed	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects
All Hazards	Install 12 "hold-up alarms."	Town Administration	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects
All Hazards	Purchase a generator for the Public Works Building for emergency power that is at least two 800 megahertz radios.	Town Administration	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds	Emergency Response/ Operational Preparedness
All Hazards	Install digital access door controls on all municipal facilities and eliminate manual keys.	Town Administration	2-3 years	>100,000	New	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
All Hazards	Upgrade the gate access at public works facility to manage access better by Integrating the employee security badge system IDs for allow for gate access.	Town Administration	3-4 years	>100,000	New	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects
All Hazards	Assess the potential use of a SCADA system for utilities to manage operations more effectively, and to integrate into Wellhouse #3 at Lake Como.	Town Administration	3-4 years	<25,000	New	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects
All Hazards	Ensure an up-to-date and more holistic education program for NIMS and ICS-certified employees.		Ongoing	<25,000	New	Staff Time, Municipal Funds, EMPG Funds	Education and Awareness Programs
Viola							
All Hazards	Educate the public regarding preparedness and protection measures including sheltering-in-place.	Town of Viola	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
Hazardous Materials	Review County Office of Emergency Services plans regarding protective measures and evacuation procedures for hazardous materials incidents and share information with citizens on ways to elevate and / or harden oil and gas storage tanks to avoid spills and contamination of surrounding areas.	Town of Viola	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Local Plans and Regulations
Terrorism (chemical agents), Hazardous Material Release	Educate the public concerning sheltering-in-place in the event of a hazardous material spill or release.	Town of Viola	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
Winter Storms	Educate the public regarding special needs populations in the event of winter storms.	Town of Viola	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
Drought	Educate the public on the necessity of periodic well testing, especially during periods of drought.	Town of Viola	Ongoing	<25,000	Ongoing	Staff Time, Municipal Funds	Education Awareness Programs
Woodside							
All Hazards	Work with the County on outreach programs designed to promote hazard awareness and identify a variety of hazard mitigation techniques for residents and businesses.	Town of Woodside	Ongoing	<25,000	Ongoing	Staff Time, Municipal/County Funds	Education Awareness Programs
Flood	Continue to coordinate with DelDot to maintain drainage in along Main Street to help reduce the impacts of minor flooding events.	Town Admin/DelDot	Ongoing	<25,000	New	Staff Time, Municipal/County Funds	Structure and Infrastructure Projects
Wyoming							
All Hazards	Install surveillance video equipment at the Wyoming police station/town hall interior and exterior and the railroad, which runs behind both northbound and southbound.	Town of Wyoming / DNREC	1-2 years	<25,000	Complete	Staff Time, Municipal Funds, EMPG Funds	Structure and Infrastructure Projects

Hazard Mitigated	Mitigation Action	Lead Agency	Timeline	Approximate Cost ($)	Action Status (New, Ongoing, In Progress, Not Started, Carried Forward)	Possible Funding Source	Action Category
Flood	Work with the Delaware Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies to address known hazards.	Town of Wyoming / DelDOT	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, FMA Funds	Structure and Infrastructure Projects
All Hazards	Develop specific mitigation strategies to protect any at-risk historic properties in town.	Town of Wyoming	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, Historic Preservation Funding Sources	Structure and Infrastructure Projects
All Hazards	Conduct a survey of all historic sites that are located in hazard areas.	Town of Wyoming	1-2 years	<25,000	Ongoing	Staff Time, Municipal Funds, Historic Preservation Funding Sources	Structure and Infrastructure Projects
All Hazards	Develop a continuity of operations plan for the town of Wyoming to include the local fire company (shared between Camden and Wyoming) and police department (shared with Camden).	Town of Wyoming	1-2 years	<25,000	Not Started	Staff Time, Municipal Funds	Local Plans and Regulations
All Hazards	Purchase back-up generator for the police station/town hall.	Town of Wyoming	1-2 years	<25,000	Complete	Staff Time, Municipal Funds	Structure and Infrastructure Projects
Flood	Install bulk head from where the rip rap ends at Wyoming park to Wyoming Mill Pond.	Town of Wyoming	3-4 years	25,000-100,000	In Progress	Staff Time, Municipal Funds, PDM Funds	Structure and Infrastructure Projects

7.4.2 Completed or Cancelled Mitigation Actions (2015 Plan)

This section addresses the mitigation actions from the 2015 Plan that were not carried forward to this 2020 Update. These actions were not carried forward because they were either completed, cancelled, not applicable. The Steering Committee reviewed the actions in the 2015 Plan and each action from the original plan was discussed and categorized based on definitions given in Table 7.7. Municipalities not completing any actions since 2015, or not providing updates have been left blank. Those actions are itemized, described, and justified in Table 7.8 for County actions, and in Table 7.9 for municipal actions.

Table 7.7 Hazard Status Definitions

Status	Definition
Completed	The lead department has completed the action since the development of the 2015 Plan.
Not Applicable	Actions that were deemed by the Steering Committee to not apply to the HMP Update.
Cancelled	Officials have decided to terminate this project.
Infeasible	After further study this project was deemed to be infeasible based on benefit/cost analysis, engineering study, or other criterion.
Combined	Actions that were combined with other existing actions that are very similar in nature.
Carried Forward	A status was not determined, therefore carried forward to this plan.

7.4.2.1 Past County Mitigation Actions

Table 7.8 Kent County 2015 Actions Completed, Cancelled, or Not Applicable

Action	Hazard Mitigated	Lead Agency for Implementation	Status	Notes
Review/revise the drainage code	Flood	Division of Emergency Management	Cancelled	County adheres to State codes – they were recently updated.
Develop an emergency evacuation plan for public assembly events.	All Hazards	Division of Emergency Management	Cancelled	Did not gain traction at State level. County plans usually developed for specific events.
Continue to work closely with DelDOT to assess the flood vulnerability of state roads, support the upgrade of state roads, and incorporate findings into DelDOT safety upgrades.	Flood, Hurricane	Division of Emergency Management	Cancelled	State maintains all roads, except for municipal roads - there are no county roads.
Identify areas where power lines can be buried underground in order to offer the security of uninterrupted power during and after winter storms. However, consideration needs to be made for maintenance and repair, particularly in cold climates where soil freezes.	Thunderstorms/ Winter Storms	Division of Emergency Management, Department of Public Works	Cancelled	County does not have control over utilities. Dover – in progress, using other mitigation methods.

7.4.2.2 Past Municipal Mitigation Actions

Table 7.9 2015 Municipal Actions Completed, Cancelled, or Not Applicable

Hazard Mitigated	Mitigation Action	Lead Agency	Action Status	Notes
Past Municipal Actions Completed, Cancelled, or N/A				
Bowers				
None				
Camden				
All Hazards	Designate emergency collection points (firehouses, churches, etc.).	Town Administration	Completed	Collection point has been designated.
Cheswold				
All Hazards	Conduct a natural hazards vulnerability assessment of the asphalt plant (independence Construction Materials) in the Town.	Town Administration	Cancelled	Plant is not in municipal limits
Clayton				
None				
Dover				
Wind	Re-enforce electric system in Emergency Operations Center so that it can sustain high winds.	City of Dover	Completed	NA
Flood	Conduct a study to determine the feasibility of relocating the City of Dover Grounds Department outside of St. Jones River floodplain.	City of Dover	Completed	Grounds Division has been removed from the St. Jones River floodplain.
All Hazards	Acquire grounds building.	City of Dover	Completed	Building for Grounds Division was acquired at Schutte Park
Farmington				
All Hazards	Purchase and install outdoor surveillance security system at the firehouse to include monitoring the nearby town playground.	Town of Farmington	Completed	System installed and does cover neighboring area and playground.
Felton				
Flood	Work with Delaware DOT to identify areas of frequent roadway flooding on Market Street and develop mitigation strategies.	Town of Felton	N/A	There is no Market Street located in the Town of Felton.
All Hazards	Revise the Emergency Water Plan (updated in 1999 by the Delaware Rural Water Association).	Town of Felton	N/A	Action is not applicable.
All Hazards	Develop an Emergency Operations Plan for the Town of Felton in conjunction with the local fire service and police.	Town of Felton, Police and Fire departments	Completed	This was created in 2006. Contact information needs to be updated.
Flood	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Felton	Completed	This may have been completed with the former Town Manager.
Frederica				
All Hazards	Introduce back-up power to the Town's pumping stations.	Town of Frederica	Completed	Portable generator connections are installed at water booster stations.

Hazard Mitigated	Mitigation Action	Lead Agency	Action Status	Notes
Harrington				
None				
Hartly				
None				
Houston				
None				
Kenton				
All Hazards	Work with the County/State to find funding and establish a schedule to provide training/ certification opportunities in GIS and in building inspection/code enforcement for the Town of Kenton.	Town Administration	Cancelled/ Not Applicable	Kenton does not have the manpower to complete this action.
Leipsic				
All Hazards	Continue to provide information about local, regional, state and federal training opportunities to fire department, EMS, ambulance services and other emergency responders.	Town of Leipsic/ local Fire Service	Not Applicable	The does not occur at the Town level
Flood	Install a bulkhead at the Leipsic River.	Town of Leipsic	Cancelled	All docks are privately owned, which is what prevented this action from happening, although it was pursued. Privately owned docks was the problem. Would still love to do it, but need to work with the State to work with the private docks, which is presented as a new action.
Little Creek				
None				
Magnolia				
Flood	Research the benefits and workload requirements for joining the National Flood Insurance Program.	Town Administration	Completed	Town of magnolia joined NFIP on April 5, 2018.
Flood	Coordinate with County and State officials to evaluate ways to eliminate or minimize flooding during heavy rain events along Barkers Landing Road just outside Town limits.	Town Administration	Cancelled	Any available resources will be designated for projects within the town limits.
Flood, coastal erosion	Purchase generator for water system when power fails.	Town Administration	Cancelled	Dema denied our application in 2015 after spending hours on preparation; will not pursue. **

Hazard Mitigated	Mitigation Action	Lead Agency	Action Status	Notes
Milford				
Flood	Relocate Milford Fertilizer out of floodplain	Town Administration	Completed	Now is called Growmark, Inc. This location is now admin office only.
Smyrna				
All Hazards	Install security partitions at customer service counters in the lobby of Town hall.	Town Administration	Completed	Security partitions have been installed.
Viola				
All Hazards	Identify shelters and notify the public about their location.	Town of Viola	Completed	Shelters identified in County. Action addressed by County.
Woodside				
None				
Wyoming				
All Hazards	Install surveillance video equipment at the Wyoming police station/town hall interior and exterior and the railroad, which runs behind both northbound and southbound.	Town of Wyoming / DNREC	complete	In new location, and that has surveillance all the way around, inside and out.
All Hazards	Purchase back-up generator for the police station/town hall.	Town of Wyoming	completed	Back up generators purchased and available
Flood	Make improvements to South Layton Street Pump House	Division of Emergency Management	Completed	Installed backup generator and pump system to pump water over to southern blvd
Flood	Address flooding issues due to the open pipe on Camden Wyoming Avenue and Southern Boulevard.	Town of Wyoming	completed	Project completed

7.5 Funding Sources

Financial sources are a critical aspect to implementing projects within a community. In the past, the municipalities, as well as the County, have taken an active role in seeking funds for these planning efforts. The following funding sources provide grants for hazard mitigation planning and project related activities:

- Hazard Mitigation Grant Program (HMGP) – HMGP is administered by FEMA and provides grants to states, tribes and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation activities to be implemented as a community recovers from a disaster. Eligible projects include: elevating flood-prone homes or businesses; acquisition of flood-prone homes from willing owners and returning the

property to open space; retrofitting buildings; and construction of floodwall systems to protect critical facilities.

- Pre-Disaster Mitigation (PDM) Program – The PDM program provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. The program provides technical and financial assistance to States and local governments to assist in the implementation of pre-disaster mitigation actions, which must be cost-effective and designed to reduce injuries, loss of life and damage and destruction of property.
- Public Health Emergency Preparedness – The PHEP program provides funds for health departments to build and strengthen their abilities to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events. Preparedness activities funded by the PHEP cooperative agreement are targeted specifically for the development of emergency ready public health departments that are flexible and adaptable.
- Urban Areas Security Initiative (UASI)– The UASI program assists high-threat, high density urban areas in efforts to build and sustain the capabilities necessary to prevent, protect against, mitigate, respond to, and recover from acts of terrorism. The UASI program is intended to provide financial assistance to address the unique multi-discipline planning, organization, equipment, training, and exercise needs of high-threat, high density urban Areas, and to assist these areas in building and sustaining capabilities.
- Flood Mitigation Assistance (FMA) Program – FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, or other National Flood Insurance Program (NFIP) insurable structures with a focus on repetitive loss properties. The NFIP enables property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Three types of FMA grants are available to States and communities: 1) planning grants to prepare Flood Mitigation Plans; 2) project grants to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures; and 3) technical assistance grants for the State to help administer the FMA program and activities.
- Repetitive Flood Claims – The program provides funding to States and communities to reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP that have had one or more claims for flood damages, and that cannot meet the requirements of the FMA program for either cost share or capacity to manage the activities. Eligible activities include: 1) acquisition of properties and either demolition or relocation of flood-prone structures, where the property is deed restricted for open space uses in perpetuity; 2) elevations; 3) dry flood-proofing of non-residential structures; and 4) minor localized flood control projects.
- Severe Repetitive Loss (SRL) - A SRL property is defined as a residential property that is covered under a NFIP flood insurance policy and: 1) that has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or 2) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. Eligible flood mitigation project activities under the SRL program include: 1) acquisition and demolition or relocation of at-risk structures and conversion of the property to open space; 2) elevation

of existing structures to at least the base flood elevation; 3) minor physical localized flood reduction projects; and 4) dry flood-proofing for historic properties.

- Emergency Management Performance Grants (EMPG) – The EMPG program provides resources to state and local governments to develop an all-hazards planning approach to emergency management and to sustain and enhance all-hazards emergency management capabilities. Every State is eligible for a percentage of the available funds and is intended to sustain the core capabilities of the five (Prevention, Protection, Mitigation, Response, and Recovery) mission areas.

Most state and Federal grant programs require local communities to provide at least part of the necessary project funding in real dollars or through "in-kind" services. While the percentage of local contribution varies from program to program, Local communities need to assess their financial capability and resources to implement their hazard mitigation action plans. Kent County can meet match requirements through various funding sources.

- Annual Budgets
  The County Comprehensive Plan discusses the intent of the Capital Improvements Program (CIP) to provide a logical and orderly sequence for undertaking the recommendations of the Comprehensive Plan and that consideration be given to the scheduling of projects in a manner as to distribute their costs realistically over a number of years. Recognizing the scarcity of the local financial resources and the increased competition for the tax dollar, the County-wide CIP makes every attempt to maximize the various financial resources available to the individual municipalities. The CIP classifications described in the Comprehensive Plan include improvements related to housing, transportation, public utilities, community facilities, and economic development.

All of the above sources of funding can serve as financial resources for implementation of this Plan. It is important to recognize that many of these sources have limited funds, and that the County will need to partner with the municipalities to provide as many opportunities for planning and hazard mitigation funds as possible. Wherever possible, County, and municipal funding should be used to leverage funds from state, federal, or other sources in order to maximize dollars.

8.0 CHAPTER 8 – PLAN MAINTENANCE AND ADOPTION

8.1 Update Process Summary

Once this Plan has received approval from DEMA and FEMA, the Plan will be adopted by the Kent County Commission and its participating jurisdictions. This County HMP Update is intended to be a 'living document'. Plan adoption is not considered the final step in the planning process, but rather as a first step to 'realization'. The plan monitoring and maintenance schedule is a cycle of events that involve periodic review, adjustments, and improvement. This Chapter establishes a method to monitor how the Plan will be evaluated and maintained in the future.

8.2 Plan Monitoring, Evaluating, and Updating the Plan

This 2020 HMP Update will be monitored by the County for several related purposes:

1. Maintain the currency of hazard and risk information.
2. Ensure mitigation projects and actions reflect the priorities of the County, the HMP Steering Committee, and the general public.
3. Comply with FEMA and DEMA requirements for HMP maintenance, and to maintain eligibility for Federal disaster assistance and mitigation grants.

In order to ensure that the Plan continues to provide a framework of reducing risk in the County, the Emergency Management will take responsibility to convene an annual meeting of the Hazard Mitigation Plan Steering Committee. The Committee will comprise of the members who were involved in the preparation of the Plan Update as well as municipal representatives. This annual review will evaluate the plans effectiveness, applicability, and ongoing strategy. The Steering Committee will assist the Division of Emergency Management to prepare a status report of the mitigation actions based on the annual report forms from the municipalities as well as the County. Each action proposed in the Mitigation Plan will be categorized as one of the following: completed, in progress, not started/delayed, modified, or cancelled.

There are several criteria that should be evaluated as part of the annual review process. During the annual review process, the following criteria should be evaluated for any changes, and adjustments made to the Plan accordingly:

- Changes in the risk assessment (hazard rankings)
- Changes in priorities
- Hazard event occurrences and impacts
- Relevance of Plan Goals
- Status of mitigation actions (completed, ongoing, in progress, not started, not applicable)

In addition to conducting an annual review of the plan, the Steering Committee will review the Plan within 30 days after a disaster. Each goal and objective will be examined for its relevance and validity to the changing situation in each municipality and the mitigation actions will be reviewed to ensure that it addresses any recent issues that may have stemmed from disaster events. During periods

without hazard events, the Plan will be updated every five years to reflect the current risk, vulnerabilities, development trends and as mitigation actions are implemented. While an annual report will be competed each year, any state and federal mandates from DEMA and FEMA respectively, will be addressed in the five-year update. The municipalities will not be responsible for making any changes to the HMP based on DEMA or FEMA requirements in between the five-year update.

The Kent County Division of Emergency Management is responsible for coordinating the Steering Committee, and the Committee shall monitor and maintain the HMP Update. The Division of Emergency Management and Steering Committee shall continuously monitor the HMP for the purposes noted above and with respect to the update triggers discussed in the section below.

Upon adoption of this plan, the Division of Emergency Management will annually convene a meeting of representatives from the Steering Committee to discuss and determine implementation accomplishments and/or implementation obstacles and recommended solutions. Although the individuals filling the positions may change from year to year, future Steering Committee members will continue to be comprised of the same departments and organizations involved in this current update. Emergency Management will also be responsible for monitoring and preparing the annual progress reports, and will utilize the data obtained from the annual meeting to note the progress made on mitigation action items in annual progress reports.

Circumstances or conditions under which Kent County will initiate HMP reviews and updates:

1. On the recommendation of the County Executive, or on its own initiative, the County may initiate an HMP review at any time.
2. At approximately the one-year anniversary of the HMP's re-adoption, and approximately at the same anniversary every year thereafter.
3. After a natural hazard event that appears to significantly change the apparent risk, County assets, operations and/or citizens.
4. Upon receipt of new or updated data or information that may affect the HIRA.
5. When activities within the County, Region, or State significantly alter the potential effect of natural hazards on County assets, operations and/or citizens. Examples include completed mitigation projects that reduce risk, or actions or circumstances that increase risk.

In addition to the circumstances listed above, revisions that warrant changing the text of this HMP or incorporating new information may be prompted by a number of circumstances, including identification of specific new mitigation projects, completion of several mitigation actions, or requirements for qualifying for specific funding. Minor revisions may be handled by addenda.

A benefit-cost analysis determines the cost effectiveness of a project to minimize damage or prevent future damage from future hazard events. By determining the benefit cost of the proposed mitigation projects, it will provide the communities as well as project developers with additional knowledge about the feasibility of the proposed mitigation alternative. If the costs outweigh the benefits, then other alternatives that are more effective can be identified to accomplish the Plan's goals. This 2020 HMP Update will be posted on Kent County's website under the Division of Emergency Management's tab. Notices of the website's availability will be distributed to the following groups:

- The Federal and State agencies that were notified and invited to participate in the HMP's development;

- The organizations, agencies, and elected officials who received notices of public meetings; and,
- Citizens who attended public meetings and provided contact information.

8.3 Continued Public Involvement

The preparation of this Plan has involved the municipalities and public throughout the process through meetings and via newspapers, the internet, and social media. Kent County is dedicated to continuing to solicit municipal and public participation during the five-year update as required by FEMA. Copies of the HMP Update will be placed on the County's website, along with a mechanism for submission for comments. Additionally, annual update meetings should be open to the public and all municipalities, and an advertising and outreach campaign undertaken to encourage the public to attend and provide comment.

Upon adoption of the updated 2020 HMP, the public will be notified of any substantial changes to the document prior to the next scheduled update in 2025. Any changes proposed by the Steering Committee that are considered significant, will be distributed to the list of stakeholders identified in Chapter 3, Planning Process. The Steering Committee will then review any and all suggested changes and make recommendations for revisions to the plan as deemed appropriate and/or necessary.

8.4 Plan Adoption

Requirement §201.6(c)(5): *[The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., County Commission).*

Adoption by the Local Governing Body

Include adoption resolution from Kent County here

Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.*

Include adoption resolutions from all municipalities in Kent County here.

Incorporation of Mitigation Actions into Existing Planning Mechanisms

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.*

The County/ Regional Comprehensive Plan; CIP; Building Code, Municipal Floodplain Management Regulations, Emergency Operations Plan (EOP), and Zoning Ordinances are identified for incorporation of hazard mitigation actions once the Plan is adopted. Each of these mechanisms will continue to be used to meet the intent of this Plan, as appropriate. Once the County adopts this County HMP Update, mitigation strategies discussed in this plan will be implemented via the aforementioned mechanisms as well as through the incorporation into the new planning mechanisms. For these documents that are already in existence, mitigation actions should be incorporated as an amendment to the document.

Incorporation of Mitigation Actions into Existing Planning Mechanisms - Municipalities

Once the County Commission adopts the 2020 Kent County HMP Update, each individual jurisdiction will be required to adopt the Plan Update as well. Once this is completed, the County Emergency Management Division will continue to assist local jurisdictions with the implementation of mitigation projects. Each participating municipality will be responsible for implementing the specific mitigation actions identified in this Plan and incorporating these actions into their local planning documents such as comprehensive plans, zoning ordinances, land development, and subdivision regulations, as amendments and will identify capital improvement projects that are consistent with this Plan's goals. Municipalities will be responsible for obtaining funds from suggested state and Federal sources to implement their respective mitigation actions.

APPENDIX A – ACRONYMS

BFE – Base Flood Elevation

CFR – Code of Federal Regulations

CRS – Community Rating System

DEMA – Delaware Emergency Management Agency

DelDOT – Delaware Department of Transportation

dFIRM – Digital Flood Insurance Rate Map

DMA2K - Disaster Mitigation Act of 2000

EAS – Emergency Alert Systems

EMD – Emergency Management Division

EMS – Emergency Medical Services

EOC – Emergency Operations Center

EOP - Emergency Operations Plan

EPA - Environmental Protection Agency

ESF - Emergency Support Functions

FEMA – Federal Emergency Management Agency

FIS – Flood Insurance Study

FMA - Flood Mitigation Assistance Program

FMP – Flood Mitigation Plan

FPE – Flood Protection Elevation

GIS – Geographic Information Systems

HIRA Hazard Identification and Risk Assessment

HMA – Hazard Mitigation Assistance

HMGP - Hazard Mitigation Grant Program

HMP – Hazard Mitigation Plan

ICS - Incident Command System

ISDN – Integrated Services Digital Network

LOMA – Letters of Map Amendments

LOMR – Letters of Map Revisions

MEMA – Maryland Emergency Management Agency

NAWAS - National Warning System

NFIP – National Flood Insurance Program

NIMS - National Incident Management System

NWS - National Weather Service

PDM - Pre-Disaster Mitigation Program

PDSI - Palmer Drought Severity Index

PIO – Public Information Office

PSAP - Public Safety Answering Point

RL - Repetitive Loss

SRL - Severe Repetitive Loss

UASI – Urban Area Security Initiative

USGS - United States Geological Survey

VPC – Vision Planning and Consulting

WUI - Wildland-Urban Interface

WWTP - Waste Water Treatment Plant

APPENDIX B – BIBLIOGRAPHY

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APPENDIX C – MEETINGS, OUTREACH, AND PARTICIPATION

Steering Committee Meetings

Kent County Hazard Mitigation Plan Update
Steering Committee Meeting #1
Summary
Date: September 30th, 2020
Time: 2:30pm-4:00pm

Attendees were given a brief introduction to the Consulting firm Howard County has contracted for the Flood and Hazard Mitigation Plan Update process, Vision Planning and Consulting (VPC). VPC representatives working on the project, Ashley and Andrew, introduced themselves and introductions for the members of the steering committee in attendance were given. VPC presented and discussed the project purpose and background, key players, steps in the planning process, county hazards, a risk assessment preview, plan integration efforts, future mitigation action development, project schedule, future meetings, and existing County HMP and FMP goals and objectives,

VPC worked with Committee members to examine and refine each of the goals and objectives laid out in the previous plans for both the Flood Mitigation Plan and the Natural Hazard Mitigation Plan. Each goal and objective was evaluated for clarity, cohesiveness, and relevance. Terminology was discussed, and suggestions made to help the plan, goals, and objectives become more actionable and be more comprehensible to the responsible implementing agencies and to the general public.

The Steering Committee was presented with the initial findings Risk Assessment This presentation provided information on HAZUS and information on the various hazards Kent County could potentially face. VPC Staff\ discussed the process for generating the 1% and .02% chance flood area, and maps to illustrate the county's flood hazard areas. Maps and exposure estimates were also generated for earthquakes and hurricanes, as well as for flood, wildfire, and HazMat locations.

VPC discussed the integration of the Kent County Comprehensive Plan and other hazard mitigation related plans and ordinances. A final review of goals and objectives was then held to gather input or recommendations on the content and verbiage. Additionally, mitigation actions from the previous plans were reviewed to determine current status (in progress, completed, deferred), relevance, and feasibility. Next steps include developing new mitigation actions for review at the next Steering Committee meeting, and hosting the public meeting, as well as the second Steering Committee meeting.

Kent County Hazard Mitigation Plan Update
Agenda Steering Committee Meeting #1
Agenda

Date: September 30th, 2020
Time: 2:30pm-4:00pm

Introductions

- Kent County Department of Public Safety, Division of Emergency Management Representatives
- Consultants – Vision Planning and Consulting and JMT
- Attendee Roll Call/Intros

Project Overview Presentation

- Planning process
- Meetings
- Progress to date
- Hazard Mitigation Plan Goals and Objectives

Steering Committee Working Sessions

- Make edits to existing Goals and Objectives, and develop new ones, as necessary
- Review the 2015 Plan's mitigation actions and determine the status of each action (Not Started, In Progress, Ongoing, Completed, Cancelled, Not Applicable)
- Discussion of New County Mitigation Actions

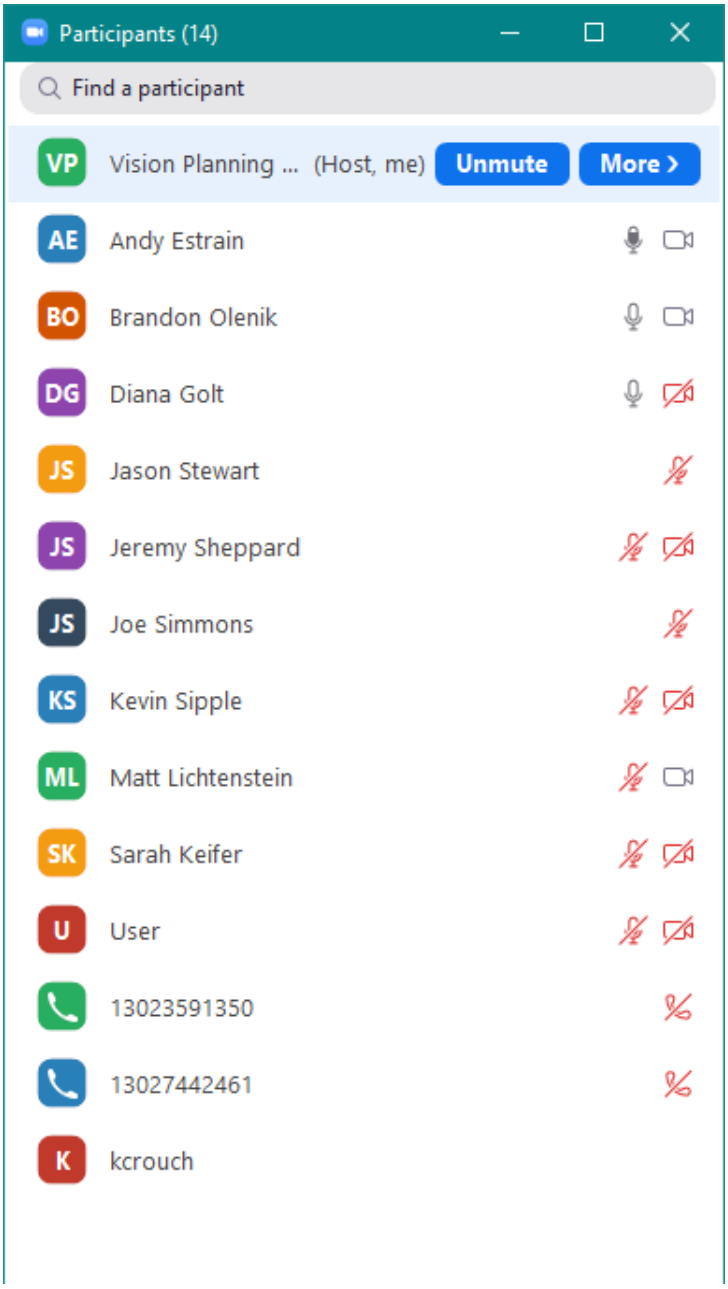
Next Steps

- Complete HIRA and GIS Analysis
- Develop New County and Municipal Mitigation Actions
- Continue Municipal Coordination and Information Gathering
- Plan Integration
- Meetings (Round 2)
- Draft Plan Development

Questions

Adjournment

Steering Committee Meeting #1 – Zoom Attendance List



Kent County Hazard Mitigation Plan Update

Steering Committee Meeting #2

Meeting Summary

Date: October 28th, 2020

Time: 2:00 p.m.-3:30 p.m.

Attendees were first provided with the project's progress to date. The Steering Committee was presented with the results of municipal participation. Vision Planning and Consulting (VPC) representative, Andrew Estrain, led an exercise to finalize and prioritize the list of mitigation actions for the Hazard Mitigation Plan, which had been emailed out prior to the meeting to ensure the Committee had sufficient time for review.

VPC then had a brainstorming session with the Steering Committee to determine and develop additional new mitigation actions based on results of the information provided back by municipalities. Several new mitigation actions were developed, and appropriate content and verbiage finalized. The Steering Committee also provided input on lead agency and potential funding sources related to the newly developed mitigation actions.

Each action item was discussed to determine phrasing, efficacy, and implementation methods. Some action items were combined for clarification and efficiency. An implementation plan was developed to determine Lead Agency, Timeline, Estimated cost and potential Funding Sources for each action item. Additionally, VPC then discussed the prioritization rubric which was based on Life/Safety, Technical/Administrative Difficulty, and Cost. As Life/Safety is the main goal of mitigation actions, it received a weight double that of the other considerations.

VPC worked with Committee members to examine and prioritize mitigation actions. Newly developed actions, as well as those carried forward from the previous plans, were evaluated and given a score based on their projected cost, the difficulty in performing or implementing the action, and the scale of area the action would protect (one street, one neighborhood, countywide, etc.). Actions were then ranked based on the prioritization score.

Next steps include assembling the draft report for county and public review, and hosting the second and final public meeting.

Kent County Hazard Mitigation Plan Update

Steering Committee Meeting #2

Agenda

Date: October 28th, 2020

Time: 2:00 p.m.-3:30 p.m.

This meeting was held virtually via Zoom Videoconference

Progress to Date

- Brief Presentation

Past Actions Review

- Brief Discussion of Past Mitigation Actions

New Actions Review*

- Discuss New Mitigation Actions that Address Goals and Objectives*

Mitigation Actions*

- Mitigation Action Finalization*
- Prioritize Mitigation Actions*
- Implementation Strategy*

Open Discussion

Next Steps

- Public Meeting (webinar forum)
- Develop Draft Plan for Public Review
- Develop Final Plan for PEMA/FEMA Review

Questions

Adjournment

Discussions will also take place via email with Steering Committee representative and municipal representatives

Steering Committee Meeting #2 – Zoom Attendance List

Name	Affiliation
Brandon Olenik	Division of Emergency Management
Collin Faulkner	Department of Public Safety/Fire and EMS
Rodney Layfield	DSP
Sharon Jefferson Hawk	American Red Cross
Kevin Sipple	911
Sarah Keifer	Facilities, Permits, Planning
Mark Kinnaman	GIS
Amy Thomas	Town of Felton
Jason Stewart	Town of Camden
Kay Sass	City of Dover
Jerry Windish	Unknown

Municipality Meeting

Kent County Hazard Mitigation Plan Update
Municipal Meeting
Meeting Summary

Date: September 23, 2020 Time: 2:00-4:00pm

This meeting took place virtually via Zoom Video. Attendees were given an introduction to the Consulting firm contracted for the planning and update process, Vision Planning and Consulting. Introductions were given to the principal Vision contacts working on the project, Andrew Estrain. Andrew discussed the project purpose, integrated planning process, deliverables, timelines, and progress to date for the plan.

He also discussed the importance of Plan Integration, the mitigation action development process, and development of the implementation plan. VPC reviewed with municipal representatives the updated goals and objectives that were updated in coordination with the County Steering Committee.

The municipal representatives were then presented with the initial findings of the Hazard Identification and Risk Assessment. This presentation provided definitions of terms used throughout the process and identified the various hazards Lackawanna County and different municipalities could potentially face. Our Team reviewed specific HAZUS_MH results and discussed potential exposure estimates and loss estimates by community.

Members were then provided a brief review of the municipal capabilities survey responses, and a general discussion of the results was held. Finally, an exercise was held to identify the current status of mitigation actions from the previous plan, and to identify potential new mitigation actions based on the survey responses. VPC staff then discussed the development of new community mitigation actions, providing representatives with a background types of actions that can be implemented and developed at the community level.

After discussions and the presentation, VPC remained in the Zoom call to allow municipal representative the opportunity to complete municipal worksheets and questionnaires, and ask questions as they came about. VPC staff was available for anybody whop had questions or needed help identifying information.

Kent County Hazard Mitigation Plan Update
Agenda Municipality Meeting #1
Agenda

Date: September 23rd, 2020
Time: 2:30pm-4:00pm

Introductions

- Kent County Department of Public Safety, Division of Emergency Management Representatives
- Consultants – Vision Planning and Consulting and JMT
- Attendee Roll Call/Intros

Project Overview Presentation

- Planning process
- Meetings
- Progress to date
- Hazard Mitigation Plan Goals and Objectives

Steering Committee Working Sessions

- Review edited existing Goals and Objectives, and develop new ones, as necessary
- Review the 2015 Plan's municipal mitigation actions and determine the status of each action (Not Started, In Progress, Ongoing, Completed, Cancelled, Not Applicable)
- Discussion of New Municipal Mitigation Actions
- Work with municipalities to discuss outreach worksheets

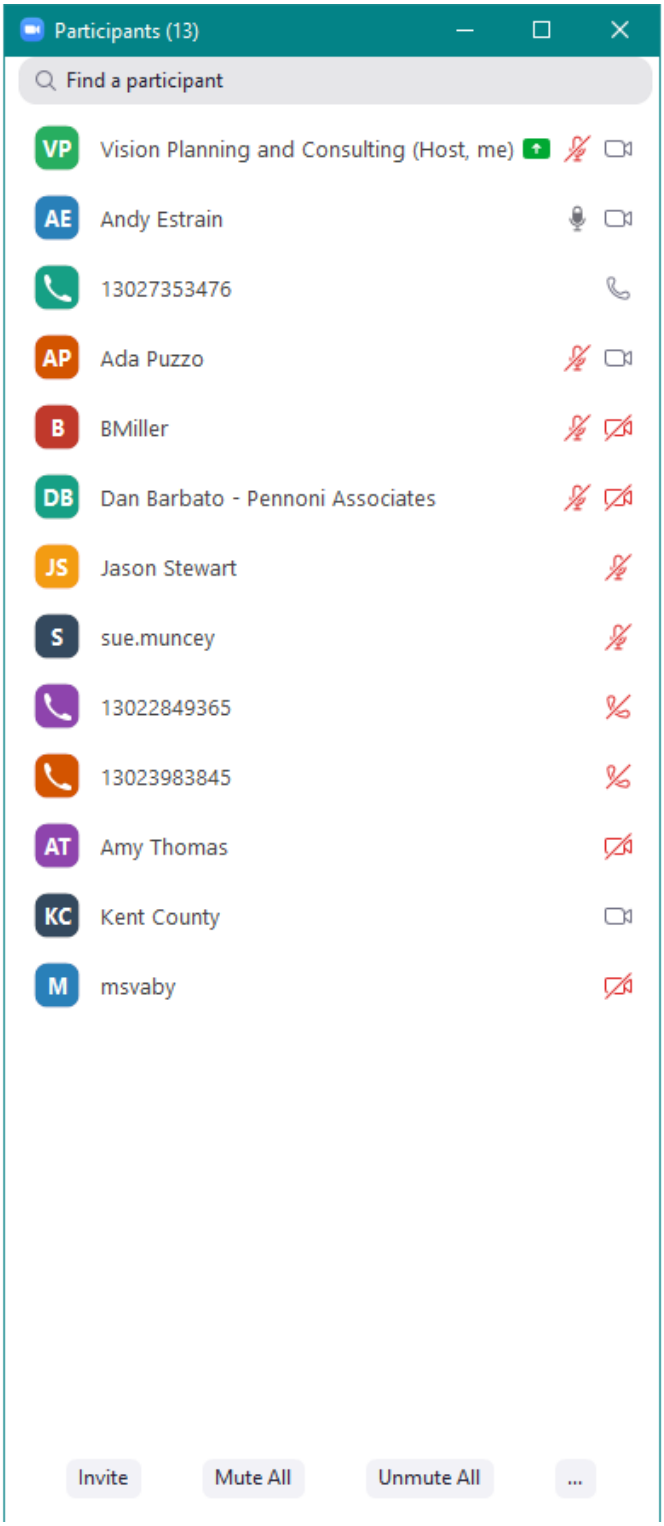
Next Steps

- Complete HIRA and GIS Analysis
- Develop New County and Municipal Mitigation Actions
- Continue Municipal Coordination and Information Gathering
- Plan Integration
- Draft Plan Development

Questions

Adjournment

Municipality Meeting #1 – Zoom Attendance List



Public Meeting

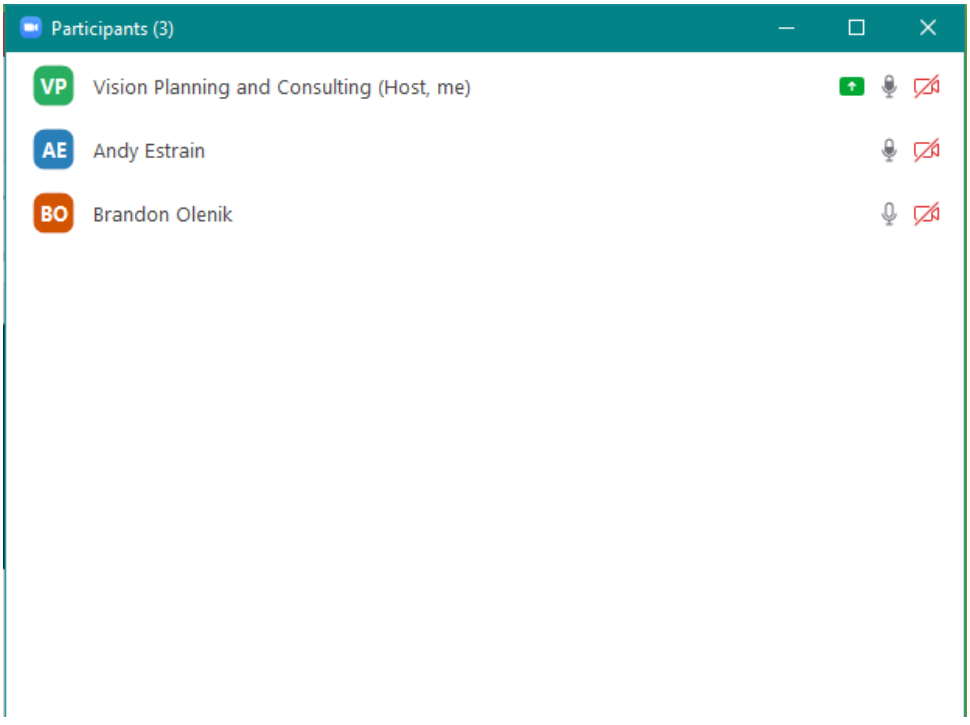
Kent County Public Invitation

The Kent County Division of Emergency Management will hold a public meeting on Monday, November 2nd , 2020 from 6:00 p.m. to 7:00 p.m. The meeting will take place via Zoom Videoconference, to solicit input and discuss the County's Hazard Mitigation Plan Update. These plans define goals and actions that can be taken to mitigate impacts from a variety of hazards, including flooding, within the County. Every five years the County is required to update these plans.

Staff members from the County's Division of Emergency Management will be on hand, as will Vision Planning & Consulting, LLC, to explain the update process, to answer any questions, and to gather public comments.

If interested in attending, send an email to aestrain@vision-pc.net or brandon.olenik@co.kent.de.us for meeting details (Zoom Link, ID, and Password). The meeting link and details will also be accessible through the County's Planning Website.

Those unable to attend the meeting who would like to view the information and/or have questions regarding the County Hazard Mitigation Plan Update should contact Brandon Olenik by email at brandon.olenik@co.kent.de.us.



Municipal Participation

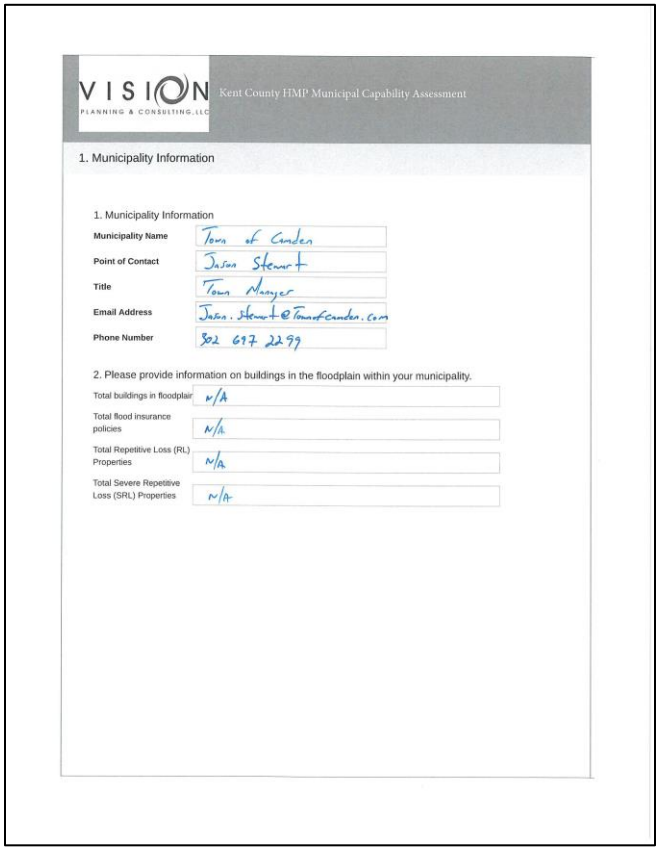
Each municipality was contacted and provided a municipal specific worksheets questionnaires to help inform different components of the Plan update, including the HIRA, Capability Assessment, and Mitigation Strategy. Each municipality were provided five specific worksheets/questionnaires to fill out and return for inclusion in the Plan update. The worksheets/questionnaires provided to each jurisdiction are identified below, followed by responses from all the municipalities that completed and returned each of the documents.

1) Municipal Capability Survey
2) NFIP Questionnaire
3) Municipal Hazard Areas Worksheet
4) Status of Past Mitigation Actions Worksheet
5) New Mitigation Actions Worksheet

Municipal Capability Survey Responses

Responses were received from: Camden, Cheswold, Farmington, Felton, Frederica, Harrington, Kenton, Leipsic, Little Creek, Magnolia, Milford, Smyrna, and Wyoming. Responses from each of these municipalities are provided below.

Town of Camden



VISION PLANNING & CONSULTING, LLC — Kent County HMP Municipal Capability Assessment

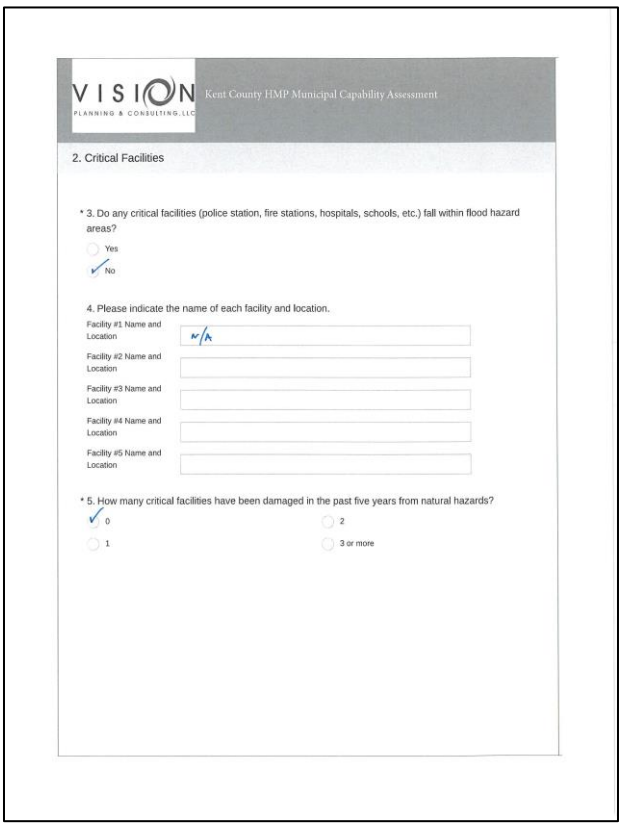
1. Municipality Information

1. Municipality Information

Municipality Name	Town of Camden
Point of Contact	Jason Stewart
Title	Town Manager
Email Address	Jason.Stewart@Townofcamden.com
Phone Number	302 697 2299

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	N/A
Total flood insurance policies	N/A
Total Repetitive Loss (RL) Properties	N/A
Total Severe Repetitive Loss (SRL) Properties	N/A



VISION PLANNING & CONSULTING, LLC — Kent County HMP Municipal Capability Assessment

2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

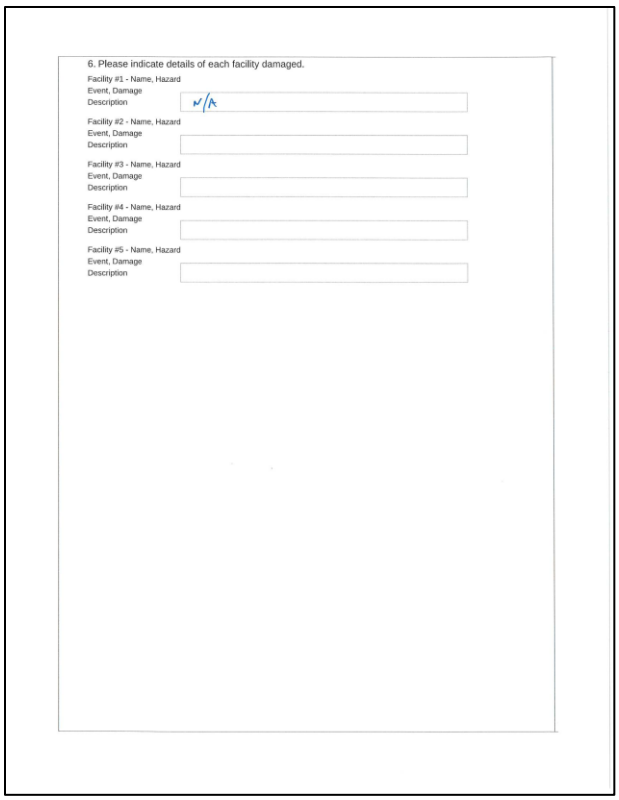
- [ ] Yes
- [x] No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	N/A
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- [x] 0
- [ ] 1
- [ ] 2
- [ ] 3 or more



6. Please indicate details of each facility damaged.

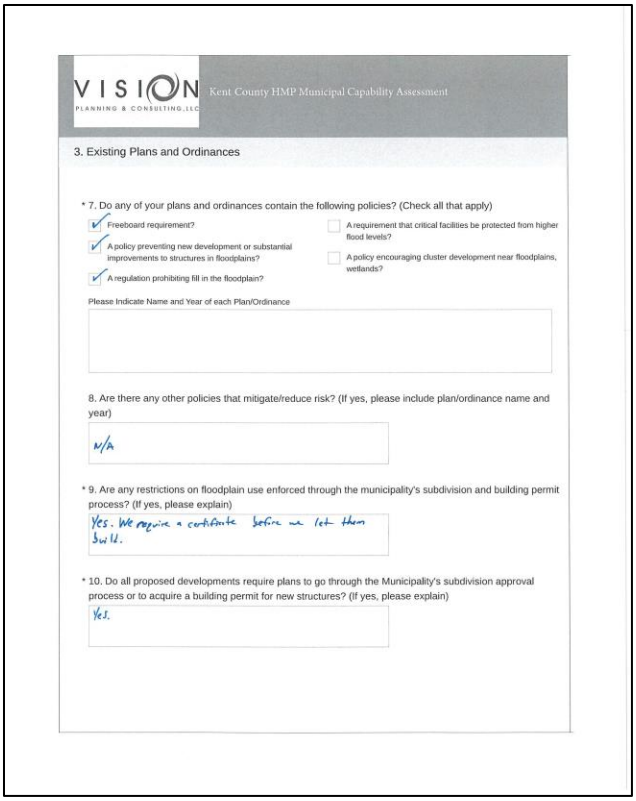
Facility #1 - Name, Hazard Event, Damage Description: N/A

Facility #2 - Name, Hazard Event, Damage Description:

Facility #3 - Name, Hazard Event, Damage Description:

Facility #4 - Name, Hazard Event, Damage Description:

Facility #5 - Name, Hazard Event, Damage Description:



VISION PLANNING & CONSULTING, LLC — Kent County HMP Municipal Capability Assessment

3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [x] Freeboard requirement?
- [x] A policy preventing new development or substantial improvements to structures in floodplains?
- [x] A regulation prohibiting fill in the floodplain?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

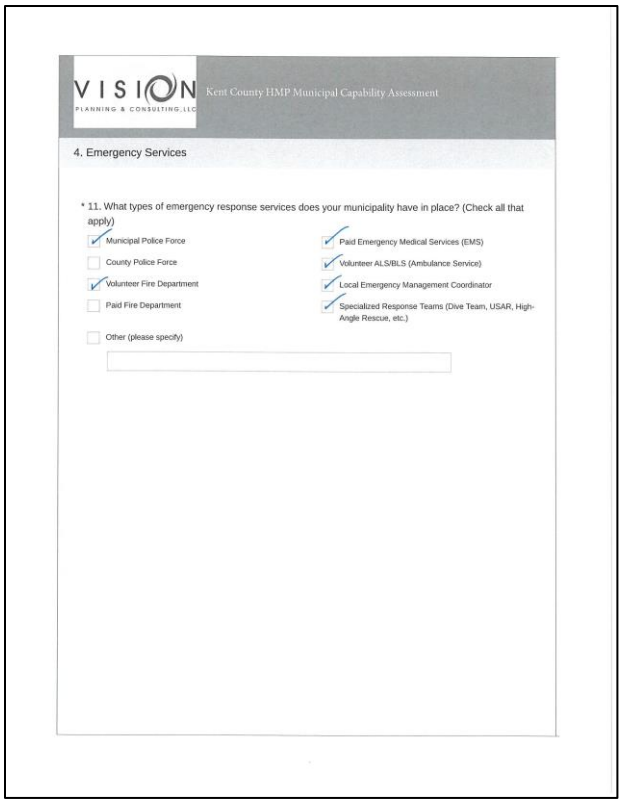
N/A

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

Yes. We require a certificate before we let them build.

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes.



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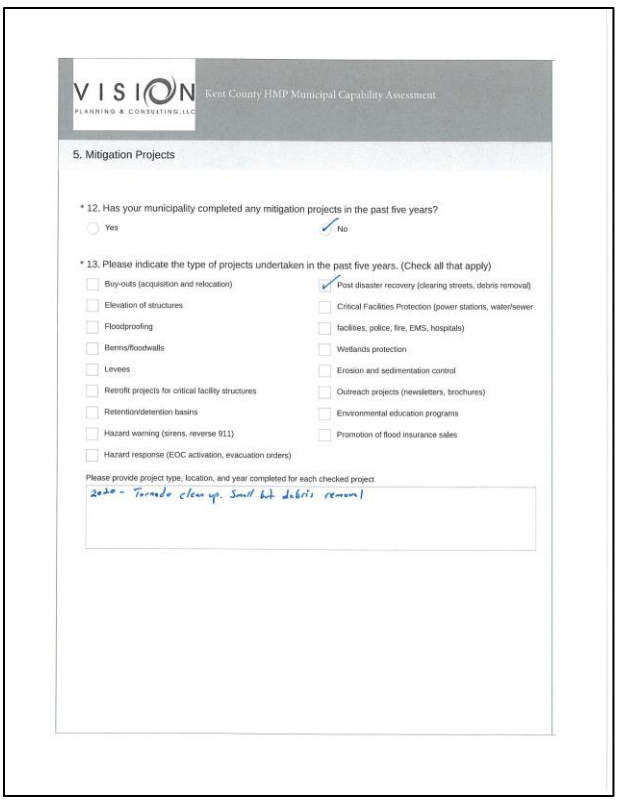
4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [x] Municipal Police Force
- [ ] County Police Force
- [x] Volunteer Fire Department
- [ ] Paid Fire Department
- [ ] Other (please specify)
- [x] Paid Emergency Medical Services (EMS)
- [x] Volunteer ALS/BLS (Ambulance Service)
- [x] Local Emergency Management Coordinator
- [x] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)



VISION PLANNING & CONSULTING, LLC — Kent County HMP Municipal Capability Assessment

5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

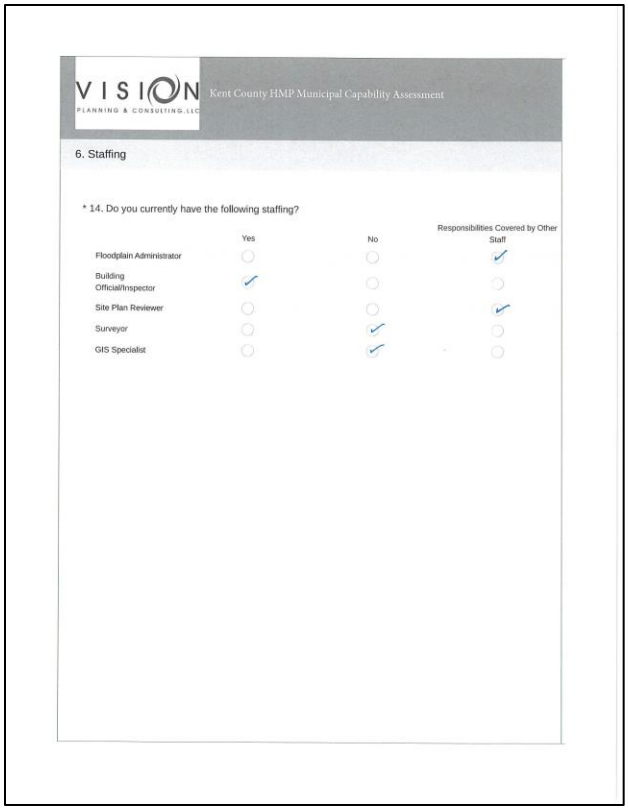
- [ ] Yes
- [x] No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- [ ] Buy-outs (acquisition and relocation)
- [ ] Elevation of structures
- [ ] Floodproofing
- [ ] Berms/floodwalls
- [ ] Levees
- [ ] Retrofit projects for critical facility structures
- [ ] Retention/detention basins
- [ ] Hazard warning (sirens, reverse 911)
- [ ] Hazard response (EOC activation, evacuation orders)
- [x] Post disaster recovery (clearing streets, debris removal)
- [ ] Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- [ ] Wetlands protection
- [ ] Erosion and sedimentation control
- [ ] Outreach projects (newsletters, brochures)
- [ ] Environmental education programs
- [ ] Promotion of flood insurance sales

Please provide project type, location, and year completed for each checked project

2020 - Tornado clean up. Small but debris removal

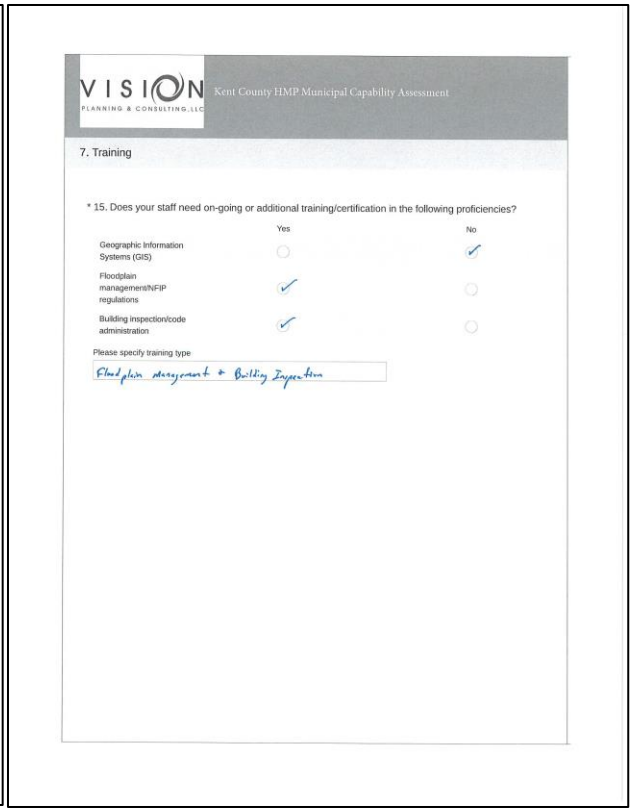


VISION PLANNING & CONSULTING, LLC Kent County HMP Municipal Capability Assessment

6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	○	○	✓
Building Official/Inspector	✓	○	○
Site Plan Reviewer	○	○	✓
Surveyor	○	✓	○
GIS Specialist	○	✓	○



VISION PLANNING & CONSULTING, LLC Kent County HMP Municipal Capability Assessment

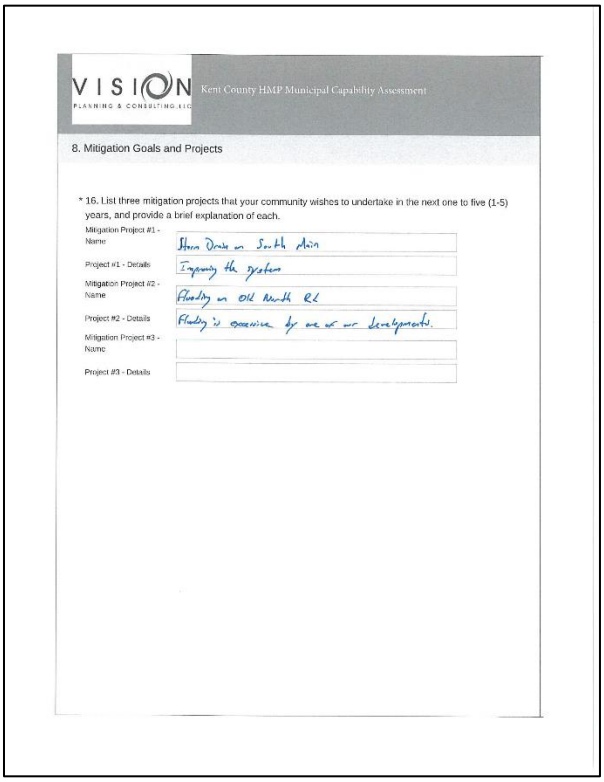
7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	○	✓
Floodplain management/NFIP regulations	✓	○
Building inspection/code administration	✓	○

Please specify training type

Floodplain management & Building Inspection



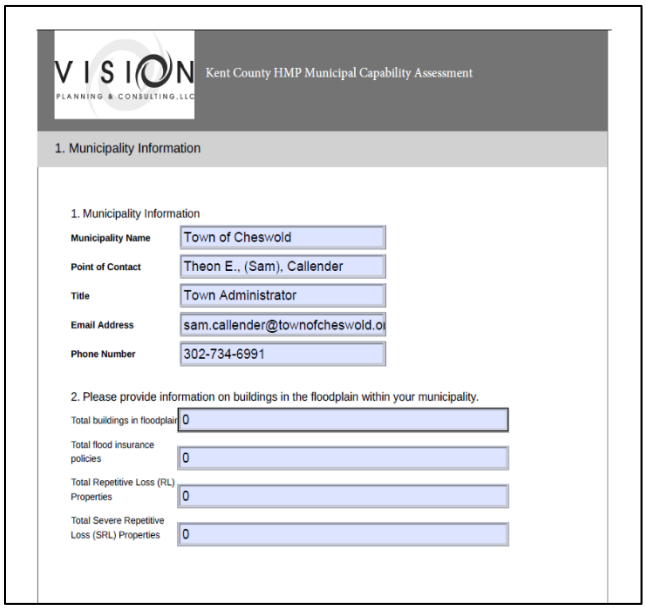
VISION PLANNING & CONSULTING, LLC Kent County HMP Municipal Capability Assessment

8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	Storm Drain on South Main
Project #1 - Details	Improving the system
Mitigation Project #2 - Name	Flooding on Old North RL
Project #2 - Details	Flooding is occurring by one of our developments.
Mitigation Project #3 - Name	
Project #3 - Details	

Town of Cheswold



Kent County HMP Municipal Capability Assessment

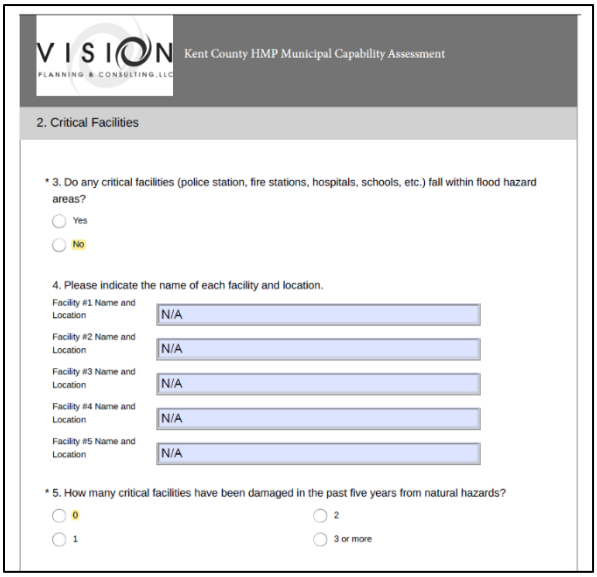
1. Municipality Information

1. Municipality Information

Municipality Name	Town of Cheswold
Point of Contact	Theon E., (Sam), Callender
Title	Town Administrator
Email Address	sam.callender@townofcheswold.or
Phone Number	302-734-6991

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	0
Total flood insurance policies	0
Total Repetitive Loss (RL) Properties	0
Total Severe Repetitive Loss (SRL) Properties	0



Kent County HMP Municipal Capability Assessment

2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

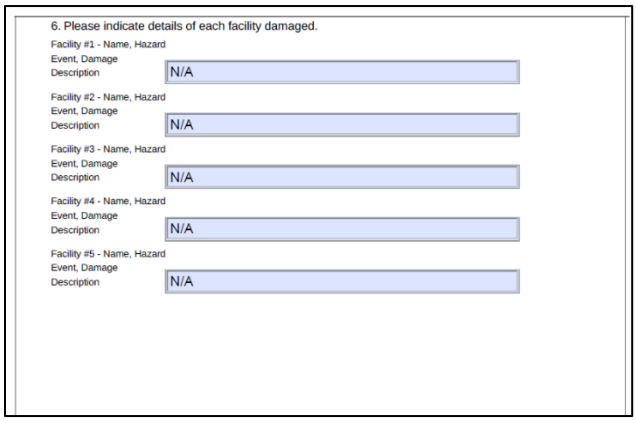
- ○ Yes
- ○ No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	N/A
Facility #2 Name and Location	N/A
Facility #3 Name and Location	N/A
Facility #4 Name and Location	N/A
Facility #5 Name and Location	N/A

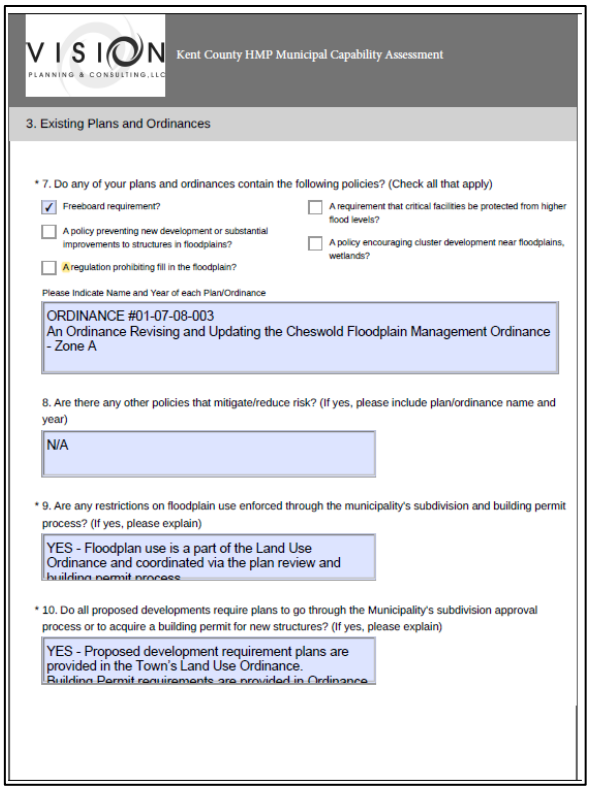
* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- ○ 0
- ○ 1
- ○ 2
- ○ 3 or more



6. Please indicate details of each facility damaged.

Facility #1 - Name, Hazard Event, Damage Description	N/A
Facility #2 - Name, Hazard Event, Damage Description	N/A
Facility #3 - Name, Hazard Event, Damage Description	N/A
Facility #4 - Name, Hazard Event, Damage Description	N/A
Facility #5 - Name, Hazard Event, Damage Description	N/A



Kent County HMP Municipal Capability Assessment

3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- ☑ Freeboard requirement?
- ☐ A policy preventing new development or substantial improvements to structures in floodplains?
- ☐ A regulation prohibiting fill in the floodplain?
- ☐ A requirement that critical facilities be protected from higher flood levels?
- ☐ A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

ORDINANCE #01-07-08-003
An Ordinance Revising and Updating the Cheswold Floodplain Management Ordinance - Zone A

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

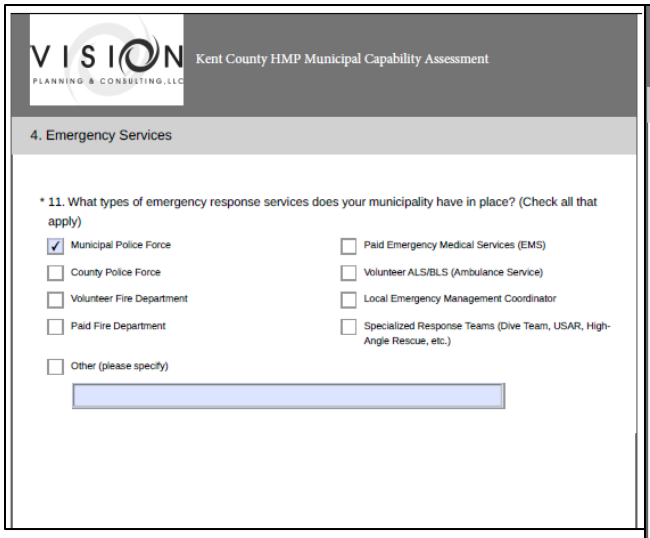
N/A

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

YES - Floodplan use is a part of the Land Use Ordinance and coordinated via the plan review and building permit process

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

YES - Proposed development requirement plans are provided in the Town's Land Use Ordinance. Building Permit requirements are provided in Ordinance

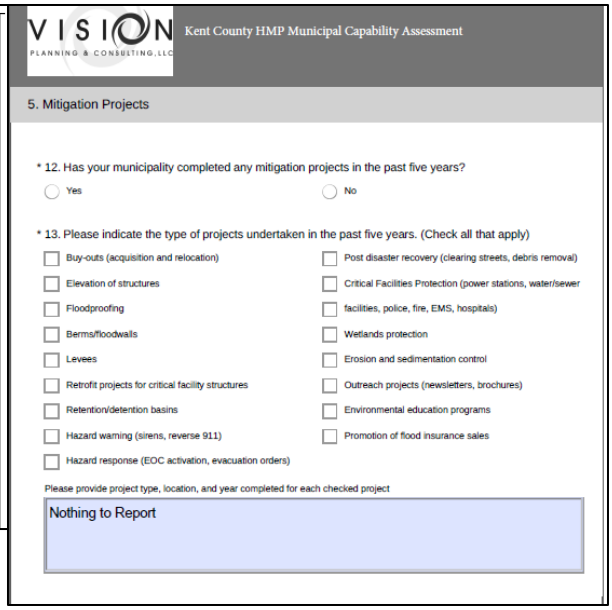


Kent County HMP Municipal Capability Assessment

4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [x] Municipal Police Force
- [ ] County Police Force
- [ ] Volunteer Fire Department
- [ ] Paid Fire Department
- [ ] Other (please specify)
- [ ] Paid Emergency Medical Services (EMS)
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Local Emergency Management Coordinator
- [ ] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)



Kent County HMP Municipal Capability Assessment

5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

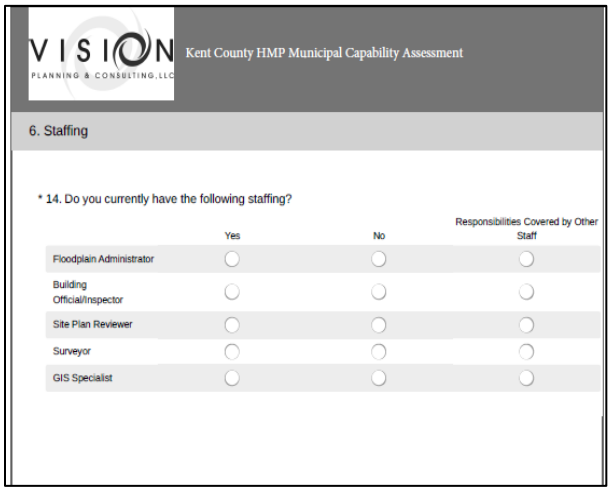
- ( ) Yes
- ( ) No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- [ ] Buy-outs (acquisition and relocation)
- [ ] Elevation of structures
- [ ] Floodproofing
- [ ] Berms/floodwalls
- [ ] Levees
- [ ] Retrofit projects for critical facility structures
- [ ] Retention/detention basins
- [ ] Hazard warning (sirens, reverse 911)
- [ ] Hazard response (EOC activation, evacuation orders)
- [ ] Post disaster recovery (clearing streets, debris removal)
- [ ] Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- [ ] Wetlands protection
- [ ] Erosion and sedimentation control
- [ ] Outreach projects (newsletters, brochures)
- [ ] Environmental education programs
- [ ] Promotion of flood insurance sales

Please provide project type, location, and year completed for each checked project

Nothing to Report

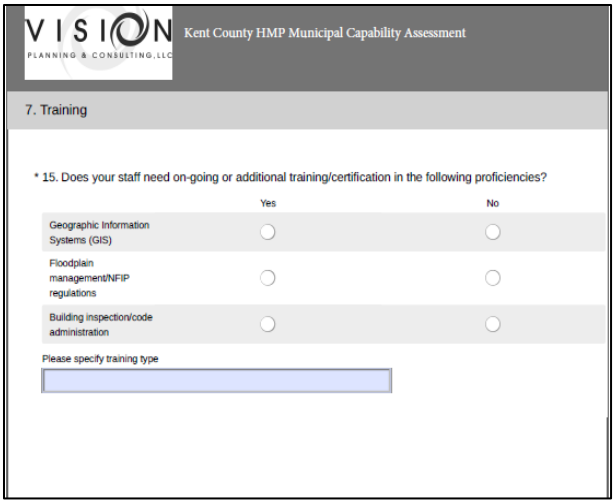


Kent County HMP Municipal Capability Assessment

6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	( )	( )	( )
Building Official/Inspector	( )	( )	( )
Site Plan Reviewer	( )	( )	( )
Surveyor	( )	( )	( )
GIS Specialist	( )	( )	( )



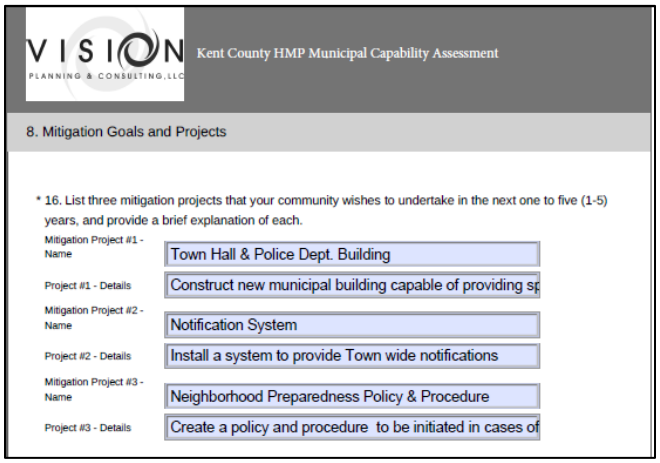
Kent County HMP Municipal Capability Assessment

7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	( )	( )
Floodplain management/NFIP regulations	( )	( )
Building inspection/code administration	( )	( )

Please specify training type



Kent County HMP Municipal Capability Assessment

8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	Town Hall & Police Dept. Building
Project #1 - Details	Construct new municipal building capable of providing sp
Mitigation Project #2 - Name	Notification System
Project #2 - Details	Install a system to provide Town wide notifications
Mitigation Project #3 - Name	Neighborhood Preparedness Policy & Procedure
Project #3 - Details	Create a policy and procedure to be initiated in cases of

Town of Felton

Kent County HMP Municipal Capability Assessment

1. Municipality Information

1. Municipality Information

Municipality Name	Town of Felton
Point of Contact	Amy Thomas
Title	Town Manager
Email Address	athomas@townoffelton.com
Phone Number	302-284-9365

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	25
Total flood insurance policies	
Total Repetitive Loss (RL) Properties	
Total Severe Repetitive Loss (SRL) Properties	

Kent County HMP Municipal Capability Assessment

2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

- ( ) Yes
- (•) No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- (•) 0
- ( ) 1
- ( ) 2
- ( ) 3 or more

6. Please indicate details of each facility damaged.

Facility #1 - Name, Hazard Event, Damage Description	
Facility #2 - Name, Hazard Event, Damage Description	
Facility #3 - Name, Hazard Event, Damage Description	
Facility #4 - Name, Hazard Event, Damage Description	
Facility #5 - Name, Hazard Event, Damage Description	

3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [ ] Freeboard requirement?
- [ ] A policy preventing new development or substantial improvements to structures in floodplains?
- [ ] A regulation prohibiting fill in the floodplain?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

Town of Felton Flood Zone Ordinance, Title 6, Article 1.
May 12, 2014.

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

Yes, information is listed in the Flood Zone Ordinance.

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes, all permits for new construction go before the Town's Planning and Zoning Committee.

4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [ ] Municipal Police Force
- [ ] County Police Force
- [ ] Volunteer Fire Department
- [ ] Paid Fire Department
- [ ] Other (please specify)
- [ ] Paid Emergency Medical Services (EMS)
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Local Emergency Management Coordinator
- [ ] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)

5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

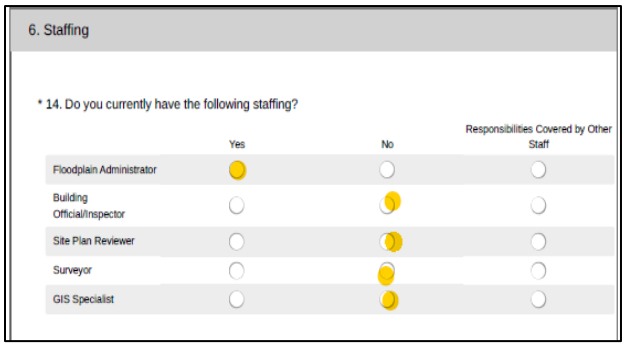
- ( ) Yes
- ( ) No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- [ ] Buy-outs (acquisition and relocation)
- [ ] Elevation of structures
- [ ] Floodproofing
- [ ] Berms/floodwalls
- [ ] Levees
- [ ] Retrofit projects for critical facility structures
- [ ] Retention/detention basins
- [ ] Hazard warning (sirens, reverse 911)
- [ ] Hazard response (EOC activation, evacuation orders)
- [ ] Post disaster recovery (clearing streets, debris removal)
- [ ] Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- [ ] Wetlands protection
- [ ] Erosion and sedimentation control
- [ ] Outreach projects (newsletters, brochures)
- [ ] Environmental education programs
- [ ] Promotion of flood insurance sales

Please provide project type, location, and year completed for each checked project

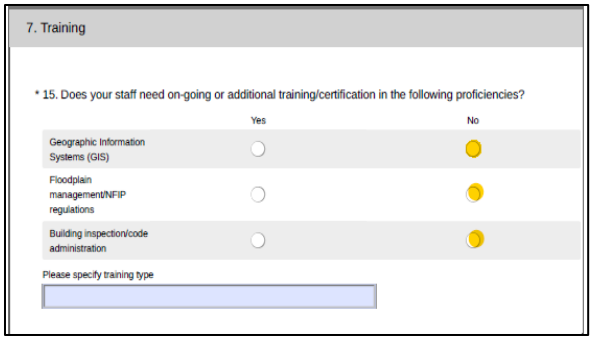
Received money from the state and worked with them to repair a drainage ditch on W Main Street that flows out of Felton to Killens Pond.



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	●	○	○
Building Official/Inspector	○	●	○
Site Plan Reviewer	○	●	○
Surveyor	○	●	○
GIS Specialist	○	●	○

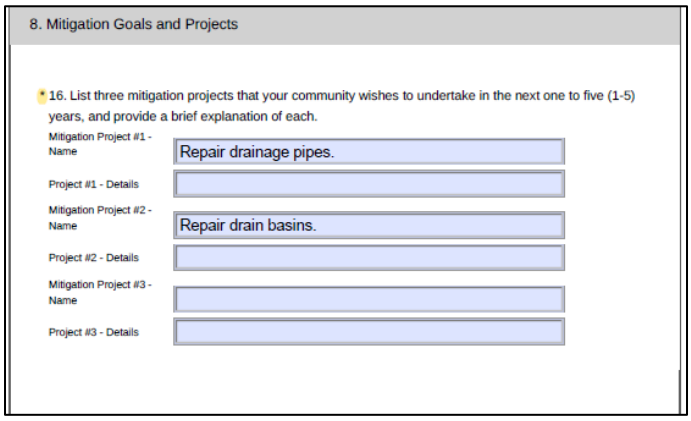


7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	○	●
Floodplain management/NFIP regulations	○	●
Building inspection/code administration	○	●

Please specify training type

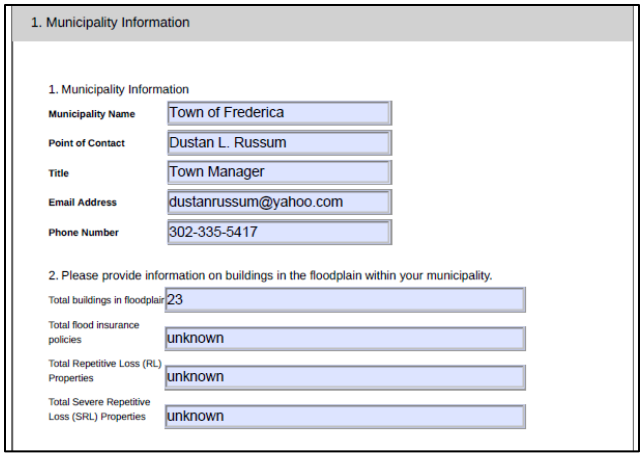


8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	Repair drainage pipes.
Project #1 - Details	
Mitigation Project #2 - Name	Repair drain basins.
Project #2 - Details	
Mitigation Project #3 - Name	
Project #3 - Details	

Town of Frederica



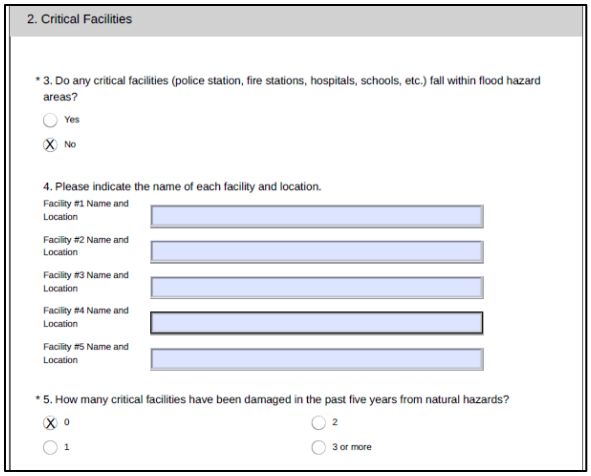
1. Municipality Information

1. Municipality Information

Municipality Name	Town of Frederica
Point of Contact	Dustan L. Russum
Title	Town Manager
Email Address	dustanrussum@yahoo.com
Phone Number	302-335-5417

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	23
Total flood insurance policies	unknown
Total Repetitive Loss (RL) Properties	unknown
Total Severe Repetitive Loss (SRL) Properties	unknown



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

○ Yes
☒ No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

☒ 0 ○ 2
○ 1 ○ 3 or more

3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [x] Freeboard requirement?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy preventing new development or substantial improvements to structures in floodplains?
- [ ] A policy encouraging cluster development near floodplains, wetlands?
- [ ] A regulation prohibiting fill in the floodplain?

Please Indicate Name and Year of each Plan/Ordinance

Chapter 212

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

Chapter 212

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

Yes. Enforced through the plan review process and requirements of the ordinance.

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes.

4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [x] Municipal Police Force
- [ ] Paid Emergency Medical Services (EMS)
- [ ] County Police Force
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Volunteer Fire Department
- [ ] Local Emergency Management Coordinator
- [ ] Paid Fire Department
- [ ] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- [ ] Other (please specify)

5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

- [x] Yes
- [ ] No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- [ ] Buy-outs (acquisition and relocation)
- [ ] Elevation of structures
- [ ] Floodproofing
- [ ] Berms/floodwalls
- [ ] Levees
- [ ] Retrofit projects for critical facility structures
- [ ] Retention/detention basins
- [ ] Hazard warning (sirens, reverse 911)
- [ ] Hazard response (EOC activation, evacuation orders)
- [ ] Post disaster recovery (clearing streets, debris removal)
- [ ] Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- [ ] Wetlands protection
- [ ] Erosion and sedimentation control
- [ ] Outreach projects (newsletters, brochures)
- [ ] Environmental education programs
- [ ] Promotion of flood insurance sales

Please provide project type, location, and year completed for each checked project

Portable generator connection for water supply pumps.

6. Please indicate details of each facility damaged.

Facility #1 - Name, Hazard Event, Damage Description

Facility #2 - Name, Hazard Event, Damage Description

Facility #3 - Name, Hazard Event, Damage Description

Facility #4 - Name, Hazard Event, Damage Description

Facility #5 - Name, Hazard Event, Damage Description

6. Staffing

* 14. Do you currently have the following staffing?

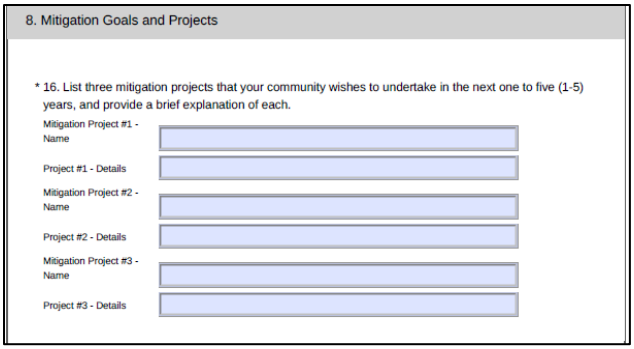
	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	○	○	X
Building Official/Inspector	X	○	○
Site Plan Reviewer	○	○	X
Surveyor	○	○	X
GIS Specialist	○	○	X

7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	○	○
Floodplain management/NFIP regulations	X	○
Building inspection/code administration	X	○

Please specify training type

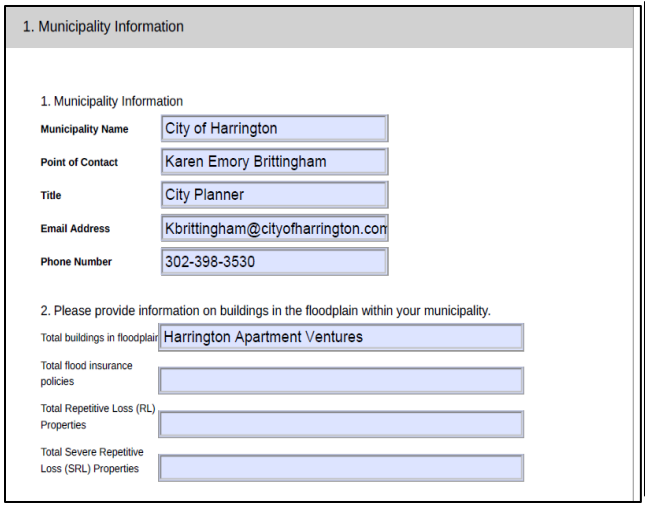


8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	
Project #1 - Details	
Mitigation Project #2 - Name	
Project #2 - Details	
Mitigation Project #3 - Name	
Project #3 - Details	

City of Harrington



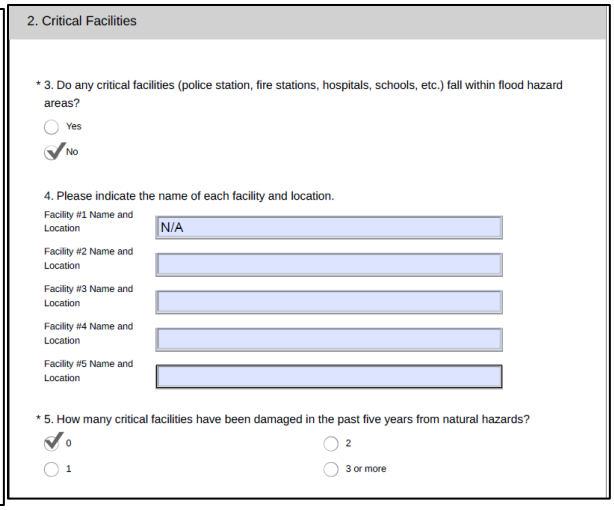
1. Municipality Information

1. Municipality Information

Municipality Name	City of Harrington
Point of Contact	Karen Emory Brittingham
Title	City Planner
Email Address	Kbrittingham@cityofharrington.com
Phone Number	302-398-3530

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	Harrington Apartment Ventures
Total flood insurance policies	
Total Repetitive Loss (RL) Properties	
Total Severe Repetitive Loss (SRL) Properties	



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

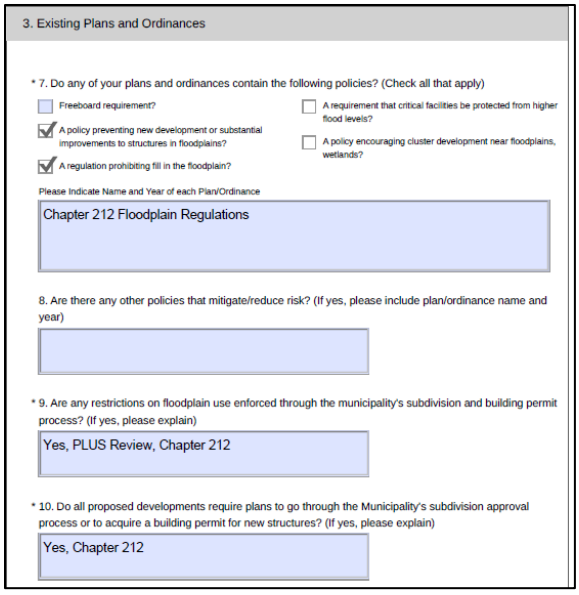
- ○ Yes
- ☑ No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	N/A
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- ☑ 0
- ○ 1
- ○ 2
- ○ 3 or more



3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- ☐ Freeboard requirement?
- ☑ A policy preventing new development or substantial improvements to structures in floodplains?
- ☑ A regulation prohibiting fill in the floodplain?
- ☐ A requirement that critical facilities be protected from higher flood levels?
- ☐ A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

Chapter 212 Floodplain Regulations

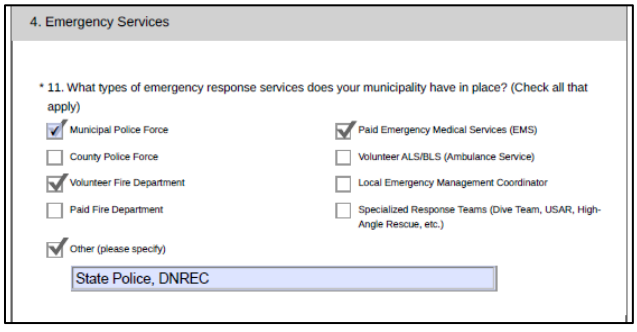
8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

Yes, PLUS Review, Chapter 212

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes, Chapter 212

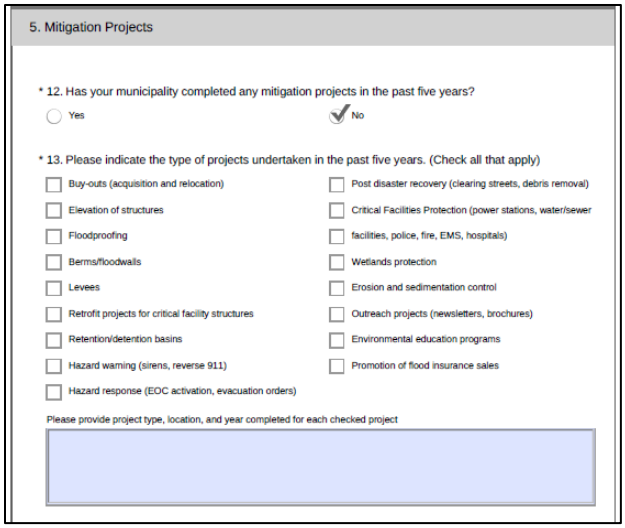


4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- ☑ Municipal Police Force
- ☐ County Police Force
- ☑ Volunteer Fire Department
- ☐ Paid Fire Department
- ☑ Paid Emergency Medical Services (EMS)
- ☐ Volunteer ALS/BLS (Ambulance Service)
- ☐ Local Emergency Management Coordinator
- ☐ Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- ☑ Other (please specify)

State Police, DNREC



5. Mitigation Projects

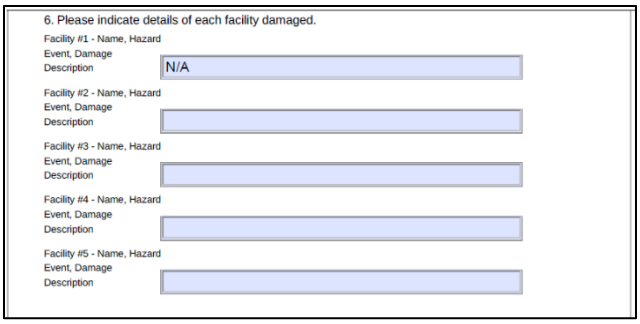
* 12. Has your municipality completed any mitigation projects in the past five years?

Yes ☐ No ☑

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

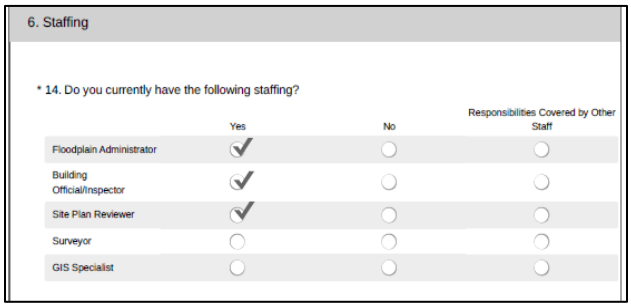
☐ Buy-outs (acquisition and relocation)	☐ Post disaster recovery (clearing streets, debris removal)
☐ Elevation of structures	☐ Critical Facilities Protection (power stations, water/sewer
☐ Floodproofing	☐ facilities, police, fire, EMS, hospitals)
☐ Berms/floodwalls	☐ Wetlands protection
☐ Levees	☐ Erosion and sedimentation control
☐ Retrofit projects for critical facility structures	☐ Outreach projects (newsletters, brochures)
☐ Retention/detention basins	☐ Environmental education programs
☐ Hazard warning (sirens, reverse 911)	☐ Promotion of flood insurance sales
☐ Hazard response (EOC activation, evacuation orders)	

Please provide project type, location, and year completed for each checked project



6. Please indicate details of each facility damaged.

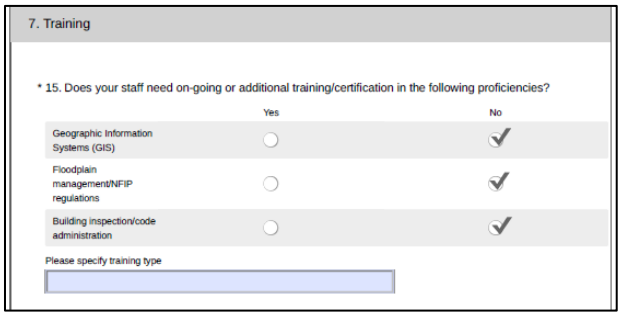
Facility #1 - Name, Hazard Event, Damage Description	N/A
Facility #2 - Name, Hazard Event, Damage Description	
Facility #3 - Name, Hazard Event, Damage Description	
Facility #4 - Name, Hazard Event, Damage Description	
Facility #5 - Name, Hazard Event, Damage Description	



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	☑	☐	☐
Building Official/Inspector	☑	☐	☐
Site Plan Reviewer	☑	☐	☐
Surveyor	☐	☐	☐
GIS Specialist	☐	☐	☐

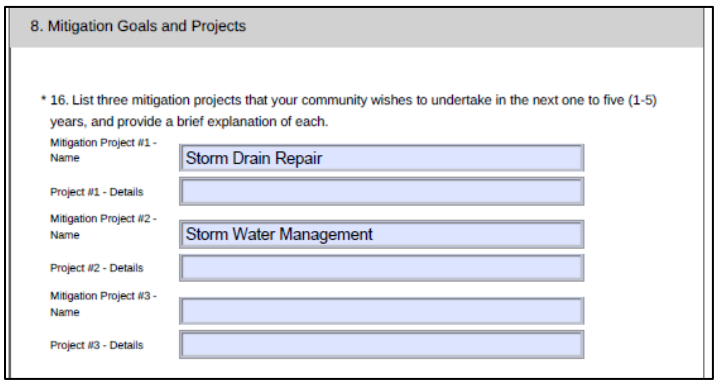


7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	☐	☑
Floodplain management/NFIP regulations	☐	☑
Building inspection/code administration	☐	☑

Please specify training type



8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	Storm Drain Repair
Project #1 - Details	
Mitigation Project #2 - Name	Storm Water Management
Project #2 - Details	
Mitigation Project #3 - Name	
Project #3 - Details	

Town of Kenton

1. Municipality Information

1. Municipality Information

Municipality Name	Town of Kenton
Point of Contact	Paul G. Caple
Title	Mayor of Kenton
Email Address	mayorofkenton@comcast.net
Phone Number	---

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	no flood risk areas -- pickstong branch outside of town
Total flood insurance policies	0
Total Repetitive Loss (RL) Properties	0
Total Severe Repetitive Loss (SRL) Properties	0

2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

- ○ Yes
- ○ No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- ○ 0
- ○ 1
- ○ 2
- ○ 3 or more

6. Please indicate details of each facility damaged.

Facility #1 - Name, Hazard Event, Damage Description	
Facility #2 - Name, Hazard Event, Damage Description	
Facility #3 - Name, Hazard Event, Damage Description	
Facility #4 - Name, Hazard Event, Damage Description	
Facility #5 - Name, Hazard Event, Damage Description	

3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- ☐ Freeboard requirement?
- ☐ A requirement that critical facilities be protected from higher flood levels?
- ☐ A policy preventing new development or substantial improvements to structures in floodplains?
- ☐ A policy encouraging cluster development near floodplains, wetlands?
- ☐ A regulation prohibiting fill in the floodplain?

Please Indicate Name and Year of each Plan/Ordinance

None, Kenton is very small town with mainly vounteers, and not at risk to flooding

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

Unknown

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

No, no floodplains in Town

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes, all goes through couhjncil and coucil makes determination

4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- ☐ Municipal Police Force
- ☐ County Police Force
- ☐ Volunteer Fire Department
- ☐ Paid Fire Department
- ☐ Other (please specify)
- ☐ Paid Emergency Medical Services (EMS)
- ☐ Volunteer ALS/BLS (Ambulance Service)
- ☐ Local Emergency Management Coordinator
- ☐ Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)

5. Mitigation Projects

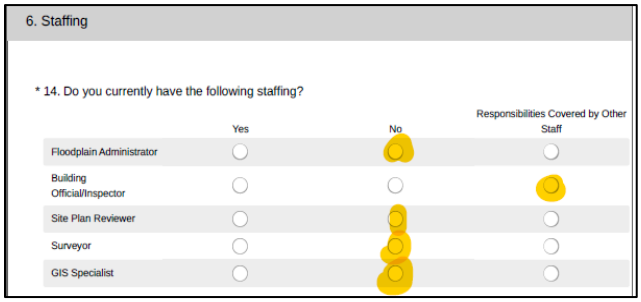
* 12. Has your municipality completed any mitigation projects in the past five years?

- ○ Yes
- ○ No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- ☐ Buy-outs (acquisition and relocation)
- ☐ Elevation of structures
- ☐ Floodproofing
- ☐ Berms/floodwalls
- ☐ Levees
- ☐ Retrofit projects for critical facility structures
- ☐ Retention/detention basins
- ☐ Hazard warning (sirens, reverse 911)
- ☐ Hazard response (EOC activation, evacuation orders)
- ☐ Post disaster recovery (clearing streets, debris removal)
- ☐ Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- ☐ Wetlands protection
- ☐ Erosion and sedimentation control
- ☐ Outreach projects (newsletters, brochures)
- ☐ Environmental education programs
- ☐ Promotion of flood insurance sales

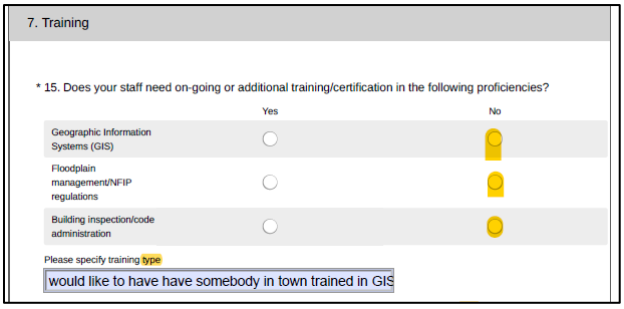
Please provide project type, location, and year completed for each checked project



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	○	●	○
Building Official/Inspector	○	○	●
Site Plan Reviewer	○	●	○
Surveyor	○	●	○
GIS Specialist	○	●	○

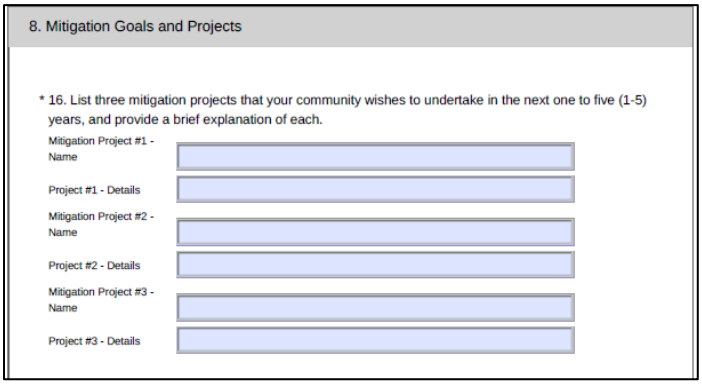


7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	○	●
Floodplain management/NFIP regulations	○	●
Building inspection/code administration	○	●

Please specify training type: would like to have have somebody in town trained in GIS

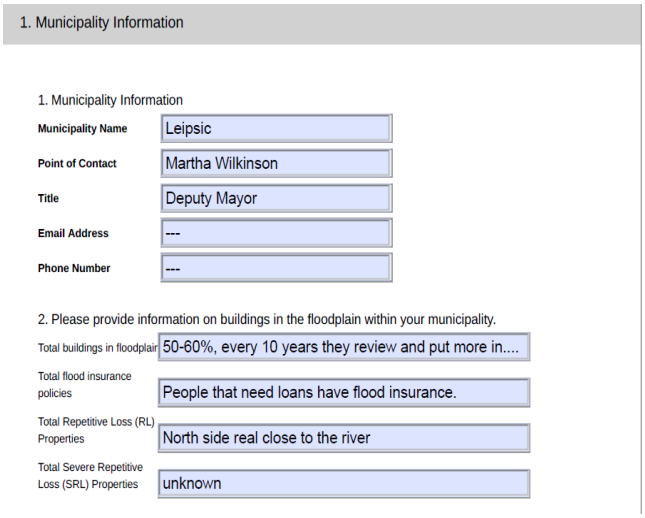


8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	
Project #1 - Details	
Mitigation Project #2 - Name	
Project #2 - Details	
Mitigation Project #3 - Name	
Project #3 - Details	

Town of Leipsic



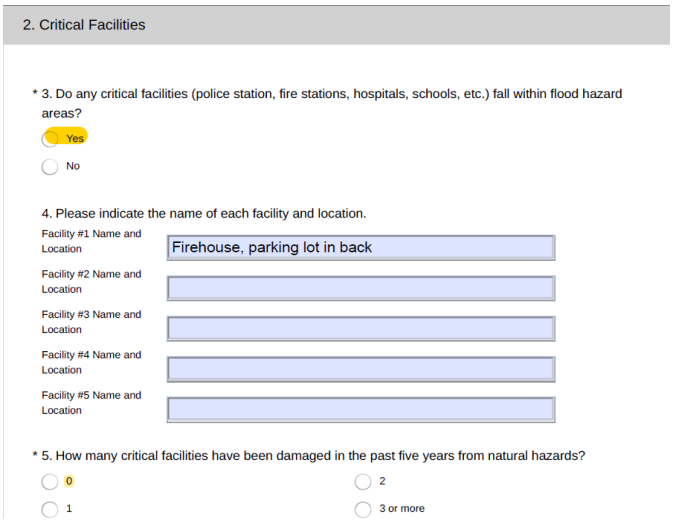
1. Municipality Information

1. Municipality Information

Municipality Name	Leipsic
Point of Contact	Martha Wilkinson
Title	Deputy Mayor
Email Address	---
Phone Number	---

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	50-60%, every 10 years they review and put more in....
Total flood insurance policies	People that need loans have flood insurance.
Total Repetitive Loss (RL) Properties	North side real close to the river
Total Severe Repetitive Loss (SRL) Properties	unknown



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

● Yes
○ No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	Firehouse, parking lot in back
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

○ 0 ○ 2
○ 1 ○ 3 or more

3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [ ] Freeboard requirement?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy preventing new development or substantial improvements to structures in floodplains?
- [ ] A policy encouraging cluster development near floodplains, wetlands?
- [ ] A regulation prohibiting fill in the floodplain?

Please indicate Name and Year of each Plan/Ordinance

unknown

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

Unknown

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

No

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

No code enforecement, governed by county. Town level does provide permission for permits.

4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [ ] Municipal Police Force
- [ ] Paid Emergency Medical Services (EMS)
- [ ] County Police Force
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Volunteer Fire Department
- [ ] Local Emergency Management Coordinator
- [ ] Paid Fire Department
- [ ] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- [ ] Other (please specify)

State Police, Paid FD only ambulance, Respond with Smyrna with E

5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

- (●) Yes
- ( ) No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- [ ] Buy-outs (acquisition and relocation)
- [ ] Post disaster recovery (clearing streets, debris removal)
- [ ] Elevation of structures
- [ ] Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- [ ] Floodproofing
- [ ] Berms/floodwalls
- [ ] Wetlands protection
- [ ] Levees
- [ ] Erosion and sedimentation control
- [ ] Retrofit projects for critical facility structures
- [ ] Outreach projects (newsletters, brochures)
- [ ] Retention/detention basins
- [ ] Environmental education programs
- [ ] Hazard warning (sirens, reverse 911)
- [ ] Promotion of flood insurance sales
- [ ] Hazard response (EOC activation, evacuation orders)

Please provide project type, location, and year completed for each checked project

Have a special Ops vehicle, if there is contamination in something like a MEth House Fire...never had to use special ops truck in town but helkp others

6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	( )	(●)	( )
Building Official/Inspector	( )	( )	(●)
Site Plan Reviewer	(●)	( )	( )
Surveyor	( )	(●)	( )
GIS Specialist	( )	(●)	( )

7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	( )	(●)
Floodplain management/NFIP regulations	(●)	( )
Building inspection/code administration	( )	(●)

Please specify training type

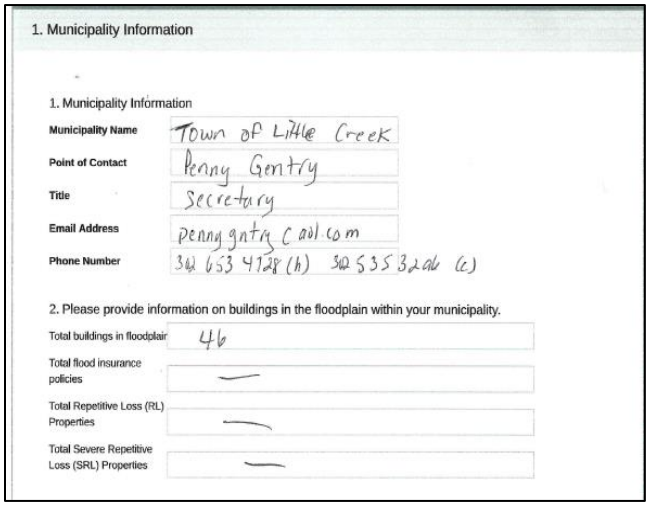
8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name

Project #1 - Details: Work with private docks to have emergency vessels safe

Town of Little Creek



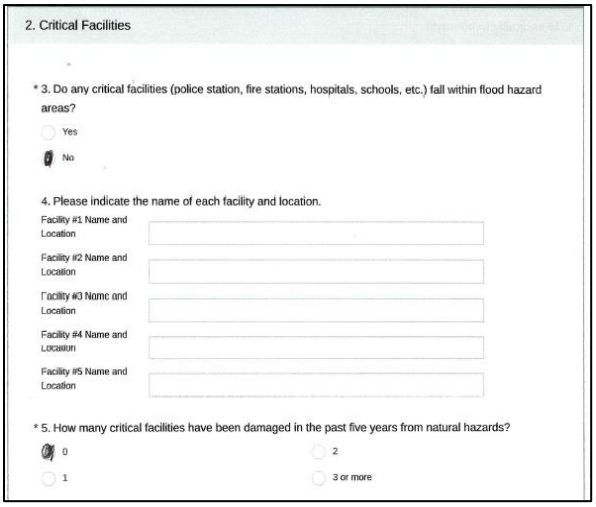
1. Municipality Information

1. Municipality Information

Municipality Name: Town of Little Creek
Point of Contact: Penny Gentry
Title: Secretary
Email Address: pennygntry@aol.com
Phone Number: 302 653 4728 (h) 302 535 3246 (c)

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain: 46
Total flood insurance policies: —
Total Repetitive Loss (RL) Properties: —
Total Severe Repetitive Loss (SRL) Properties: —



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

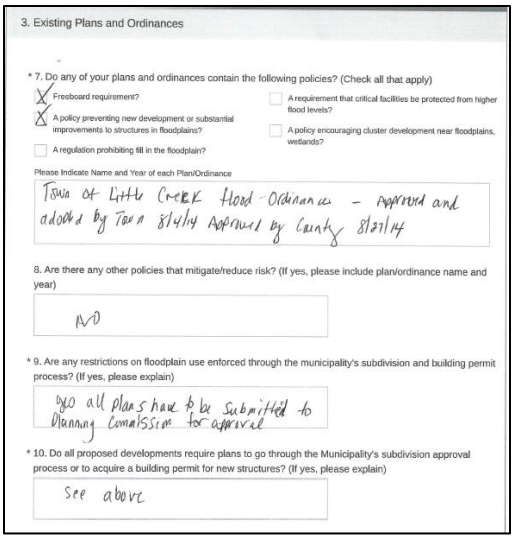
Yes
No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location
Facility #2 Name and Location
Facility #3 Name and Location
Facility #4 Name and Location
Facility #5 Name and Location

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

0
1
2
3 or more



3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [x] Freeboard requirement?
- [x] A policy preventing new development or substantial improvements to structures in floodplains?
- [ ] A regulation prohibiting fill in the floodplain?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

Town of Little Creek flood Ordinances - approved and adopted by Town 8/4/14 Approved by County 8/27/14

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

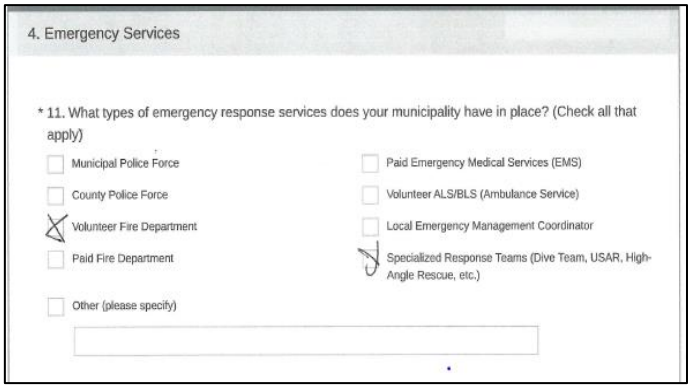
NO

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

yes all plans have to be submitted to Planning Comission for approval

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

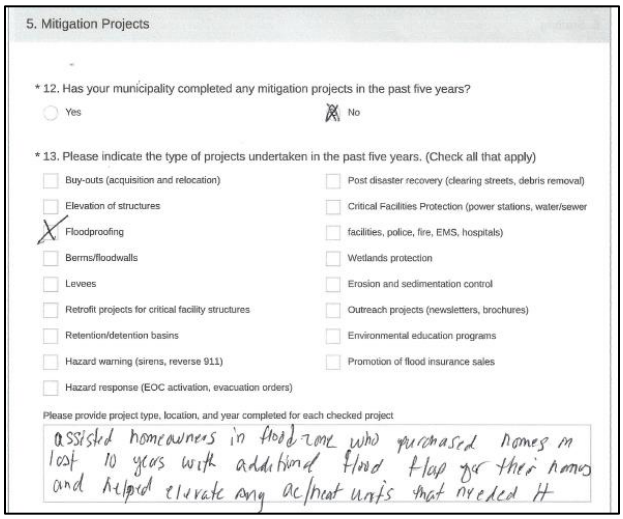
See above



4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [ ] Municipal Police Force
- [ ] County Police Force
- [x] Volunteer Fire Department
- [ ] Paid Fire Department
- [ ] Paid Emergency Medical Services (EMS)
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Local Emergency Management Coordinator
- [x] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- [ ] Other (please specify)



5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

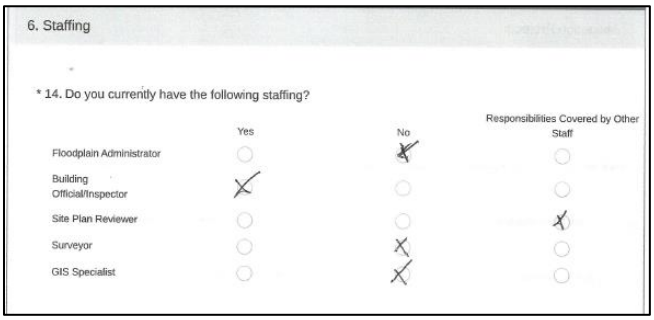
Yes
No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- [ ] Buy-outs (acquisition and relocation)
- [ ] Elevation of structures
- [x] Floodproofing
- [ ] Berms/floodwalls
- [ ] Levees
- [ ] Retrofit projects for critical facility structures
- [ ] Retention/detention basins
- [ ] Hazard warning (sirens, reverse 911)
- [ ] Hazard response (EOC activation, evacuation orders)
- [ ] Post disaster recovery (clearing streets, debris removal)
- [ ] Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- [ ] Wetlands protection
- [ ] Erosion and sedimentation control
- [ ] Outreach projects (newsletters, brochures)
- [ ] Environmental education programs
- [ ] Promotion of flood insurance sales

Please provide project type, location, and year completed for each checked project

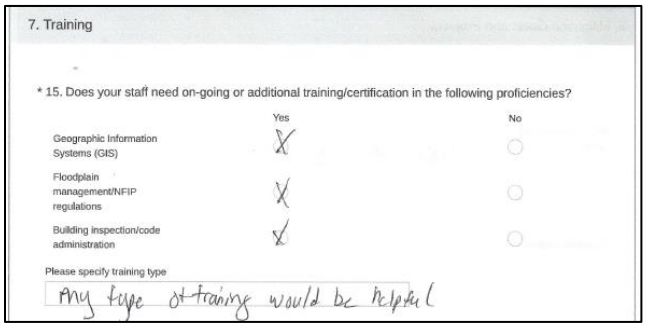
Assisted homeowners in flood zone who purchased homes in last 10 years with additional flood flap for their homes and helped elevate any ac/heat units that needed it



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator		X	
Building Official/Inspector	X		
Site Plan Reviewer			X
Surveyor		X	
GIS Specialist		X	



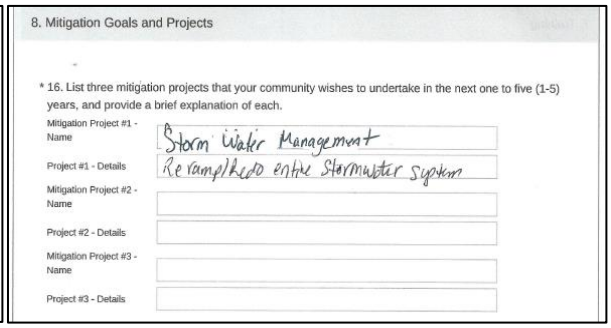
7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	X	
Floodplain management/NFIP regulations	X	
Building inspection/code administration	X	

Please specify training type

Any type of training would be helpful

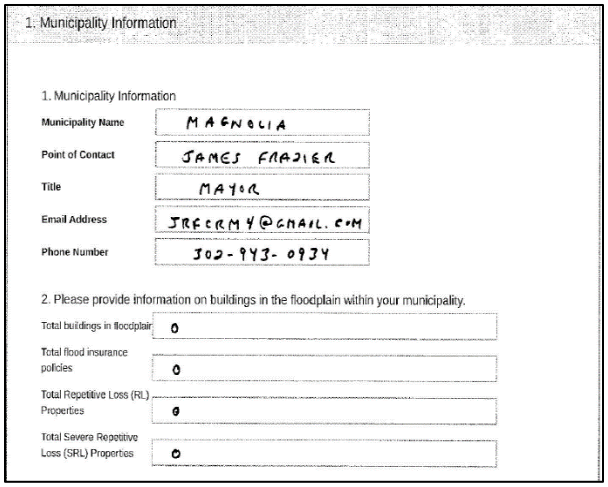


8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	Storm Water Management
Project #1 - Details	Revamp/Redo entire Stormwater System
Mitigation Project #2 - Name	
Project #2 - Details	
Mitigation Project #3 - Name	
Project #3 - Details	

Town of Magnolia



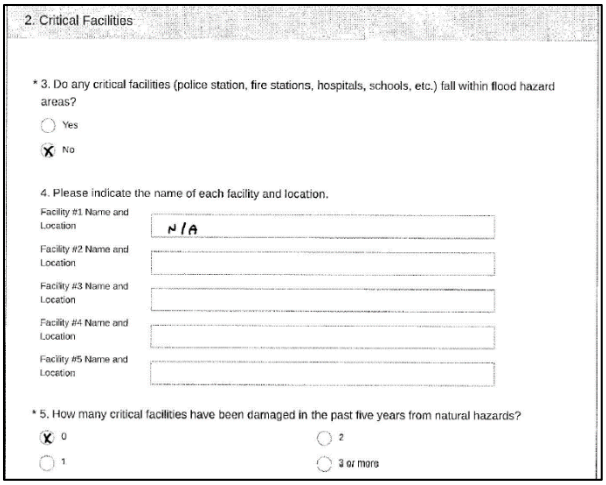
1. Municipality Information

1. Municipality Information

Municipality Name	MAGNOLIA
Point of Contact	JAMES FRAZIER
Title	MAYOR
Email Address	JREARMY@GMAIL.COM
Phone Number	302-993-0934

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	0
Total flood insurance policies	0
Total Repetitive Loss (RL) Properties	0
Total Severe Repetitive Loss (SRL) Properties	0



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

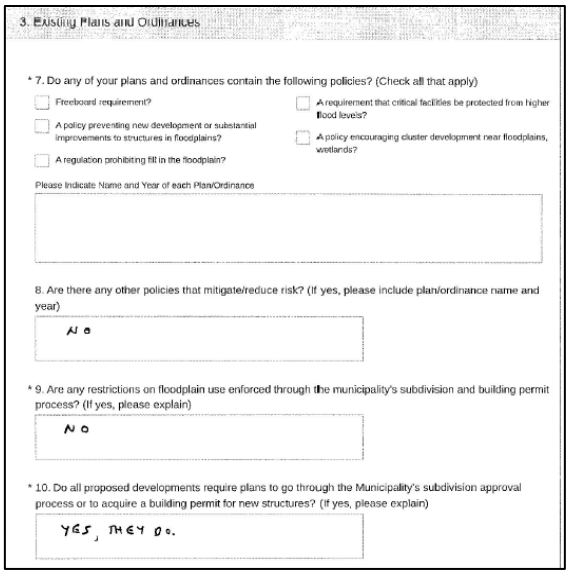
- ( ) Yes
- (X) No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	N/A
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- (X) 0
- ( ) 1
- ( ) 2
- ( ) 3 or more



3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [ ] Freeboard requirement?
- [ ] A policy preventing new development or substantial improvements to structures in floodplains?
- [ ] A regulation prohibiting fill in the floodplain?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy encouraging cluster development near floodplains, wetlands?

Please indicate Name and Year of each Plan/Ordinance

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

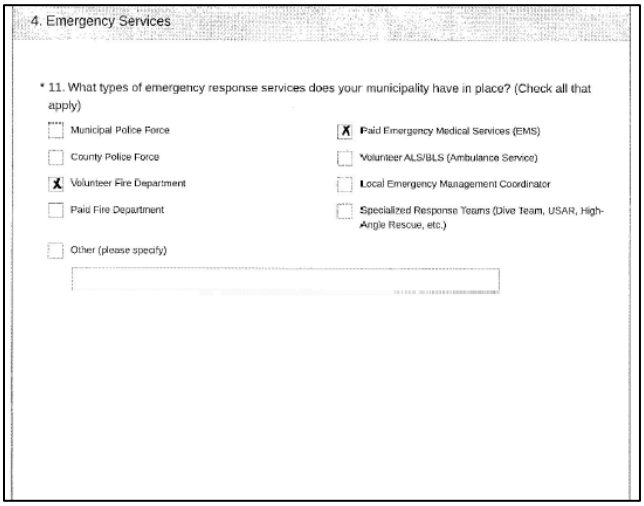
No

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

No

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

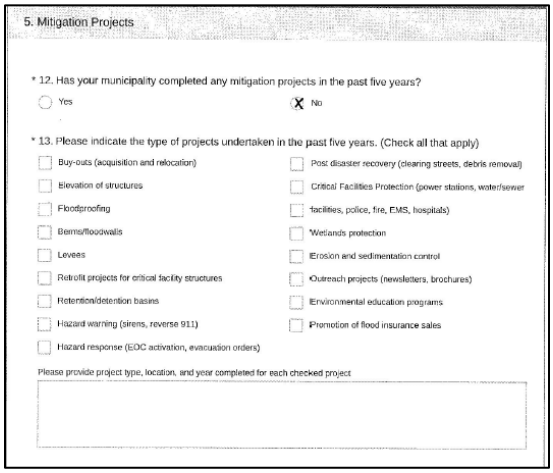
YES, THEY DO.



4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [ ] Municipal Police Force
- [ ] County Police Force
- [X] Volunteer Fire Department
- [ ] Paid Fire Department
- [X] Paid Emergency Medical Services (EMS)
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Local Emergency Management Coordinator
- [ ] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- [ ] Other (please specify)



5. Mitigation Projects

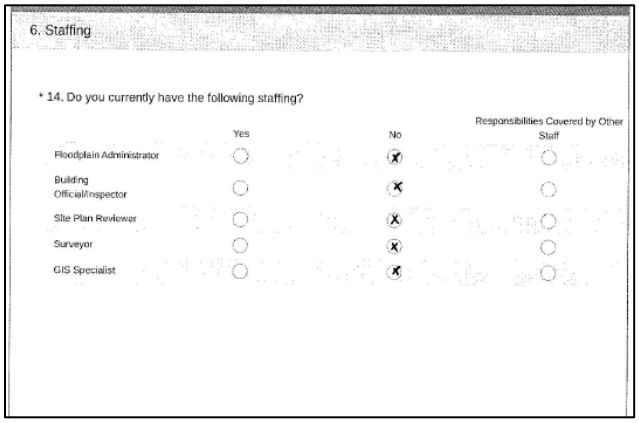
* 12. Has your municipality completed any mitigation projects in the past five years?

○ Yes ☒ No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

☐ Buy-outs (acquisition and relocation)	☐ Post disaster recovery (clearing streets, debris removal)
☐ Elevation of structures	☐ Critical Facilities Protection (power stations, water/sewer
☐ Floodproofing	☐ facilities, police, fire, EMS, hospitals)
☐ Berms/floodwalls	☐ Wetlands protection
☐ Levees	☐ Erosion and sedimentation control
☐ Retrofit projects for critical facility structures	☐ Outreach projects (newsletters, brochures)
☐ Retention/detention basins	☐ Environmental education programs
☐ Hazard warning (sirens, reverse 911)	☐ Promotion of flood insurance sales
☐ Hazard response (EOC activation, evacuation orders)	

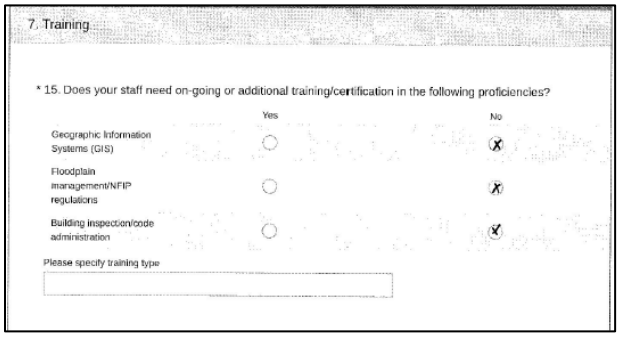
Please provide project type, location, and year completed for each checked project



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	○	☒	○
Building Official/Inspector	○	☒	○
Site Plan Reviewer	○	☒	○
Surveyor	○	☒	○
GIS Specialist	○	☒	○

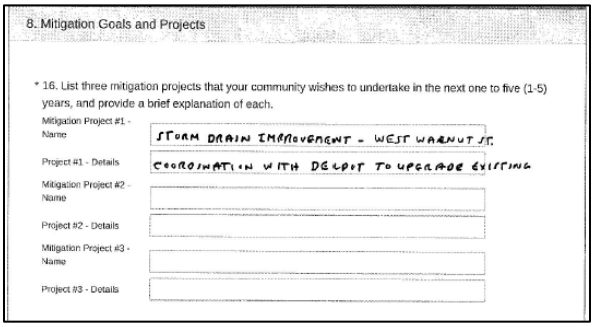


7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	○	☒
Floodplain management/NFIP regulations	○	☒
Building inspection/code administration	○	☒

Please specify training type

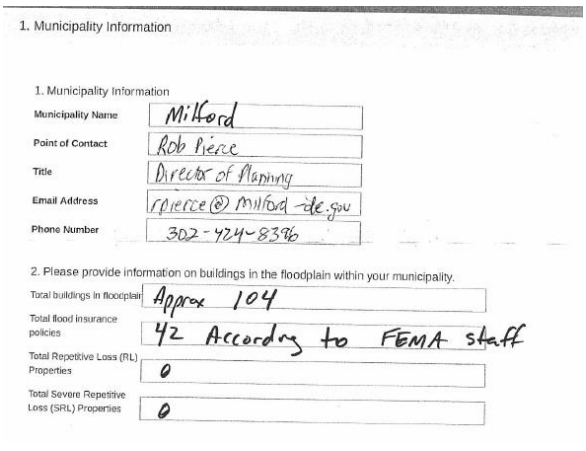


8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	STORM DRAIN IMPROVEMENT - WEST WALNUT ST.
Project #1 - Details	COORDINATION WITH DELDOT TO UPGRADE EXISTING
Mitigation Project #2 - Name	
Project #2 - Details	
Mitigation Project #3 - Name	
Project #3 - Details	

Town of Milford



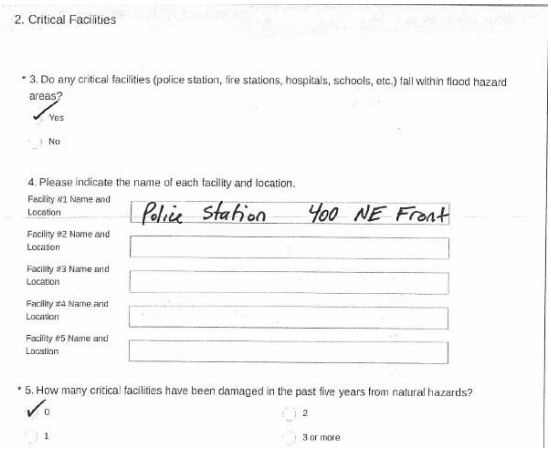
1. Municipality Information

1. Municipality Information

Municipality Name	Milford
Point of Contact	Rob Pierce
Title	Director of Planning
Email Address	rpierce@milford-de.gov
Phone Number	302-424-8396

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	Approx 104
Total flood insurance policies	42 According to FEMA staff
Total Repetitive Loss (RL) Properties	0
Total Severe Repetitive Loss (SRL) Properties	0



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

✓ Yes

○ No

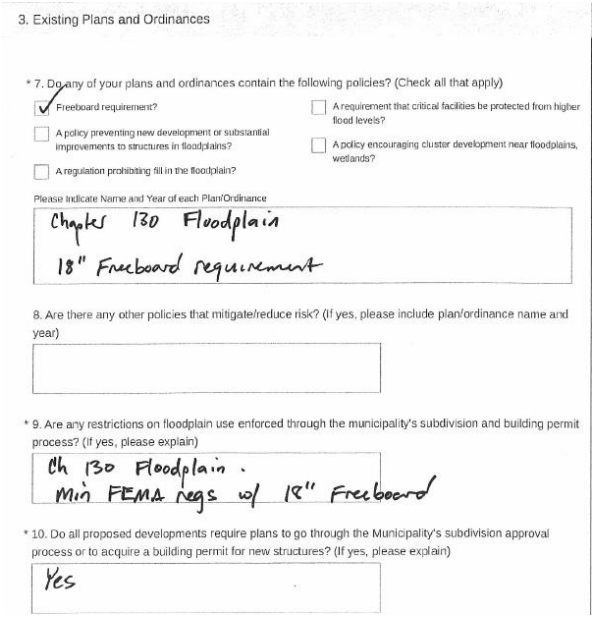
4. Please indicate the name of each facility and location.

Facility #1 Name and Location	Police Station 400 NE Front
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

✓ 0 ○ 2

○ 1 ○ 3 or more



3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- [x] Freeboard requirement?
- [ ] A requirement that critical facilities be protected from higher flood levels?
- [ ] A policy preventing new development or substantial improvements to structures in floodplains?
- [ ] A policy encouraging cluster development near floodplains, wetlands?
- [ ] A regulation prohibiting fill in the floodplain?

Please Indicate Name and Year of each Plan/Ordinance

Chapter 130 Floodplain
18" Freeboard requirement

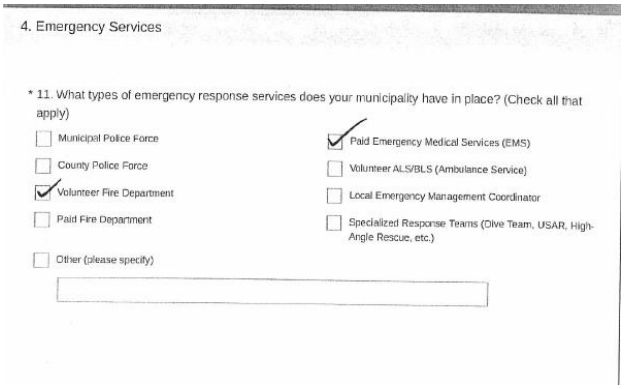
8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

Ch 130 Floodplain.
Min FEMA regs w/ 18" Freeboard

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes

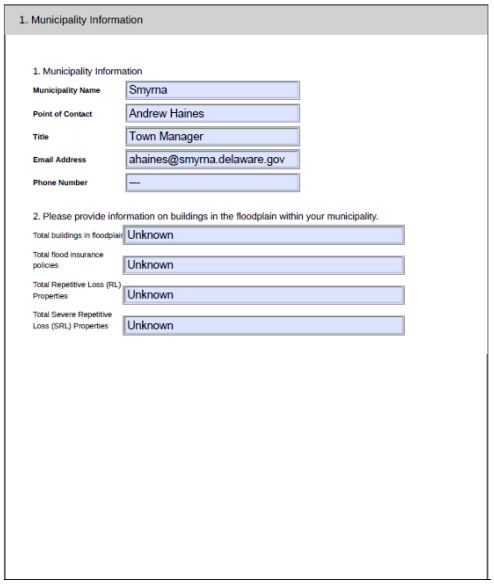


4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- [ ] Municipal Police Force
- [ ] County Police Force
- [x] Volunteer Fire Department
- [ ] Paid Fire Department
- [x] Paid Emergency Medical Services (EMS)
- [ ] Volunteer ALS/BLS (Ambulance Service)
- [ ] Local Emergency Management Coordinator
- [ ] Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- [ ] Other (please specify)

Town of Smyrna



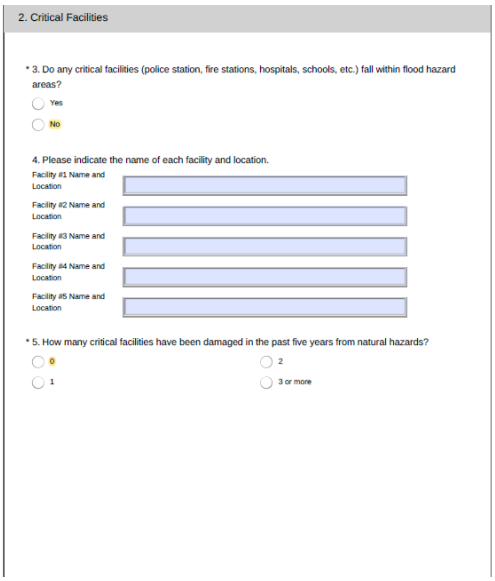
1. Municipality Information

1. Municipality Information

Municipality Name	Smyrna
Point of Contact	Andrew Haines
Title	Town Manager
Email Address	ahaines@smyrna.delaware.gov
Phone Number	---

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	Unknown
Total flood insurance policies	Unknown
Total Repetitive Loss (RL) Properties	Unknown
Total Severe Repetitive Loss (SRL) Properties	Unknown



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

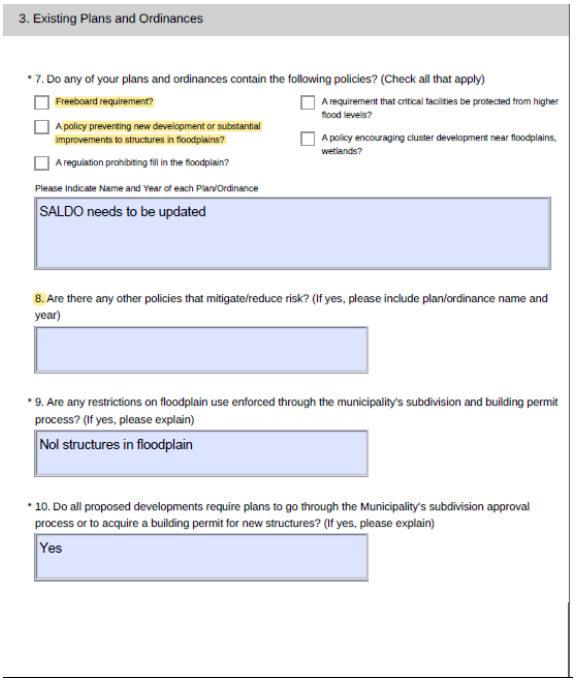
- ( ) Yes
- ( ) No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- ( ) 0
- ( ) 1
- ( ) 2
- ( ) 3 or more



3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- ☐ Freeboard requirement?
- ☐ A policy preventing new development or substantial improvements to structures in floodplains?
- ☐ A regulation prohibiting fill in the floodplain?
- ☐ A requirement that critical facilities be protected from higher flood levels?
- ☐ A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

SALDO needs to be updated

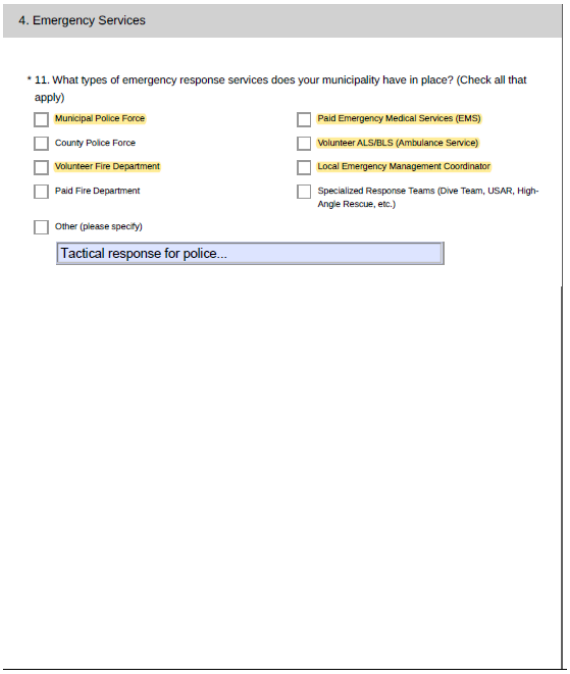
8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

Nol structures in floodplain

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

Yes

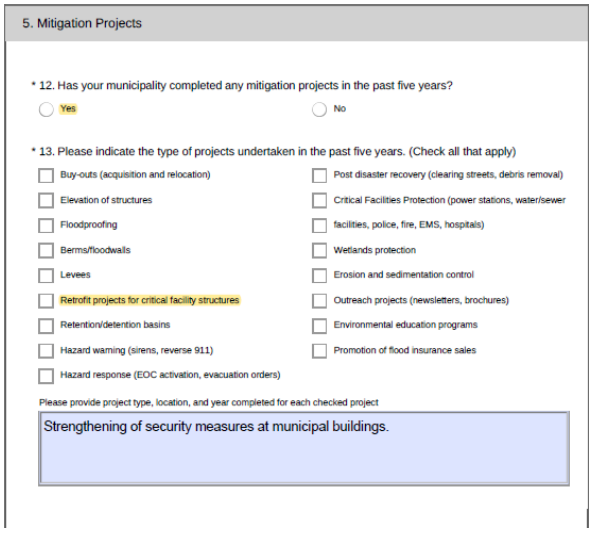


4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- ☐ Municipal Police Force
- ☐ County Police Force
- ☐ Volunteer Fire Department
- ☐ Paid Fire Department
- ☐ Other (please specify)
- ☐ Paid Emergency Medical Services (EMS)
- ☐ Volunteer ALS/BLS (Ambulance Service)
- ☐ Local Emergency Management Coordinator
- ☐ Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)

Tactical response for police...



5. Mitigation Projects

* 12. Has your municipality completed any mitigation projects in the past five years?

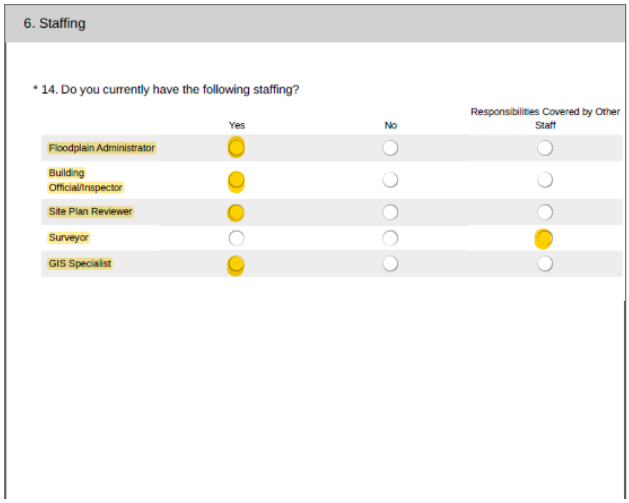
- ○ Yes
- ○ No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- ☐ Buy-outs (acquisition and relocation)
- ☐ Elevation of structures
- ☐ Floodproofing
- ☐ Berms/floodwalls
- ☐ Levees
- ☐ Retrofit projects for critical facility structures
- ☐ Retention/detention basins
- ☐ Hazard warning (sirens, reverse 911)
- ☐ Hazard response (EOC activation, evacuation orders)
- ☐ Post disaster recovery (clearing streets, debris removal)
- ☐ Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- ☐ Wetlands protection
- ☐ Erosion and sedimentation control
- ☐ Outreach projects (newsletters, brochures)
- ☐ Environmental education programs
- ☐ Promotion of flood insurance sales

Please provide project type, location, and year completed for each checked project

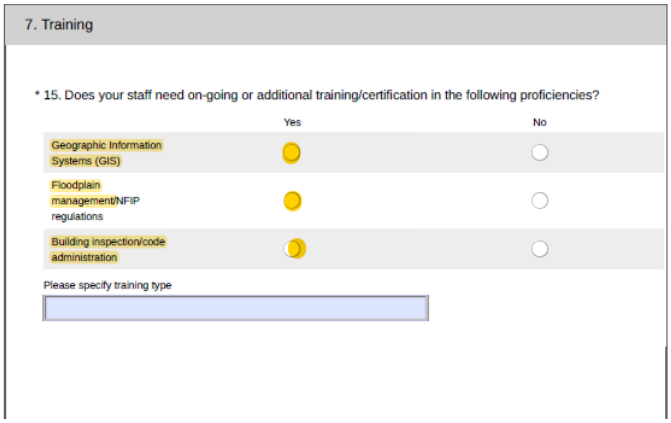
Strengthening of security measures at municipal buildings.



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator	◉	○	○
Building Official/Inspector	◉	○	○
Site Plan Reviewer	◉	○	○
Surveyor	○	○	◉
GIS Specialist	◉	○	○



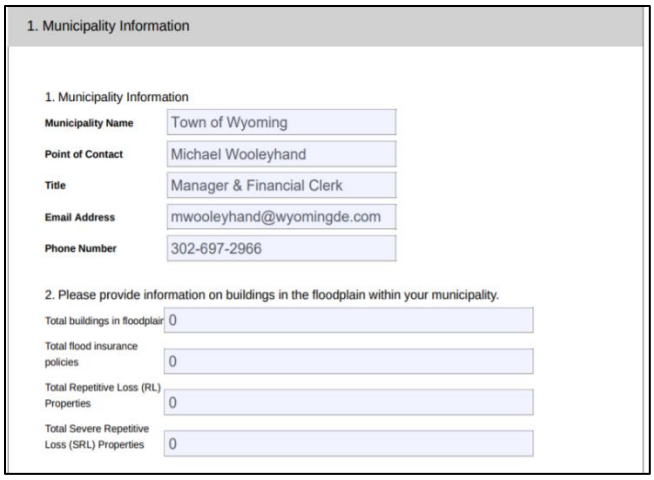
7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	◉	○
Floodplain management/NFIP regulations	◉	○
Building inspection/code administration	◉	○

Please specify training type

Town of Wyoming



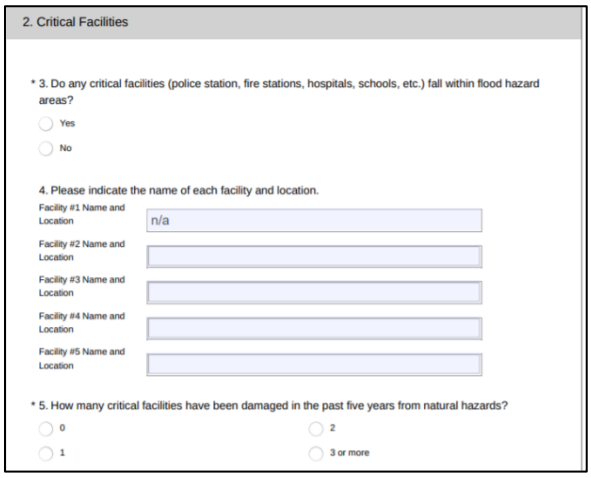
1. Municipality Information

1. Municipality Information

Municipality Name	Town of Wyoming
Point of Contact	Michael Wooleyhand
Title	Manager & Financial Clerk
Email Address	mwooleyhand@wyomingde.com
Phone Number	302-697-2966

2. Please provide information on buildings in the floodplain within your municipality.

Total buildings in floodplain	0
Total flood insurance policies	0
Total Repetitive Loss (RL) Properties	0
Total Severe Repetitive Loss (SRL) Properties	0



2. Critical Facilities

* 3. Do any critical facilities (police station, fire stations, hospitals, schools, etc.) fall within flood hazard areas?

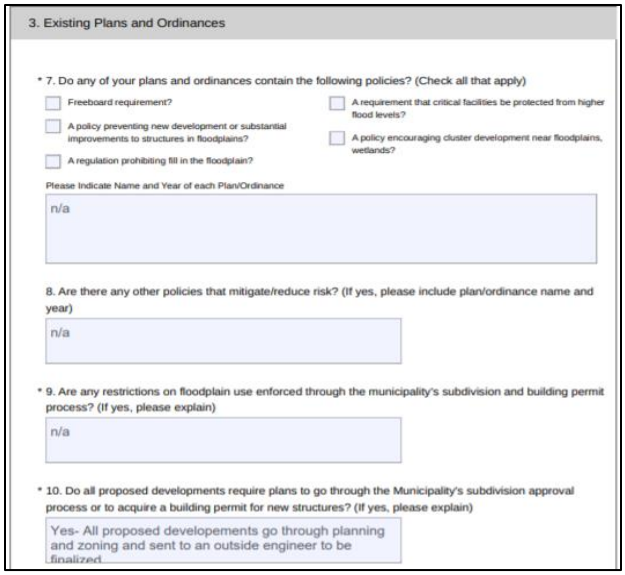
- Yes
- No

4. Please indicate the name of each facility and location.

Facility #1 Name and Location	n/a
Facility #2 Name and Location	
Facility #3 Name and Location	
Facility #4 Name and Location	
Facility #5 Name and Location	

* 5. How many critical facilities have been damaged in the past five years from natural hazards?

- 0
- 1
- 2
- 3 or more



3. Existing Plans and Ordinances

* 7. Do any of your plans and ordinances contain the following policies? (Check all that apply)

- Freeboard requirement?
- A policy preventing new development or substantial improvements to structures in floodplains?
- A regulation prohibiting fill in the floodplain?
- A requirement that critical facilities be protected from higher flood levels?
- A policy encouraging cluster development near floodplains, wetlands?

Please Indicate Name and Year of each Plan/Ordinance

n/a

8. Are there any other policies that mitigate/reduce risk? (If yes, please include plan/ordinance name and year)

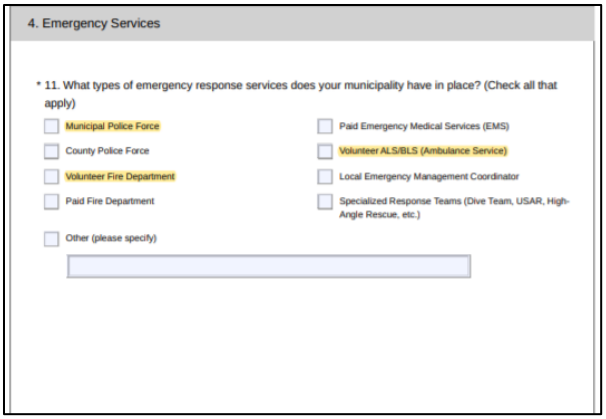
n/a

* 9. Are any restrictions on floodplain use enforced through the municipality's subdivision and building permit process? (If yes, please explain)

n/a

* 10. Do all proposed developments require plans to go through the Municipality's subdivision approval process or to acquire a building permit for new structures? (If yes, please explain)

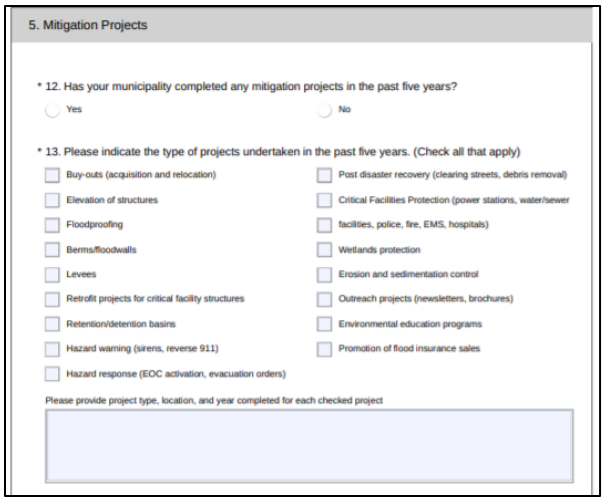
Yes- All proposed developements go through planning and zoning and sent to an outside engineer to be finalized.



4. Emergency Services

* 11. What types of emergency response services does your municipality have in place? (Check all that apply)

- Municipal Police Force
- County Police Force
- Volunteer Fire Department
- Paid Fire Department
- Paid Emergency Medical Services (EMS)
- Volunteer ALS/BLS (Ambulance Service)
- Local Emergency Management Coordinator
- Specialized Response Teams (Dive Team, USAR, High-Angle Rescue, etc.)
- Other (please specify)



5. Mitigation Projects

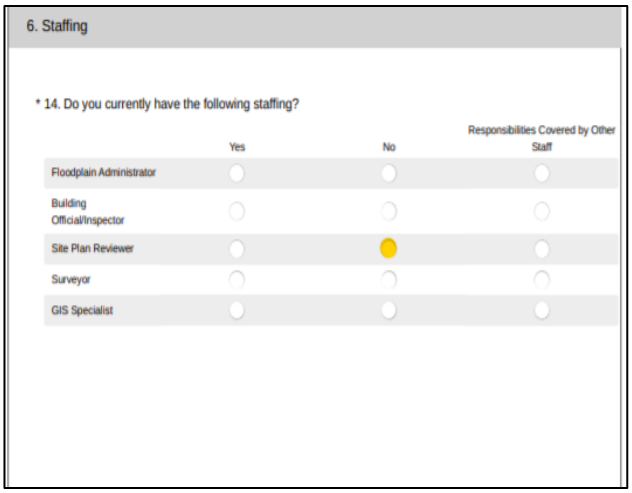
* 12. Has your municipality completed any mitigation projects in the past five years?

- Yes
- No

* 13. Please indicate the type of projects undertaken in the past five years. (Check all that apply)

- Buy-outs (acquisition and relocation)
- Elevation of structures
- Floodproofing
- Berms/floodwalls
- Levees
- Retrofit projects for critical facility structures
- Retention/detention basins
- Hazard warning (sirens, reverse 911)
- Hazard response (EOC activation, evacuation orders)
- Post disaster recovery (clearing streets, debris removal)
- Critical Facilities Protection (power stations, water/sewer facilities, police, fire, EMS, hospitals)
- Wetlands protection
- Erosion and sedimentation control
- Outreach projects (newsletters, brochures)
- Environmental education programs
- Promotion of flood insurance sales

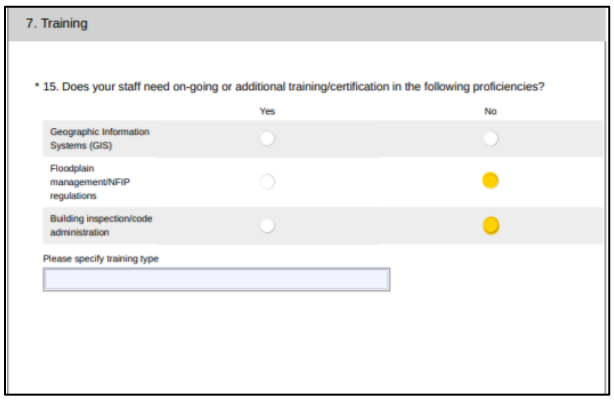
Please provide project type, location, and year completed for each checked project



6. Staffing

* 14. Do you currently have the following staffing?

	Yes	No	Responsibilities Covered by Other Staff
Floodplain Administrator			
Building Official/Inspector			
Site Plan Reviewer			
Surveyor			
GIS Specialist			

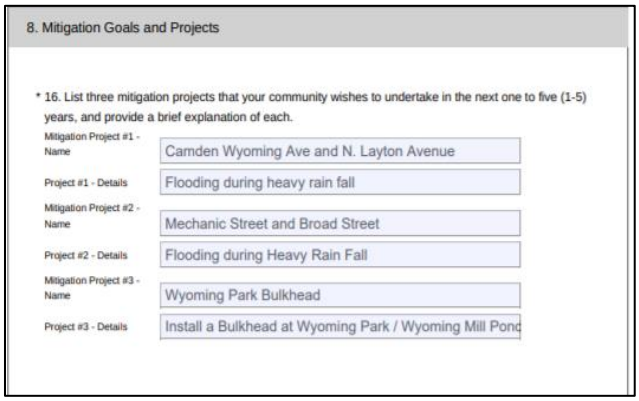


7. Training

* 15. Does your staff need on-going or additional training/certification in the following proficiencies?

	Yes	No
Geographic Information Systems (GIS)	○	○
Floodplain management/NFIP regulations	○	●
Building inspection/code administration	○	●

Please specify training type



8. Mitigation Goals and Projects

* 16. List three mitigation projects that your community wishes to undertake in the next one to five (1-5) years, and provide a brief explanation of each.

Mitigation Project #1 - Name	Camden Wyoming Ave and N. Layton Avenue
Project #1 - Details	Flooding during heavy rain fall
Mitigation Project #2 - Name	Mechanic Street and Broad Street
Project #2 - Details	Flooding during Heavy Rain Fall
Mitigation Project #3 - Name	Wyoming Park Bulkhead
Project #3 - Details	Install a Bulkhead at Wyoming Park / Wyoming Mill Pond

NFIP Questionnaire Responses

Responses were received from: Camden, Felton, Frederica, Harrington, Magnolia, and Milford. Responses from each of these municipalities are provided below.

Camden		
Flood Identification and Mapping	**County**	**Municipalities**
Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?	Yes they are in the Administrative building	Yes we have a copy on site
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?	Yes	Yes
A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?	Yes	Yes
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?	Yes	No
Does the County maintain records of approved letters of map change?	Yes	No
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?	Yes	No
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?	Yes	Yes
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?	No	Yes
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?	Yes	Yes
Flood Insurance		
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?	Yes but we do not know if they send an annual letter referencing flood insurance.	No
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?	Yes	No
When was the last Community Assistance Visit conducted and, as of that date, was Wyoming County found to meet the requirements for continued participation in the NFIP?	We do not know	Approximately 2 years ago

Felton		
Flood Identification and Mapping	County	Municipalities
Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?		
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?		
A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?		
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?		
Does the County maintain records of approved letters of map change?		
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?		
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?		Yes
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?		Yes
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?		Yes
Flood Insurance		
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?		
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?		
When was the last Community Assistance Visit conducted and, as of that date, was Wyoming County found to meet the requirements for continued participation in the NFIP?		

Fredrerica		
Flood Identification and Mapping	County	Municipalities

Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?		Yes, provide reference to FEMA.
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?		Has not been discussed.
A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?		Yes, through Floodplain Administrator.
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?		Yes, through Floodplain Administrator.
Does the County maintain records of approved letters of map change?		Yes
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?		Yes, through Floodplain Administrator.
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?		Yes
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?		No
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?		Yes
Flood Insurance		
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?		No annual letter is provided by Town.
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?		Yes, through Floodplain Administrator.
When was the last Community Assistance Visit conducted and, as of that date, was Kent County found to meet the requirements for continued participation in the NFIP?		

Harrington		
Flood Identification and Mapping	**County**	**Municipalities**
Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?		Yes, Planning Department

Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?		Yes, Planning/Library
A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?		N/A
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?		N/A
Does the County maintain records of approved letters of map change?		N/A
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?		N/A
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?		Yes, Chapter 212 Building Inspection IBC IRC 2012
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?		Yes, PLUS
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?		Yes
Flood Insurance		
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?		N/A
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?		N/A
When was the last Community Assistance Visit conducted and, as of that date, was Wyoming County found to meet the requirements for continued participation in the NFIP?		N/A

Magnolia		
Flood Identification and Mapping	**County**	**Municipalities**
Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?		
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?		

A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?		
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?		
Does the County maintain records of approved letters of map change?		
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?		
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?		NO
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?		YES
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?		NO
Flood Insurance		
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?		
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?		
When was the last Community Assistance Visit conducted and, as of that date, was Kent County found to meet the requirements for continued participation in the NFIP?		NEVER HAD ONE

City of Milford

Floodplain Coordinator Questionnaire (NFIP Questionnaire)

Flood Identification and Mapping	County	Municipalities
Does the County make the Flood Insurance Rate Map and Flood Insurance Studies available to the public? Where are these documents housed within the County?		Planning office FEMA website
Will the recently developed Digital Flood Insurance Rate Maps be made available to the public as well? How?		link on website
A) Are Letters of Map Revisions (LOMRs) reviewed and signed by County officials. B) If during the subdivision review process a new development determines a reduction in the floodplain delineation of the FIRM floodplain, is the developer required to submit a LOMR submission to FEMA?		Yes
Does the County provide advice to community residents regarding elevation certificates and Letter of Map Amendment (LOMA) applications?		Yes
Does the County maintain records of approved letters of map change?		Yes
Does the County assist residents in interpreting the FIRM and County flood studies to determine the property's status in the floodplain? If yes, which department?		Yes
Floodplain Management		
Are any restrictions on floodplain use enforced through the subdivision and building permit process?		Yes
Do all proposed developments require plans to go through the County's subdivision approval process or to acquire a building permit for new structures?		Yes
Are all new structures required to be at least 1.5 feet above the 100-year base flood elevation?		Yes
Flood Insurance		
Is the County committed to educating residents about the value and availability of flood insurance? Is an annual letter sent to residents in the floodplain explaining the importance of flood insurance and where it may be obtained?	1	No
Does the County assist residents in interpreting the FIRM and County flood studies to determine the resident's property's flood plain status, and offer advice regarding elevation certificates and LOMA applications?		Yes
When was the last Community Assistance Visit conducted and, as of that date, was Wyoming County found to meet the requirements for continued participation in the NFIP?		Unknown

Municipal Hazard Areas Worksheet Responses

Responses were received from: Camden, Cheswold, Dover, Farmington, Felton, Frederica, Harrington, Little Creek, Magnolia, Milford, and Woodside. Responses from each of these municipalities are provided below.

HAZARD AREA IDENTIFICATION

Municipality: Town of Camden

Contact Name: Jason Stewart

Contact Email: Jason.stewart@townofcamden.com

Contact Phone Number: 302 697 2299

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas: NONE AT THIS TIME

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.):

Hazard type (ex. – flood area):

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):

Notes:

HAZARD AREA IDENTIFICATION

Municipality: Town of Cheswold

Contact Name: Theon E. (Sam), Callender

Contact Email: sam.callender@townofcheswold.org

Contact Phone Number: 302-734-6991

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): flooding related issues on US Route 13 south of 42.

Hazard type (ex. – flood area): Flood

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):

Notes: flooding related issues on US Route 13 south of 42.

Municipality: Dover, Delaware

Contact Name: Kay Sass

Contact Email: ksass@dover.de.us

Contact Phone Number: 302-736-7003

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): Meeting House Branch Drainage Basin

Hazard type (ex. – flood area): Flood

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads): Undersized stormwater infrastructure and limited natural floodplain causes significant flooding from the 10-year rain event. The flooding causes multiple road closures around Bayhealth Hospital and cuts off access to the hospitals main parking lot, as well as their Central Services building.

Notes:

Hazard Area #2:

Location (ex. - address, cross streets, or road segments): Puncheon Run Drainage Basin

Hazard type (ex. - flood, pipeline, land subsidence): Flood

Hazard Description: Overdevelopment within and around the natural floodplain has resulted in increased stormwater runoff. The increased runoff into a narrow floodplain causes flooding for nearby residents.

Notes:

Hazard Area #3:

Location (ex. - address, cross streets, or road segments): Various Electrical Substations in Dover

Hazard type (ex. - flood, pipeline, land subsidence): Electrical Transmission and Distribution Mitigation

Hazard Description:

Notes: Upgrade 7 of 15 substations with digital relays to enhance reliability of electrical service, decrease the recovery time for outages and have quicker response times for restoration.

HAZARD AREA IDENTIFICATION

Municipality: Farmington

Contact Name: Ritchie Smith

Contact Email:

Contact Phone Number:

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): Flooding near new development on Farmington Road

Hazard type (ex. – flood area): Flood

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):

New Flooding issues on Farmington Road that are associated with new development… in cooperation with conservation department and county, trying to obtain mitigation plan and trying to get some defined waterflow area

Notes:

HAZARD AREA IDENTIFICATION

Municipality: Town of Felton

Contact Name: Amy Thomas

Contact Email: athomas@townoffelton.com

Contact Phone Number: 302-284-9365

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1: W High Street

Location (ex. – address, cross streets, or road segments.): Areas on W High Street.

Hazard type (ex. – flood area): Flood area.

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads): Drain tiles are in poor condition.

Notes:

Hazard Area #2: Courtney Lane

Location (ex. - address, cross streets, or road segments): Courtney Lane.

Hazard type (ex. - flood, pipeline, land subsidence): Flood.

Hazard Description: Poor drainage and no basins.

Notes:

HAZARD AREA IDENTIFICATION

Municipality: Town of Frederica

Contact Name: Dustan Russum, Town Manager

Contact Email: dustanrussum@yahoo.com

Contact Phone Number: 302-335-5417

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1: North Market Street

Location (ex. – address, cross streets, or road segments.):

- Between Coleman Avenue to Frederica Road

Hazard type (ex. – flood area):

- Roadway flooding with increasing frequency.

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):

- Rising water level in marshland.

Notes:

Market Street is a DelDOT roadway within the Town limits. Road Closed signs are in place.

Hazard Area #2: South Market Street

Location (ex. - address, cross streets, or road segments):

- Between Frederica Road and Murderkill River crossing

Hazard type (ex. - flood, pipeline, land subsidence):

- Roadway flooding with increasing frequency.

Hazard Description:

- Rising water level in marshland.

Notes:

Market Street is a DelDOT roadway within the Town limits.

HAZARD AREA IDENTIFICATION

Municipality: City of Harrington

Contact Name: Karen Brittingham

Contact Email: Kbrittingham@cityofharrington.com

Contact Phone Number: 302-398-3530

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas: Nothing major to report

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): Heritage Manor

Hazard type (ex. – flood area): Flood Area

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads): Low sitting homes

Notes:

HAZARD AREA IDENTIFICATION

Municipality: Town of Little Creek

Contact Name: Penny Gentry

Contact Email: pennygntry@aol.com

Contact Phone Number: (302) 653-4728 (h) (302) 535-3296 - cell

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): Cavaliers East, 63 Main St. Little Creek

Hazard type (ex. – flood area): Flood Area

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads): Flooding during times of high tide

Notes:

Hazard Area #2:

Location (ex. - address, cross streets, or road segments): Main Street and Lowe Streets

Hazard type (ex. - flood, pipeline, land subsidence): Flooding

Hazard Description: With heavy rains, rainwater runs from neighboring fields and floods Lowe Street into Main Street making driving hazardous. Storm drains do not function properly

Notes: Working with DelDOT and U of D to do a makeover of the Town's storm water syst34m to address flooding concerns

HAZARD AREA IDENTIFICATION

Municipality: Town of Magnolia

Contact Name: James Frazier

Contact Email: JRFCRM4@GMAIL.COM

Contact Phone Number: 302-943-0934

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): West Walnut Street

Hazard type (ex. – flood area): Flood Area

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):

Storm Drain Overflow

Notes:

Coordination with DelDOT to upgrade existing.

VISION
PLANNING & CONSULTING, LLC

HAZARD AREA IDENTIFICATION

Municipality: Milford
Contact Name: Rob Pierce
Contact Email: rpierce@milford-de.gov
Contact Phone Number: 302-424-83[illegible]96

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): N. Church St. & SW Front
Hazard type (ex. – flood area): Flooding
Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):
Tidal Flooding
Notes:

Hazard Area #2:

Location (ex. - address, cross streets, or road segments): Park Avenue/Denney Row
Hazard type (ex. - flood, pipeline, land subsidence): Flood
Hazard Description:
Tidal Flooding
Notes:

Hazard Area #3:

Location (ex. - address, cross streets, or road segments): NE Front St from
Hazard type (ex. - flood, pipeline, land subsidence): 220 to 320
Hazard Description: Flood
Tidal Flooding
Notes:

HAZARD AREA IDENTIFICATION

Municipality: Smyrna

Contact Name: Andrew Haines

Contact Email: ahaines@smyrna.delaware.gov

Contact Phone Number: ---

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas: Nothing to report.

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.):

Hazard type (ex. – flood area):

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads):

Notes:

HAZARD AREA IDENTIFICATION

Municipality: Town of Woodside

Contact Name: Brenda Richards

Contact Email: woodsidede19980@gmail.com

Contact Phone Number: ---

Please identify problem/hazard areas within the municipality along with a brief description of the hazard and any past occurrences.

Hazard Areas:

Hazard Area #1:

Location (ex. – address, cross streets, or road segments.): Main Street Woodside

Hazard type (ex. – flood area): Flood

Hazard Description (ex. – no stormwater pipes along roadway, rainwater washes out roads): Occasional street flooding occurs along Main Street, but is not extreme.

Notes: Coordination with DelDot helps to maintain our drainage in this area.

Status of Past Mitigation Actions Worksheet Responses

Responses were received from: Bowers Beach, Camden, Cheswold, Dover Farmington, Felton, Frederica, Harrington, Kenton, Leipsic, Little Creek, Magnolia, Milford, and Wyoming. Responses from each of these municipalities are provided below.

Municipal Mitigation Actions – Previous Actions Update from 2015 Plan

Please fill out the table below, specifically the Status and Notes columns. A sample action update has been completed in orange.

Kent County Municipal Hazard Mitigation Actions Bowers					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Bowers Beach					
	Flood	Elevate Route 18 (Main Street) from the highway to town sign (approximately 1/4 mile).	DelDOT	Not Started	Bowers has a few storm drains located on Main Street, near the church, and also near the corner of Main and Hubbard Avenue. Some storm drains are also located on Hubbard Avenue. Storm drains were removed when the sanitary sewer was installed. Storm water still tends to lie in parts of Main Street after minor rainfall. The Town's only drainage check valve, located on the south end of Hubbard Avenue, was replaced in 2019.
	Flood, Storm Surge	Work with DNREC to develop a Coastal Resiliency Plan to reduce losses from coastal hazards and integrate the Action Plan with Kent County Hazard Mitigation Plan.	Town of Bowers Beach	Not Started	
	Flood, Storm Surge	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Bowers Beach	Not Started	

	Flood	Reuse pipe size and improve outfall on Hubbard Avenue adjacent to the Creek.	Division of Emergency Management	Completed	The Town replaced drainage pipe and installed a new TideFlex valve on the sound end of Hubbard Avenue. This project, primarily funded under a USDA grant, was also identified as one (1) of the top three (3) ranked drainage problems in a flooding and coastal hazards vulnerability study done by the Delaware Coastal Programs (DCP), DNREC in 2011.

Kent County Municipal Hazard Mitigation Actions - Camden					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Camden					
	All Hazards	Purchase satellite cell phones for use by key personnel during emergencies.	Town Manager	Not started	Action has not started
	All Hazards	Conduct emergency response training exercises once every two years.	Town administration, Police Department, Fire Department and EMTs	On-Going	Action is Ongoing
	All Hazards	Designate emergency collection points (firehouses, churches, etc.).	Town Administration	Completed -	Camden-Wyoming Firehouse
	All Hazards	Encourage residents who depend on electric power for essential medical devices (i.e., ventilators and IV pumps) to register in the 9-1-1 system.	Town Administration, Police Department	Not started	We can start to send them with our quarterly letters
	All Hazards	Request an annual presentation by a DEMA representative on local disaster planning.	Town Administration	Not started	We can start to request this planning
	Flood	Investigate flooding and drainage related issues at the intersection of Main Street and South Street.	Town Administration	On-going	Action is Ongoing
	Flood	Replace the undersized stormwater drain on South Street.	Town Administration	On-going	Action is Ongoing

Kent County Municipal Hazard Mitigation Actions - Cheswold

Municipality	Hazard Mitigated	Mitigation Action	Lead Agency	Status (In Progress, On-going, Not Applicable, Completed, Cancelled)	Notes
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Cheswold					
	All Hazards	Conduct a natural hazards vulnerability assessment of the asphalt plant (independence Construction Materials) in the Town.	Town Administration	Not Applicable	Not within town limits
	Flood	Investigate flooding related issues on US Route 13 south of 42.	Town Administration	Ongoing	Action is ongoing

Kent County Municipal Hazard Mitigation Actions - Dover					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Dover					
	Wind, Winter Storm, Hurricane, Tornado	Consider relocating the electric distribution system to protect against long-term outages.	City of Dover Electric Department	On-going	City of Dover continues to upgrade lines by burying those areas based on the number of outages, age of material and accessibility to pole lines to decrease the duration of outage.
	Wind	Re-enforce electric system in Emergency Operations Center so that it can sustain high winds.	City of Dover	Completed	NA
	Flood	Conduct a study to determine the feasibility of relocating the City of Dover Grounds Department outside of St. Jones River floodplain.	City of Dover	Completed	Grounds Division has been removed from the St. Jones River floodplain.
	Flood, Storm Surge	Work with the County to conduct a detailed flood vulnerability study for the entire City.	City of Dover	On-going	Certain areas of the City have been mapped for flood vulnerability. A comprehensive review with the County should be scheduled to ensure project is complete.
	All Hazards	Acquire grounds building.	City of Dover	Completed	Building for Grounds Division was acquired at Schutte Park

Kent County Municipal Hazard Mitigation Actions - Farmington

Municipality	Hazard Mitigated	Mitigation Action	Lead Agency	Status (In Progress, On-going, Not Applicable, Completed, Cancelled)	Notes
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Farmington					
	All Hazards	Purchase and install outdoor surveillance security system at the town hall once retrofitted.	Town of Farmington	Ongoing	Action is ongoing.
	All Hazards	Retrofit town hall to serve as an emergency shelter and evacuation point.	Town of Farmington	Ongoing	Purchased new building to conform to be a new town hall. Programs still relevant
	All Hazards	Purchase and install outdoor surveillance security system at the firehouse to include monitoring the nearby town playground.	Town of Farmington	Completed	Does protect neighboring area

Kent County Municipal Hazard Mitigation Actions - Felton					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Felton					
	Flood	Work with Delaware DOT to identify areas of frequent roadway flooding on Market Street and develop mitigation strategies.	Town of Felton	N/A	There is no Market Street located in the Town of Felton.
	All Hazards	Revise the Emergency Water Plan (updated in 1999 by the Delaware Rural Water Association).	Town of Felton	N/A	Action is no longer applicable.
	All Hazards	Develop an Emergency Operations Plan for the Town of Felton in conjunction with the local fire service and police..	Town of Felton, Police and Fire departments	Completed	This was created in 2006. Contact information needs to be updated.
	All Hazards	Provide property owners in Felton with brochures and other material regarding potential flood hazards.	Town of Felton	On-going	To be discussed in the future.
	Flood	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Felton	Completed	This may have been completed with the former Town Manager.

Kent County Municipal Hazard Mitigation Actions - Frederica

Municipality	Hazard Mitigated	Mitigation Action	Lead Agency	Status (In Progress, On-going, Not Applicable, Completed, Cancelled)	Notes
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Frederica					
	All Hazards	Introduce back-up power to the Town's pumping stations.	Town of Frederica	Completed	Portable generator connections are installed at water booster stations.
	Flood	Provide property owners in Frederica with brochures and other material regarding potential flood hazards.	Town of Frederica	In Progress	Town will endeavor to have information available or provide references to residents.
	Flood, Storm Surge	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Frederica	In Progress	Site visit completed within last 2 years

Kent County Municipal Hazard Mitigation Actions - Harrington					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Harrington					
	Drought	Purchase generator for wells.	Town Administration	Not Started	Action not started and carried forward
	Flood	Retrofit sewer lines to limit groundwater inflow into treatment plant.	Public Works, Town Administration	Not Started	Action not started and carried forward
	Fire	Integrate 500,000 gallon and 250,000 gallon water towers.	Public Works, Town Administration	Ongoing	Action is ongoing
	Flood, Drought	Dig a new well to increase redundancy of water supply system.	Public Works, Town Administration	Not Started	Action not started and carried forward

Kent County Municipal Hazard Mitigation Actions - Kenton					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Kenton					
	Hazardous Materials	Work with the LEPC to develop a hazardous materials site inventory.	Town Administration	Carried Forward – Not Applicable	This action has not started.
	Hazardous Materials	Identify strategies to mitigate risks associated with the transportation and storage of hazardous materials in and around the Town of Kenton.	Town Administration	Not Started	This action has not started
	Flood	Evaluate stormwater management system as it relates to tertiary roads.	Town Administration	Ongoing	This occurs on an ongoing and as-needed basis.
	All Hazards	Coordinate with the Towns of Cheswold, Hartly, Smyrna and Clayton conduct training for emergency management activities.	Town Administration	Cancelled	Not applicable – no crew
	All Hazards	Retrofit the Kenton Municipal Building (public shelter) to be more resilient to all hazards.	Town Administration	Not Started	This action has not started.

Kent County Municipal Hazard Mitigation Actions					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Leipsic					
	All Hazards	Develop an Emergency Operation Plan for the Town of Leipsic in conjunction with the local fire service, county, and state police.	Town of Leipsic/ local Fire Service/ State Police	Ongoing	This is discussed at meetings.
	All Hazards	Continue to provide information about local, regional, state and federal training opportunities to fire department, EMS, ambulance services and other emergency responders.	Town of Leipsic/ local Fire Service	Not Applicable	The does not occur at the Town level

	All Hazards	Continue to develop an emergency preparedness and response brochure specific to the Town of Leipsic for all residents that contains information on shelters, evacuation procedures and emergency contact information.	Town of Leipsic	Ongoing	Residents are made aware of the Town shelter. Brochures still should be developed.
	All Hazards	Continue to increase the number of trained volunteer citizen emergency responders.	Town of Leipsic	Ongoing	This action is ongoing.
	All Hazards	Work with the County to conduct a detailed flood vulnerability study for the entire Town.	Town of Leipsic	In Progress/Ongoing	Local resident has attempted to conduct flood study for the Town and specific properties.
	Flood	Install a bulkhead at the Leipsic River.	Town of Leipsic	Cancelled	All docks are privately owned, which is what prevented this action from happening, although it was pursued. Privately owned docks was the problem. Would still love to do it, but need to work with the State to work with the private docks, which is presented as a new action.
	Flood	Maintain/Rehab the Leipsic tax ditch to aid in flood control plans.	Town of Leipsic	Ongoing	Tax ditch was cleaned and maintained, but not yet rehabbed to aid in flood control plans.

Kent County Municipal Hazard Mitigation Actions – Little Creek					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Little Creek					
	All Hazards	Develop method to address mosquitoes and possible West Nile Virus outbreak.	Division of Emergency Management	Carried Forward	Action is carried forward.
	All Hazards	Improve facilities at the Town's Fire Hall to support the use of the building as a Town shelter. Establish a decontamination facility within the Fire Hall to include shower and wet room equipment.	Town of Little Creek	Carried Forward	Action is carried forward
	Flood, Coastal Erosion	Relocate flood-prone structures when elevation is not a cost-effective alternative.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	Flood	Elevate flood-prone structures.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.

	Flood, High Wind, Snow Load	Dry floodproof historic residential structure to reduce risk from (hazard) only when other techniques that would mitigate to the BFE would cause the structure to lose its status.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	Flood, High Wind, Snow Load	Retrofit existing structure/building to reduce risk from (hazard). (i.e. foundation, load-bearing wall, beam, column, building envelope, structural floor and roof, connections between these).	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	Flood, High Wind, Snow Load	Retrofit non-structural elements of buildings to reduce risk from (hazard) (i.e. bracing of building contents to prevent damage or elevation of heating and ventilation systems).	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	Flood	Target hazard-prone properties, i.e., repetitive flood loss properties (FEMA repetitive loss and severe repetitive loss lists) through sponsorship of FEMA HMGP, FMA, PDM, RFC, and SRL grant programs.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent initiative funding to procure warning systems that provide real time warning of impending hazards.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent initiative funding to install generator “quick-connects” to critical facilities.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent initiative funding to install generators to critical facilities.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent Initiative Funding to improve public outreach and communication efforts regarding hazard mitigation — utilizing websites, training, newsletters, brochures, etc.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent initiative funding to evaluate building codes in support of future adoption and/or mitigation.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent initiative funding to assist in mitigating damage from trees during high wind events such as hurricanes, snow load and ice accumulation.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.
	All Hazards	Pursue 5 percent initiative funding to assist in obtaining elevation certificates for all residences in town to determine which residences are most vulnerable to flooding.	Kent County and Town of Little Creek	Ongoing	Action is ongoing and carried forward.

Kent County Municipal Hazard Mitigation Actions – Magnolia

Municipality	Hazard Mitigated	Mitigation Action	Lead Agency	Status (In Progress, On-going, Not Applicable, Completed, Cancelled)	Notes
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Magnolia					
	Flood	Research the benefits and workload requirements for joining the National Flood Insurance Program.	Town Administration	COMPLETED	Town Of Magnolia Joined Nfip On April 5, 2018.
	Flood	Coordinate with County and State officials to evaluate ways to eliminate or minimize flooding during heavy rain events along Barkers Landing Road just outside Town limits.	Town Administration	CANCELLED	Any Available Resources Will Be Designated For Projects Within The Town Limits.
	Flood, Coastal Erosion	Purchase generator for water system when power fails.	Town Administration	CANCELLED	Dema Denied Our Application In 2015 After Spending Hours On Preparation; Will Not Pursue. **

Kent County Municipal Hazard Mitigation Actions					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Milford					
	Flood	Relocate Milford Fertilizer out of floodplain	Town Administration	Completed	Now is called Growmark, Inc. This location is now admin office only.
	Flood	Develop a riparian buffer standard for building setbacks along the Mispillion River and other waterways.	Town Administration	Ongoing	Flood regs are included in chapter 130 of Milford DE city code.
	All Hazards	Obtain back-up emergency radio system.	Town Administration	Ongoing	Radio licenses renewed on a timely basis.
	All Hazards	Update reverse notification system.	Town Administration	Ongoing	System is updated and maintained as necessary.

Kent County Municipal Hazard Mitigation Actions					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Smyrna	Smyrna				
	All Hazards	Develop security badge system for use by all Town of Smyrna employees.	Town Administration	Ongoing	Hopefully deployed by end of 2021
	All Hazards	Install security partitions at customer service counters in the lobby of Town hall.	Town Administration	Completed	Project has been completed.
	All Hazards	Install 12 "hold-up alarms."	Town Administration	Ongoing	Have alarm systems in facilities….emergency buttons, panic buttons that go back to police department. Still looking to expand on system.
	All Hazards	Purchase a generator for the Public Works Building for emergency power that is at least two 800 megahertz radios.	Town Administration	Ongoing	Trying to get a grant currently
	Flood	Purchase a flood alert monitor for Lake Como Spillway – wellhouse #3	Town Administration	Ongoing	Trying to find a grant to fund it, so is not complete.

Kent County Municipal Hazard Mitigation Actions - Wyoming					
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**	**Status (In Progress, On-going, Not Applicable, Completed, Cancelled)**	**Notes**
Sample	Flood	Sample Action	Municipal Utilities (MUC)	On-Going	Backflow prevention devices are being installed throughout the township. Four of seven have been installed. Expected completion by Fall 2019
Wyoming					

	All Hazards	Install surveillance video equipment at the Wyoming police station/town hall interior and exterior and the railroad, which runs behind both northbound and southbound.	Town of Wyoming / DNREC	complete	In new location the has surveillance all the way around
	Flood	Work with the Delaware Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies to address known hazards.	Town of Wyoming / DelDOT	Ongoing	Action is ongoing
	All Hazards	Develop specific mitigation strategies to protect any at-risk historic properties in town.	Town of Wyoming	Ongoing	Action is ongoing
	All Hazards	Conduct a survey of all historic sites that are located in hazard areas.	Town of Wyoming	Ongoing	Action is ongoing
	All Hazards	Develop a continuity of operations plan for the town of Wyoming to include the local fire company (shared between Camden and Wyoming) and police department (shared with Camden).	Town of Wyoming	Not started	Action is not started
	All Hazards	Purchase back-up generator for the police station/town hall.	Town of Wyoming	completed	Generators were purchased and available.
	Flood	Install bulk head from where the rip rap ends at Wyoming park to Wyoming Mill Pond.	Town of Wyoming	In progress	Action is currently in progress
	Flood	Make improvements to South Layton Street Pump House	Division of Emergency Management	Completed	Installed backup generator and pump system to pump water over to southern blvd.
	Flood	Address flooding issues due to the open pipe on Camden Wyoming Avenue and Southern Boulevard.	Town of Wyoming	completed	Project completed

New Mitigation Actions Worksheet Responses

Responses were received from: Bowers Beach, Clayton, Dover, Farmington, Felton, Frederica, Harrington, Kenton, Leipsic, Little Creek, Milford, Smyrna, Woodside, and Wyoming.

Kent County Municipal Hazard Mitigation Actions - Bowers			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE#/INTERSECTION> to prevent further damage.	Local Watershed Organization
Bowers			
Bowers Beach	Flood, Climate Resiliency, Storm water	Alleviate one (1) of the top three (3) ranked drainage problem identified in the flooding and coastal hazards vulnerability study done by the Delaware Coastal Programs (DCP), DNREC in 2011 by restoring wetlands, improving infiltration and improving drainage in a state-owed parking lot and covert a portion of the existing paved area into community open space. Project is partially completed. Copied and paraphrased from SOFA Summary (attached): Phase I 1.7 acres of pavement have been removed and converted to open space and 0.6 acres of pavement have been rehabilitated to influence positive drainage and provide community parking. Thirty-eight trees have been planted around the perimeter. Approximately 800 linear feet of existing drainage channels have been restored. Buffer along the South Flack drainage ditch was doubled in width. Sixty-seven standard parking spaces and 4 disabled persons parking spaces were striped. Phase II In design now, includes the creation of additional green space, complete wetland restoration and enhancement of more than 700 linear feet of ditch, drainage pipe replacement, and installation of additional trees and resurfacing of the remaining lot. Phase II is anticipated to be completed in 2021	DNREC Town of Bowers Beach
	Flood	Alleviate nuisance flooding on N. Bayshore Drive and N. Flack Avenue. The Town is now focusing on the last of the top three (3) ranked drainage problem identified in the flooding and coastal hazards vulnerability study done by the Delaware Coastal Programs (DCP), DNREC in 2011: North Flack Avenue and Bayshore Drive.	DelDOT, DNREC, Town of Bowers Beach
	Flood	Alleviate nuisance flooding on Wyatt and Davidson Street.	DelDOT, DNREC, Town of Bowers Beach

Kent County Municipal Hazard Mitigation Actions - Clayton			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**

Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Clayton			
Clayton	All Hazards	Establish a tracking mechanism to track the progress of hazard mitigation projects to help with future plan updates.	Town Administration

Kent County Municipal Hazard Mitigation Actions - Dover			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Town Council
Dover			
Dover	Flood	Upgrade undersized stormwater infrastructure within Meeting House Branch drainage basin to prevent flooding.	City of Dover
	Flood	Incorporate "green" infrastructure within all drainage basins to reduce stormwater runoff quantity and improve stormwater runoff quality.	City of Dover
	Flood	Obtain and remediate properties within the floodplain so the natural floodplain is rehabilitated.	City of Dover
	Electrical Outage	Upgrade 7 of 15 substations with digital relays to reduce recovery from outages and increase reliability.	City of Dover

Kent County Municipal Hazard Mitigation Actions - Farmington			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Farmington			
Farmington	Flood	Work with the Conservation Department and the County to define water flow areas in reference to developing a mitigation strategy for flooding on Farmington Road.	Town of Farmington

Kent County Municipal Hazard Mitigation Actions - Felton			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**

Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Felton			
Felton	Flood	Work with Delaware DOT to identify areas of frequent roadway flooding on Church Street and develop mitigation strategies.	Town of Felton
	All Hazards	Revise the Emergency Water Plan (updated in 1999 by the Delaware Rural Water Association)	Town of Felton
	All Hazards	Provide property owners in Felton with brochures and other material regarding potential flood hazards.	Town of Felton
	All Hazards	Update the Emergency Operation Plan for the Town of Felton in conjunction with the local fire service and police.	Town of Felton, Police and Fire Departments.
	Flood	Investigate flooding and drainage issues on Courtney Lane.	Town of Felton

Kent County Municipal Hazard Mitigation Actions - Frederica			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME ON STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Municipal Utilities (MUC)
Kenton			
	NO NEW ADDITIONAL ACTIONS		

Kent County Municipal Hazard Mitigation Actions - Felton			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME ON STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Harrington			
City of Harrington	Flooding	Improve drainage along Dip Brown's Branch, Jacksons, and City tax ditches by installing storm drains where necessary; partnering with Heritage Manor subsidized housing development for drainage improvement; and partnering with Kent Conservation District for tax ditch maintenance.	City of Harrington in partnership with Kent Conservation District.

Kent County Municipal Hazard Mitigation Actions - Kenton			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**

Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME ON STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Municipal Utilities (MUC)
Kenton			
Kenton			
	All Hazards	Work with the County/State to find funding to provide training/certification opportunities in GIS and in building inspection/code enforcement	Town Administration

Kent County Municipal Hazard Mitigation Actions			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Town Council
Leipsic			
Leipsic	Flood/ Coastal Storms	Work with the State to bulkhead the private docks in Leipsic, to provide flood protection and so emergency vessels docked in Leipsic can be safely docked during coastal storm events.	Town Council

Kent County Municipal Hazard Mitigation Actions – Little Creek			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME ON STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Municipal Utilities (MUC)
Little Creek			
NO NEW ADDITIONAL ACTIONS			

Kent County Municipal Hazard Mitigation Actions – Milford			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME ON STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Municipal Utilities (MUC)
Milford			
NO NEW ADDITIONAL ACTIONS			

Kent County Municipal Hazard Mitigation Actions			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Smyrna			
Smyrna	All	Install digital access door controls on all municipal facilities and eliminate manual keys.	Town Administration
	All Hazards	Upgrade the gate access at public works facility to manage access better by Integrating the employee security badge system IDs for allow for gate access.	Town Administration
	All Hazards	Assess the potential use of a SCADA system for utilities to manage operations more effectively, and to integrate into Wellhouse #3 at Lake Como.	Town Administration
	All Hazards	Ensure an up-to-date and more holistic education program for NIMS and ICS-certified employees.	Town Administration

Kent County Municipal Hazard Mitigation Actions			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**
Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME OF STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Woodside, DE			
Town of Woodside, DE	Flood	Continue to coordinate with DelDot to maintain drainage in along Main Street to help reduce the impacts of minor flooding events.	Town Admin/DelDot

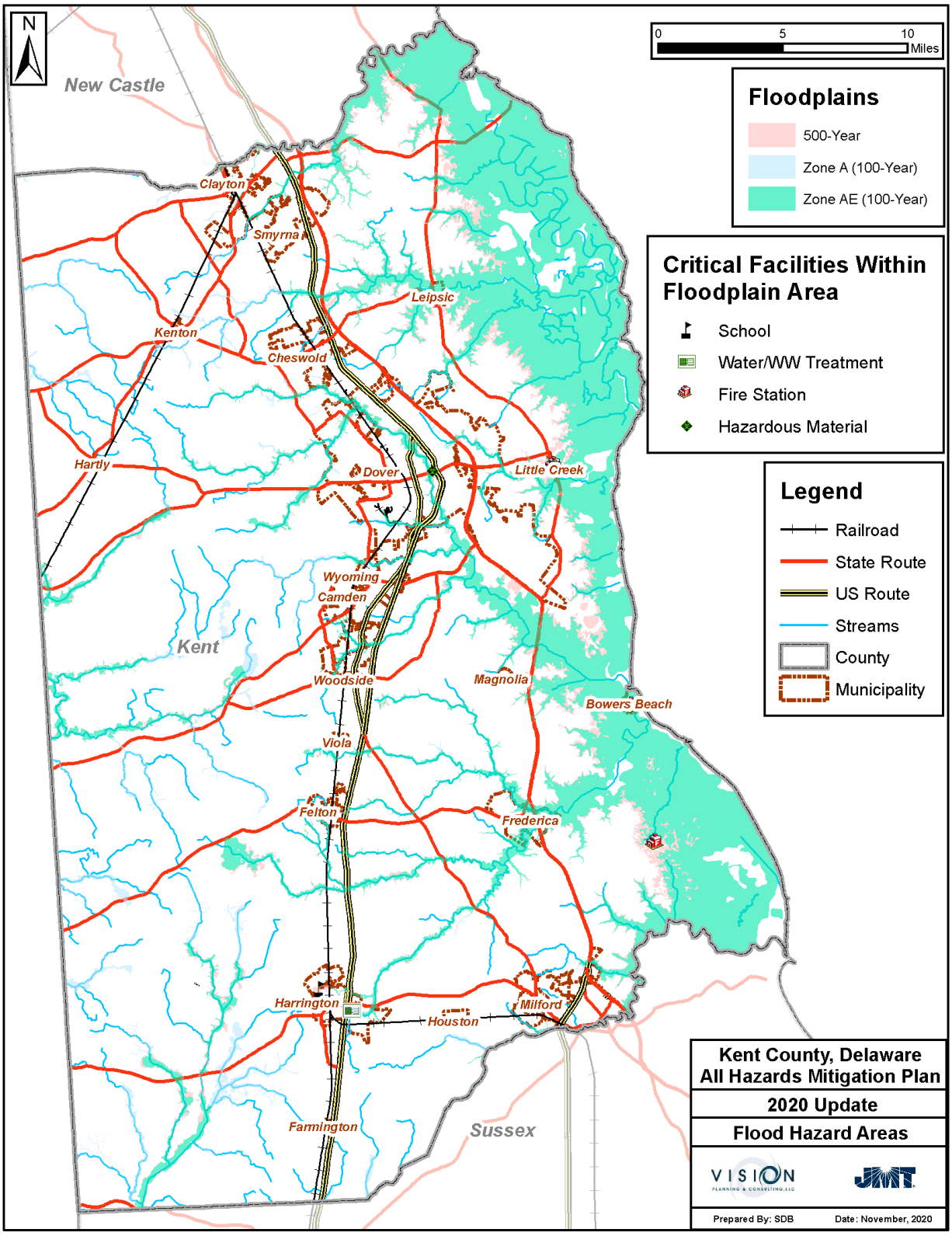
Kent County Municipal Hazard Mitigation Actions - Wyoming			
Municipality	**Hazard Mitigated**	**Mitigation Action**	**Lead Agency**

Sample	Flood	Conduct streambank stabilization at <INSERT LOCATION/NAME ON STREAM/WATER BODY> on <INSERT ROAD NAME/ROUTE #/INTERSECTION> to prevent further damage.	Local Watershed Organization
Wyoming			
Town of Wyoming	Flood	Address Flooding Issues during hard rain events at the intersection of Camden Wyoming Ave and N. Layton Avenue	Town of Wyoming / Deldot
	Flood	Address Flooding issues during hard rain events at Mechanic Street and Broad St	Town of Wyoming/Deldot

APPENDIX D – MAPS AND EXPOSURE

This Appendix provides County hazard maps as well as exposure estimates by municipality. This Appendix also provides local hazard are maps in which the information included on the maps were provided directly by the municipalities and design under the influence of local experience. This Appendix provides the following: County Flood Areas Map, County Potential Wildfire Areas Map, and exposure estimates for flood (100-year and 500-year) and wildfire for the County and municipalities. Municipal hazard area maps that were directly informed for municipal representatives are also provided in the Appendix.

Flood Hazard Areas Map



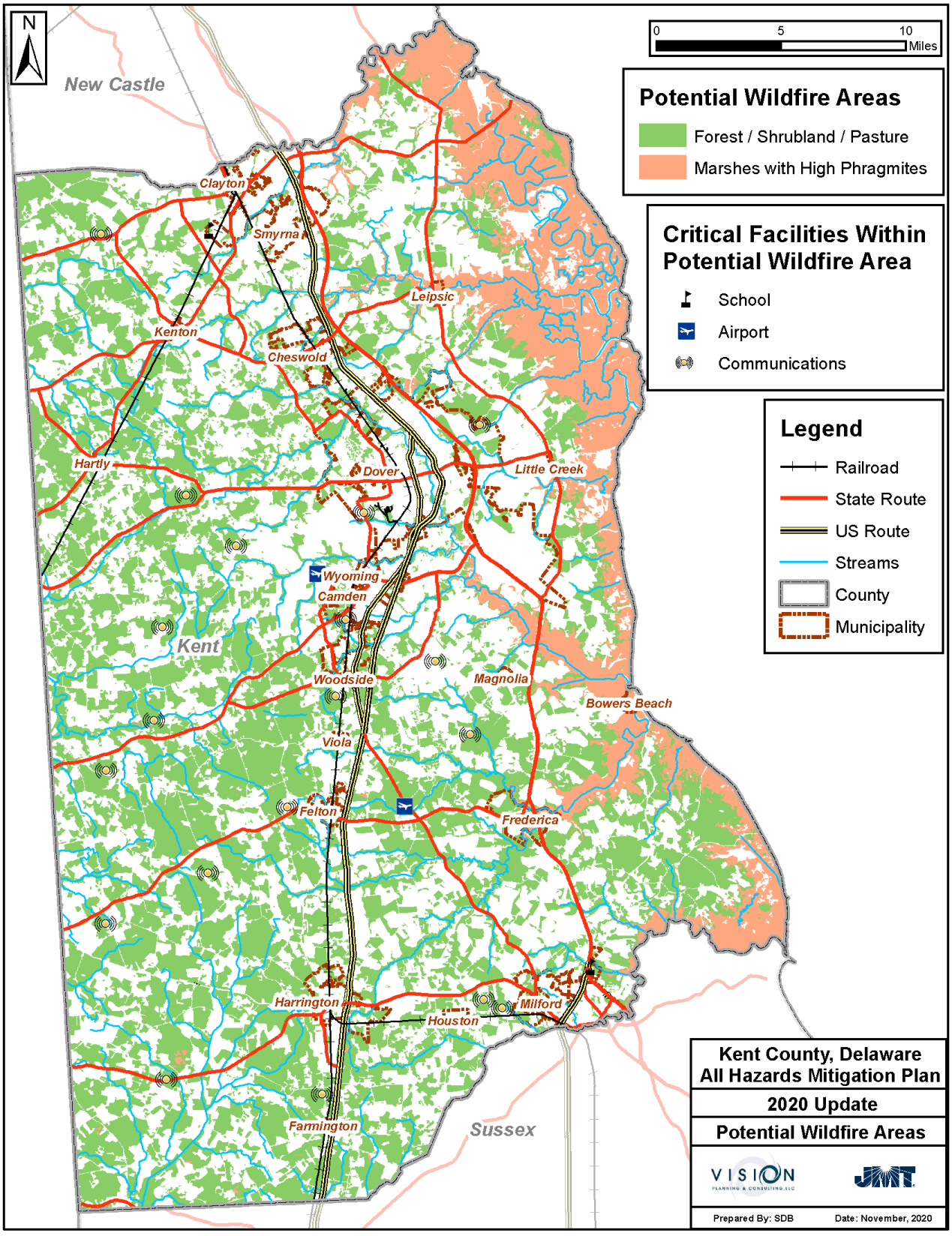
Flood Hazard Exposure Estimates

Number of Structures and Critical Facilities in 100-Year Floodplain		
Municipality	Number of Structures	Critical Facilities / Number
Bowers Beach	323	Fire Station / 1
Camden	4	-
Cheswold	4	-
Clayton	4	-
Dover	83	-
Farmington	-	-
Felton	24	-
Frederica	43	-
Harrington	25	-
Hartly	-	-
Houston	-	-
Kenton	-	-
Leipsic	127	-
Little Creek	83	Fire Station / 2
Magnolia	-	-
Milford	-	-
Smyrna	12	-
Viola	-	-
Woodside	-	-
Wyoming	5	-
Kent County	1612	-
Total	**2349**	**3**

Number of Structures and Critical Facilities in 500-Year Floodplain		
Municipality	No. Structures	Critical Facilities / No.
Bowers Beach	323	Fire Station / 1
Camden	4	-
Cheswold	4	-
Clayton	11	-
Dover	135	Haz. Mat. / 1
Farmington	-	-
Felton	34	-
Frederica	50	-
Harrington	92	WW Treatment / 1
		School / 1
Hartly	-	-
Houston	-	-
Kenton	-	-

Leipsic	148	-
Little Creek	153	Fire Station / 2
Magnolia	-	-
Milford	-	-
Smyrna	18	-
Viola	-	-
Woodside	-	-
Wyoming	7	-
Kent County	2134	Fire Station / 1
Total	**3113**	**7**

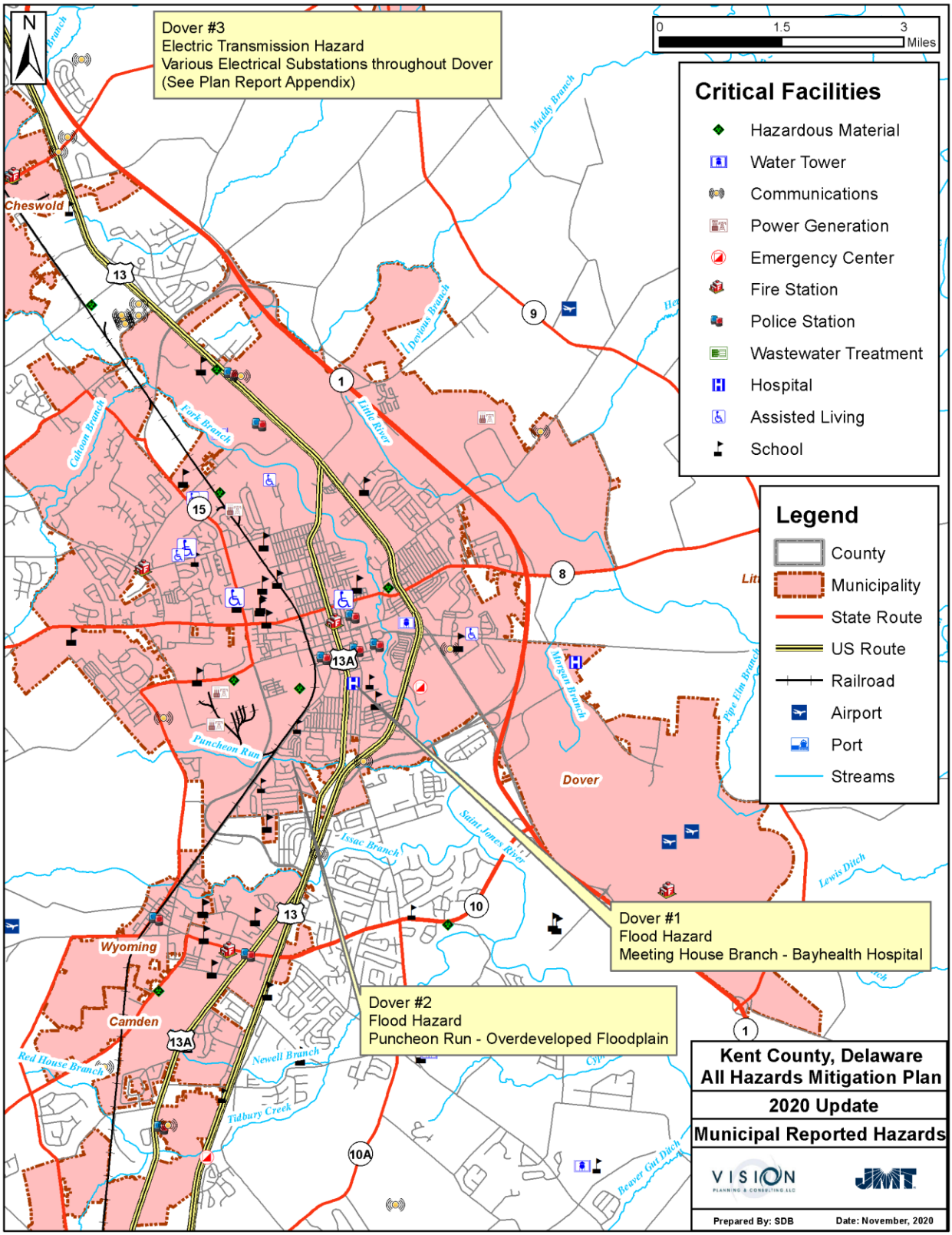
Potential Wildfire Areas Map

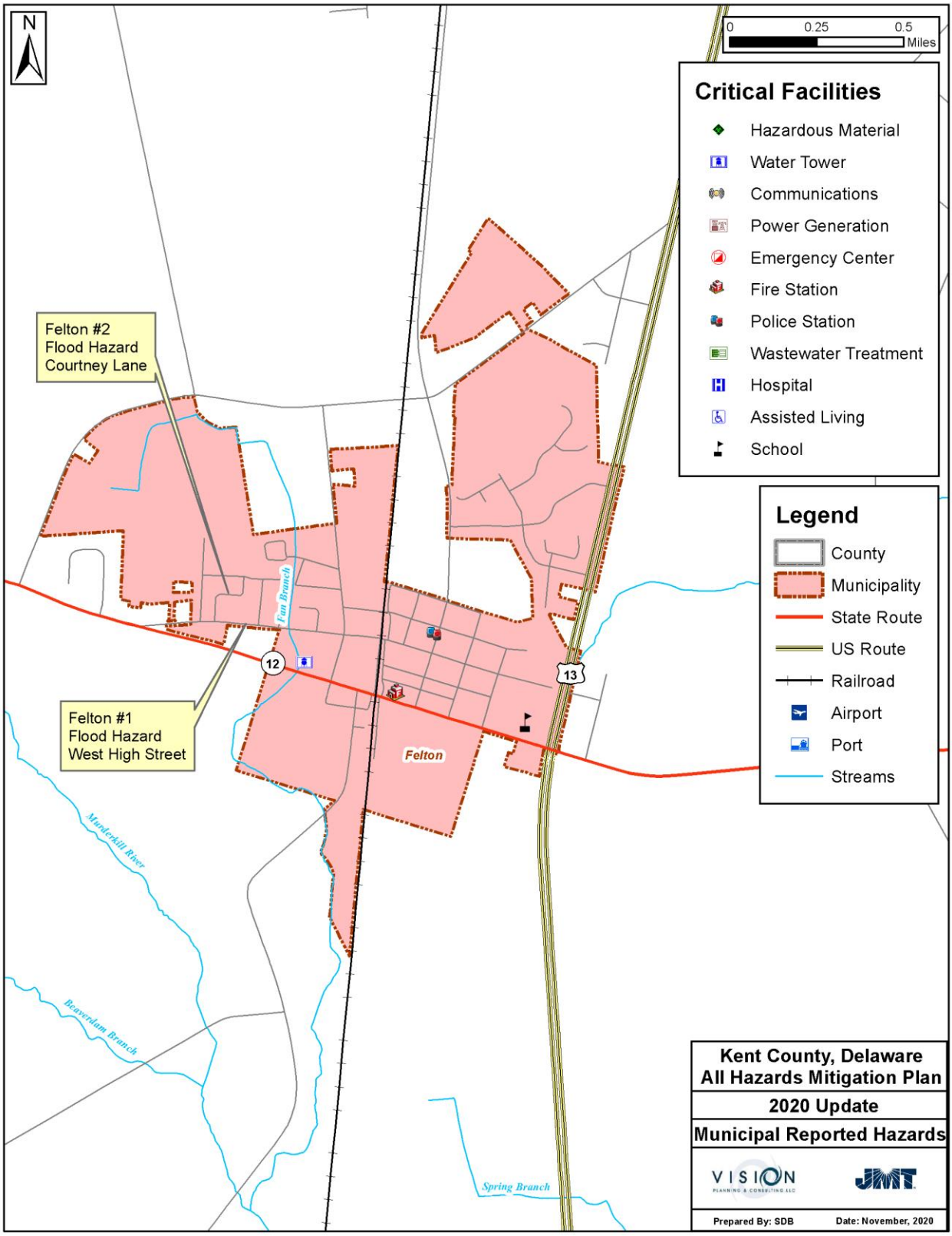


Wildfire Exposure Estimates

Number of Structures and Critical Facilities in Wildfire Areas		
Municipality	No. Structures	Critical Facilities / No.
Bowers Beach	-	-
Camden	90	-
Cheswold	10	-
Clayton	19	School / 1
Dover	811	Communications / 2
Farmington	1	-
Felton	27	-
Frederica	22	-
Harrington	76	-
Hartly	5	-
Houston	8	-
Kenton	3	-
Leipsic	1	-
Little Creek	16	-
Magnolia	10	-
Milford	66	School / 1
Smyrna	43	-
Viola	10	-
Woodside	9	-
Wyoming	41	-
Kent County	13997	Airports / 2
		Communications / 18
Total	**15265**	**24**

Municipal Hazard Areas

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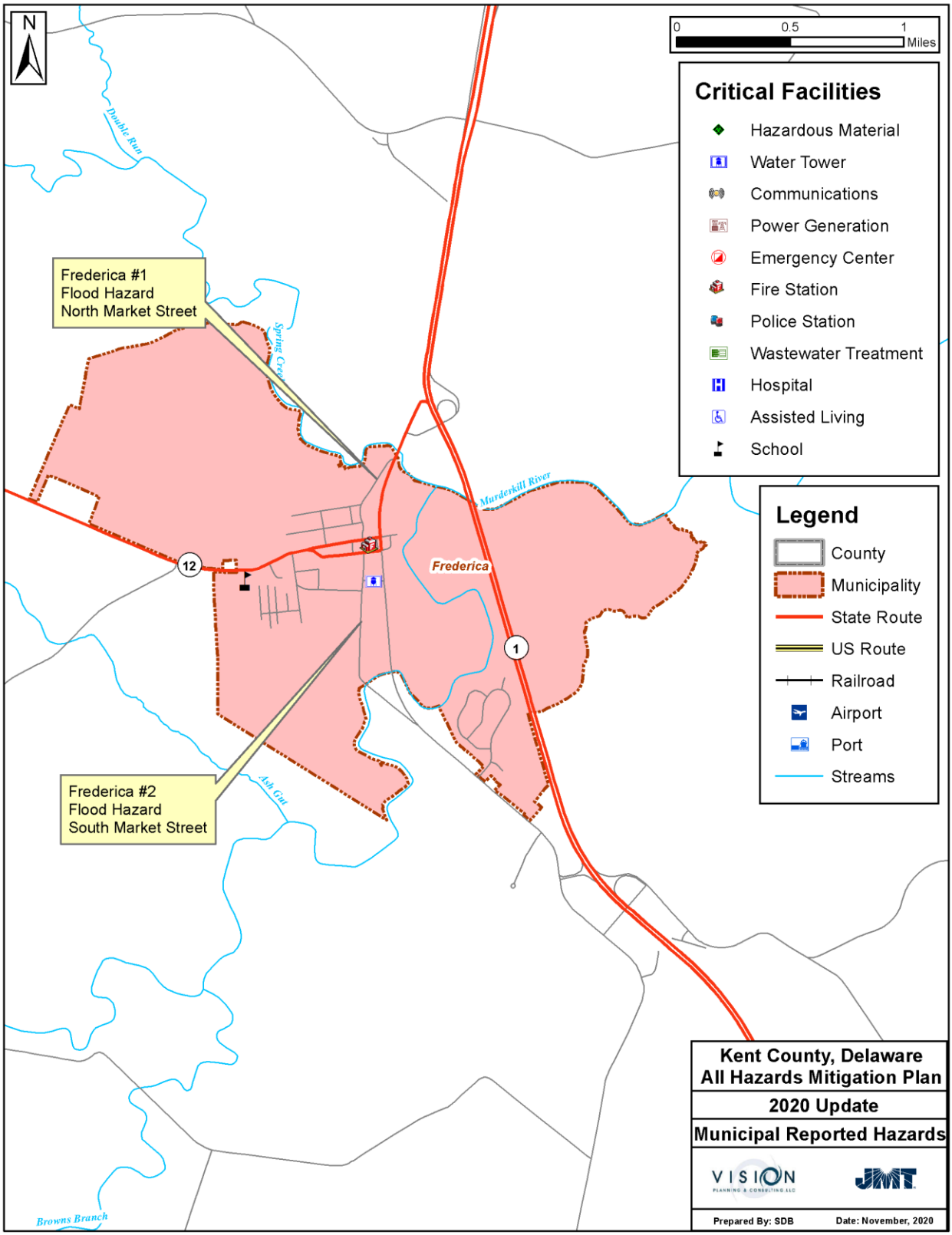
0
0.25
0.5
Miles
Critical Facilities
Hazardous Material
Water Tower
Communications
Power Generation
Emergency Center
Fire Station
Police Station
Wastewater Treatment
Hospital
Assisted Living
School
Legend
County
Municipality
State Route
US Route
Railroad
Airport
Port
Streams
Felton #2
Flood Hazard
Courtney Lane
Felton #1
Flood Hazard
West High Street
Fan Branch
Felton
12
13
Murderkill River
Beaverdam Branch
Spring Branch
Kent County, Delaware
All Hazards Mitigation Plan
2020 Update
Municipal Reported Hazards
VISION
JMT
Prepared By: SDB
Date: November, 2020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Critical Facilities
Hazardous Material
Water Tower
Communications
Power Generation
Emergency Center
Fire Station
Police Station
Wastewater Treatment
Hospital
Assisted Living
School
Legend
County
Municipality
State Route
US Route
Railroad
Airport
Port
Streams
Frederica #1
Flood Hazard
North Market Street
Frederica #2
Flood Hazard
South Market Street
Frederica
Double Run
Spring Creek
Murderkill River
Ash Gut
Browns Branch
12
1
Kent County, Delaware
All Hazards Mitigation Plan
2020 Update
Municipal Reported Hazards
VISION
JMT
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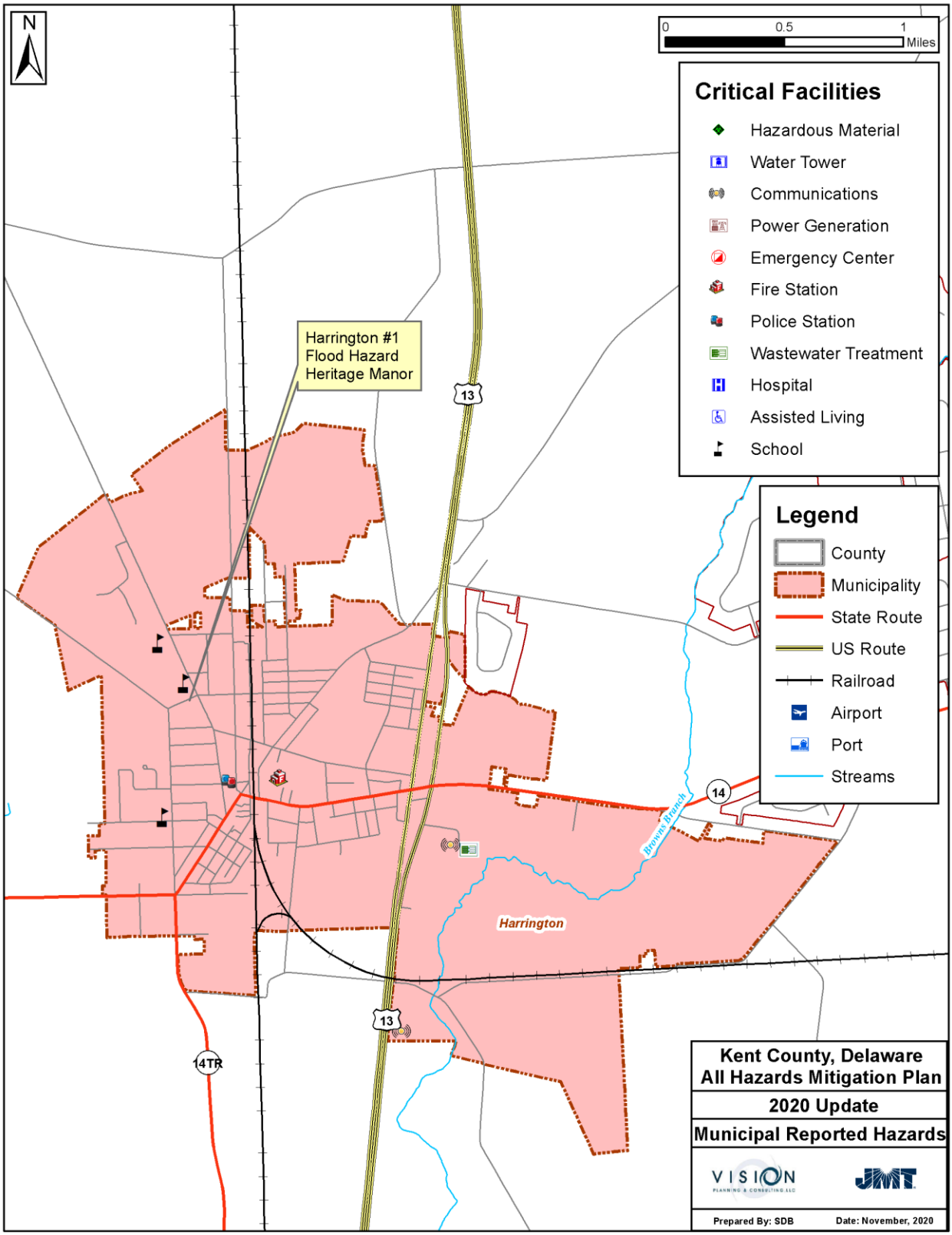
Date: November, 2020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Miles
Critical Facilities
Hazardous Material
Water Tower
Communications
Power Generation
Emergency Center
Fire Station
Police Station
Wastewater Treatment
Hospital
Assisted Living
School
Legend
County
Municipality
State Route
US Route
Railroad
Airport
Port
Streams
Harrington #1
Flood Hazard
Heritage Manor
13
14
14TR
Browns Branch
Harrington
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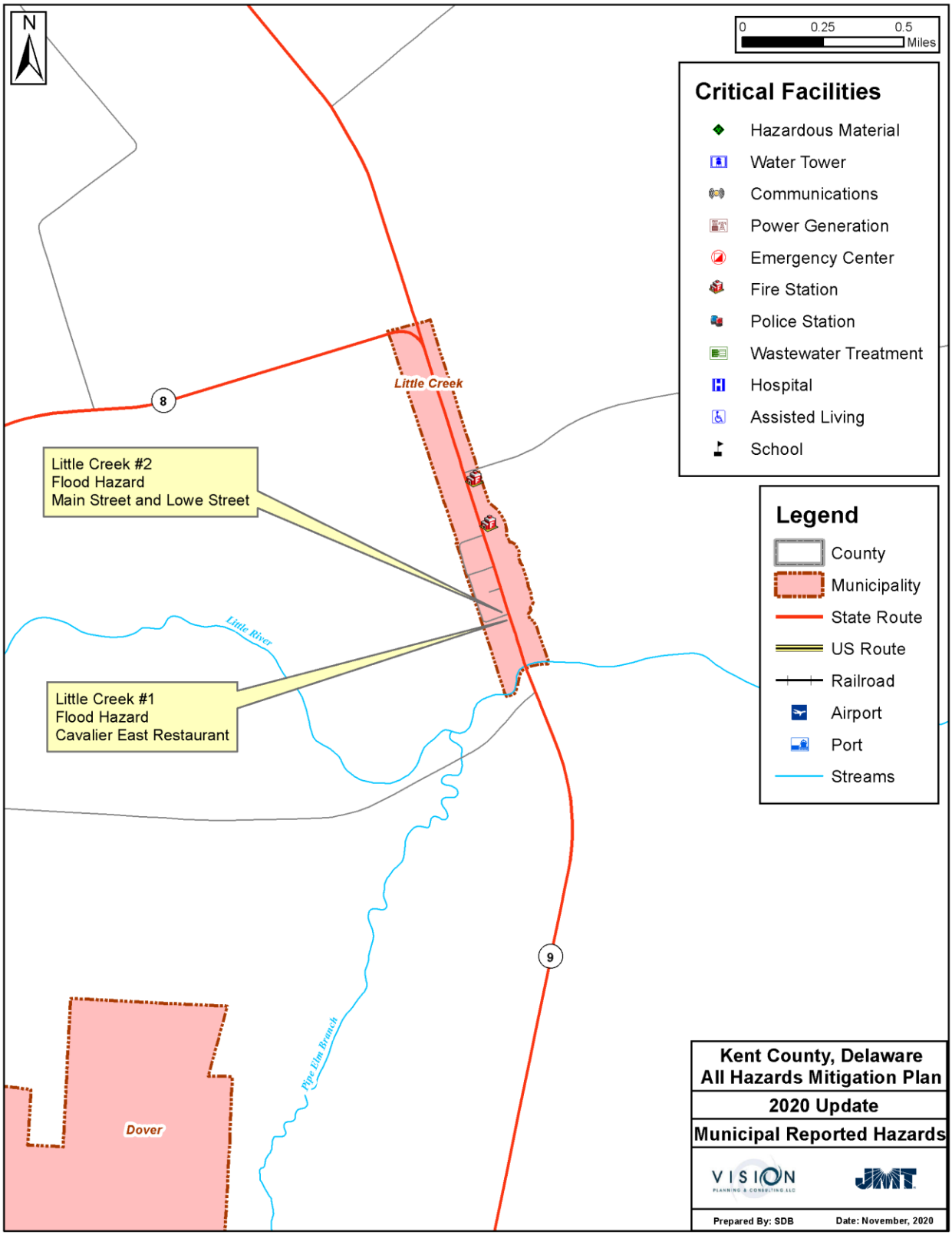
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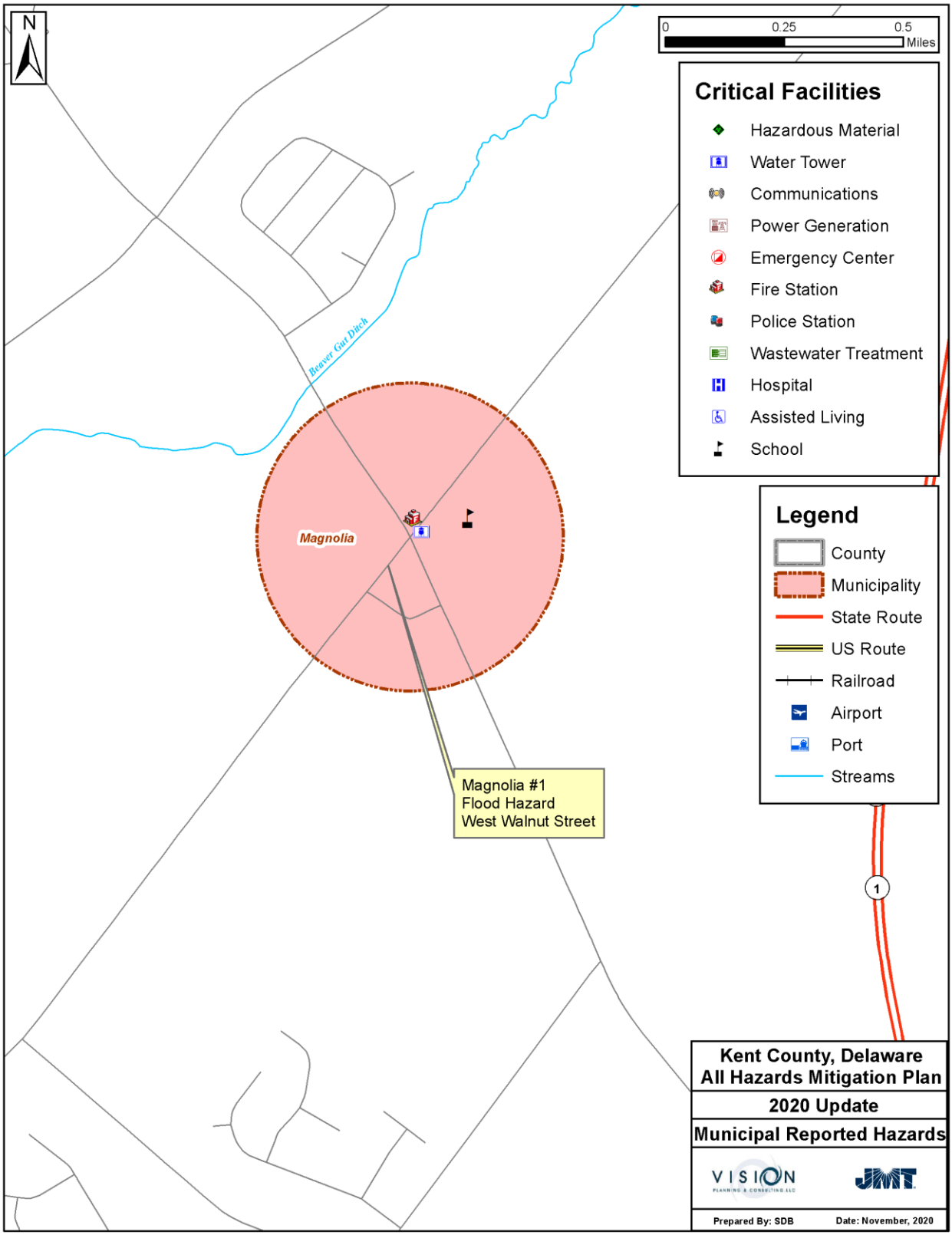
Miles
Critical Facilities
Hazardous Material
Water Tower
Communications
Power Generation
Emergency Center
Fire Station
Police Station
Wastewater Treatment
Hospital
Assisted Living
School
Legend
County
Municipality
State Route
US Route
Railroad
Airport
Port
Streams
Little Creek
Little Creek #2
Flood Hazard
Main Street and Lowe Street
Little Creek #1
Flood Hazard
Cavalier East Restaurant
Little River
Pipe Elm Branch
Dover
8
9
Kent County, Delaware
All Hazards Mitigation Plan
2020 Update
Municipal Reported Hazards
VISION
JMT
Prepared By: SDB
Date: November, 2020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Miles
Critical Facilities
Hazardous Material
Water Tower
Communications
Power Generation
Emergency Center
Fire Station
Police Station
Wastewater Treatment
Hospital
Assisted Living
School
Legend
County
Municipality
State Route
US Route
Railroad
Airport
Port
Streams
Beaver Gut Ditch
Magnolia
Magnolia #1
Flood Hazard
West Walnut Street
1
Kent County, Delaware
All Hazards Mitigation Plan
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VISION
JMT
Prepared By: SDB
Date: November, 2020

APPENDIX E – FIMA ROUTINE USE LETTER FOR KENT COUNTY PRIVACY ACT REQUEST FOR FEMA'S REPETITIVE LOSS INFORMATION

U.S. Department of Homeland Security
Washington, DC 20472

FEMA

January 12, 2021

Brandon L. Olenik
Kent County Emergency Management
Kent County
911 Public Safety Boulevard
Dover, DE 19901

Re: Kent County Privacy Act Request for FEMA's Repetitive Loss Information

Dear Mr. Olenik,

Thank you for your request dated January 5, 2021 for data maintained by the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). Specifically, you seek NFIP flood insurance policy and claims information related to Kent County's Repetitive Loss (RL) properties. You indicated that you need specific property-owner level information to identify properties located in a flood zone; whether property is insured by a federal flood insurance policy; and whether flood insurance claims have been filed (including claims information and insurance payments). The information you are requesting will allow Kent County to update their All Hazards Plan.

FEMA approves your request and will send the information to you securely via email on a password-protected spreadsheet or pdf. Specifically, based on this request FEMA will share with you the data elements listed in Appendix A of this letter. FEMA discloses this to you pursuant to the "routine use" provision of the Privacy Act of 1974, 5 U.S.C. § 552a(b)(3), specifically under Routine Use (T) of the System of Records Notice (SORN), DHS/FEMA-003 - National Flood Insurance Program Files 79 FR 28747 (May 19, 2014). This Routine Use allows FEMA to disclose personally identifiable information (PII) of the NFIP to community officials and representatives to provide repetitive loss records of properties within that community.

However, Kent County does not have permission to release the provided information to third parties, including third party contractors. Unauthorized disclosure of FEMA data will result in an immediate denial of access to the FEMA data. Pursuant to the Privacy Act, 5 U.S.C. § 552a(e)(10), please destroy or return said PII to FEMA once you no longer have use for it.

In the event of a privacy incident resulting from this sharing of FEMA PII, Kent County shall immediately, but in no event later than twenty-four (24) hours from suspicion, discovery or notification of the suspected or confirmed privacy incident, notify the FEMA Privacy Officer at (202) 212-5100 or FEMA-Privacy@fema.dhs.gov. FEMA will investigate the incident pursuant to DHS standard procedures and will

www.fema.gov

consult the Kent County in order to diagnose, mitigate and manage the privacy incident. Kent County will be responsible for carrying out all necessary measures to remedy the effects of the privacy incident.

By accepting the FEMA data, Kent County agrees that it shall bear all costs, losses and damages to the extent resulting from Kent County's breach of FEMA data. Kent County further agrees to release, defend, indemnify, and hold FEMA harmless for claims, losses, penalties and damages, and reasonable attorneys' fees and costs to the extent arising out of Kent County's, or its contractor's, negligence, unauthorized use or disclosure of FEMA PII and/or Kent County's, or its contractor's, breach of its obligations under this sharing.

If you or your staff has any questions or need additional information about this matter, please contact Rich Sobota at 267 319-6341 or richard.sobota@fema.dhs.gov .

Sincerely,

JEFFREY M JACKSON

Digitally signed by JEFFREY M JACKSON
Date: 2021.01.12 15:10:49 -05'00'

Jeffrey Jackson
Deputy Assistant Administrator, Federal Insurance
DHS/FEMA/Resilience/FIMA

www.fema.gov

APPENDIX F – HAZUS SUMMARY REPORTS

This Appendix provides the results from the Hazus-MH, which was performed as part of the Risk Assessment. Included in this Appendix are the Hazus Summary Reports for a simulated 100-year, 200-year, 500-year, and 1000-year wind events, and for a 1000-year earthquake event.