HAZARD MITIGATION PLAN

Delaware County, Pennsylvania

October
2022

Prepared By:
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EXECUTIVE SUMMARY

The 2022 update to the Delaware County Hazard Mitigation Plan (HMP) was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 requires states and local governments to prepare HMPs to remain eligible to receive pre-disaster mitigation grant funds and funds made available in the wake of federally declared disasters. Additionally, DMA 2000 effectively improves the disaster planning process by increasing hazard mitigation planning requirements for hazard events. DMA 2000 requires participating municipalities to (1) document their hazard mitigation planning process and (2) identify hazards; potential losses; and mitigation needs, goals, and strategies.

The Delaware County HMP represents the work of citizens, elected and appointed government officials, business leaders, and volunteer and nonprofit groups to protect community assets, preserve economic viability of the community, and save lives. DMA 2000 regulations require formal updates and adoptions of local plans every 5 years, reassessing risks, and updating local strategies to manage and mitigate those risks. To comply, Delaware County and inclusive jurisdictions actively participated in updating the county HMP. Extensive outreach efforts by Delaware County's Department of Emergency Services resulted in participation by 33 of the county's 49 municipalities and the Brandywine Conservancy and Museum of Art Special District. Upon completion and approval of the HMP, participating jurisdictions will continue to address and implement findings and recommendations of this plan update. This 2022 version is an update of the county HMP, with the previous HMP developed in 2016.

Table ES-1 identifies jurisdictions that actively participated in the HMP update process.

Table ES-1. Participating Jurisdictions in the 2022 Delaware County HMP Update

Participating Jurisdictions				
• Delaware County	• Chester Heights Borough	• Haverford Township	• Radnor Township	• Tinicum Township
• Aldan Borough	• Chester Township	• Marcus Hook Borough	• Ridley Park Borough	• Upland Borough
• Aston Township	• Clifton Heights Borough	• Marple Township	• Ridley Township	• Upper Chichester Township
• Bethel Township	• Concord Township	• Media Borough	• Rutledge Borough	• Upper Darby Township
• Brookhaven Borough	• Darby Borough	• Middletown Township	• Springfield Township	• Upper Providence Township
• Chadds Ford Township	• Darby Township	• Newtown Township	• Swarthmore Borough	• Yeadon Borough
• Chester City	• Eddystone Borough	• Prospect Park Borough	• Thornbury Township	• Brandywine Conservancy and Museum of Art Special District
Non-Participating Jurisdictions				
• Collingdale Borough	• Folcroft Borough	• Lower Chichester Township	• Nether Providence Township	• Rose Valley Borough
• Colwyn Borough	• Glenolden Borough	• Millbourne Borough	• Norwood Borough	• Sharon Hill Borough
• East Lansdowne Borough	• Lansdowne Borough	• Morton Borough	• Parkside Borough	• Trainer Borough
• Edgmont Township				

During the plan update process, Delaware County and its participating municipalities engaged in the following planning process steps:

1. Identified and prioritized hazards that may affect the county and its municipalities.
2. Assessed the county's and each municipalities' vulnerabilities to these hazards.
3. Identified mitigation actions that can reduce those vulnerabilities.
4. Developed a strategy for implementing those actions, including identifying the agency (or agencies) responsible for each implementation.

Throughout the planning process, the general public was offered an opportunity to comment on the existing HMP and provide suggestions for the updated version. The county hosted a Planning Team meeting that was open to the public, during which residents could provide input on the HMP.

The following hazards were identified by the Planning Team as presenting the highest risk to the county and its municipalities:

- Floods, Flash Flood, Ice Jam
- Winter Storm
- Drought and Water Supply Deficiencies
- Environmental Hazards: Hazardous Materials Releases
- Utility Interruption
- Hailstorm
- Extreme Temperature

This HMP also includes hazard profiles for the following hazards (listed in order of risk factor analysis ranking):

- Radon Exposure
- Tornado, Windstorm
- Pandemic and Infectious Disease
- Environmental Hazards: Oil and Natural Gas Pipelines
- Lightning
- Transportation Accident
- Wildfire
- Hurricane, Tropical Storm, Nor'easter
- Urban Fire and Explosions
- Dam Failure
- Subsidence, Sinkholes
- Terrorism
- Landslide

- Civil Disturbance
- Earthquake
- Levee Failure

To mitigate the effects of those hazards, the Planning Team identified the following goals for hazard mitigation over the next 5 years:

1. **Goal 1:** Prevent injury/death, damage, and other impacts from natural and man-made hazards in Delaware County.
2. **Goal 2:** Protect the citizens of Delaware County as well as public and private property from the impacts of natural and human-caused hazards.
3. **Goal 3:** Increase public education and awareness of existing and potential hazards in Delaware County and what people can do to reduce their vulnerability.
4. **Goal 4:** Improve response and recovery capabilities in Delaware County to protect citizens from natural and human-caused hazards.
5. **Goal 5:** Protect and restore existing natural resources.

Objectives and actions to be implemented are discussed in the Mitigation Action Plan in Section 6.2 of this HMP.

Additionally, Planning Team members will meet annually to evaluate the status of plan implementation and prepare a summary report of HMP status and any needed updates. The mitigation evaluation will address changes as new hazard events occur, as the area develops, and as more information becomes available pertaining to hazards and their impacts. The evaluation will include an assessment of whether the planning process and actions have been effective, whether development or other issues warrant changes to the HMP or its priorities, if progress toward the communities' goals is satisfactory, and whether changes are warranted. The public is encouraged to give feedback (1) by directly contacting the County Hazard Mitigation Plan Coordinator, (2) during recurring review meetings, and (3) during the 5-year revision process.

To request information or provide comments regarding this plan, please contact the Delaware County Department of Emergency Services. Contact information is provided below.

Mailing Address:	Hazard Mitigation Plan Coordinator c/o Delaware County Emergency Services 360 N. Middletown Road Lima, PA 19063
Contact Name:	Larry Bak, Deputy Director, Emergency Management
E-mail Address:	BakL@co.delaware.pa.us
Telephone:	(610) 565-8700

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APPENDICES

CERTIFICATION OF ANNUAL REVIEW

The Delaware County Hazard Mitigation Steering Committee and Planning Team have reviewed this Hazard Mitigation Plan (HMP). See Section 7 of this document for further details regarding this certification section. The HMP Coordinator hereby certifies the review.

Year	Date of Meeting	Public Outreach Addressed?*	Signature
2023			
2024			
2025			
2026			
2027			

** Confirm yes here annually and describe on record of changes page.*

RECORD OF CHANGES

Date	Description of Change Made, Mitigation Action Completed, or Public Outreach Performed	Change Made By (Print Name)	Change Made By (Signature)

REMINDER: *Please attach all associated meeting agendas, sign-in sheets, handouts, and minutes.*

SECTION 1 INTRODUCTION

This section presents background information, describes the purpose, and defines the scope of the 2022 update of the Delaware County Hazard Mitigation Plan (HMP).

1.1 BACKGROUND

Across the United States, natural and human-caused disasters have led to increasing levels of deaths, injuries, property damage, and interruptions of business and government services. The time, money, and effort spent to recover from these disasters exhaust resources, diverting attention from important public programs and private efforts.

Delaware County, Pennsylvania, has experienced a significant number of statewide or county-specific disaster declarations since 1955 (Federal Emergency Management Agency 2020). The emergency management community, citizens, elected officials, and other stakeholders in Delaware County recognize the impact of disasters on their community and have concluded that proactive efforts need to be taken to reduce the impact of natural and human-caused hazards. For that purpose, Delaware County is committed to updating and maintaining the Delaware County HMP.

"Hazard mitigation" describes actions taken to prevent, reduce, or eliminate the long-term risks to life and property caused by a disaster (Federal Emergency Management Agency 2020). Pre-disaster mitigation actions are taken in advance of a hazard event. These actions are a key component to breaking the typical disaster cycle. Most communities sustain damage from storm events, rebuild the same way, and undergo damage again. With careful selection, mitigation actions can be long-term, cost-effective measures taken to reduce the risk of loss (Pennsylvania Emergency Management Agency 2019).

The Delaware County Hazard Mitigation Steering Committee and Planning Team have participated in this HMP update. The Steering Committee was composed of officials from Delaware County, the Delaware Valley Regional Planning Commission, municipalities, stakeholder organizations, and commonwealth and federal agencies. The Planning Team was composed of additional Delaware County officials, municipal representatives, emergency responders, and representatives from utility companies and commonwealth and federal agencies. Delaware County contracted Tetra Tech, Inc. (Tetra Tech) to prepare the 2022 HMP update.

The HMP update is the result of several months of collaboration between the county's citizens and officials and Tetra Tech's representatives to develop a pre-disaster, multi-hazard mitigation plan that will guide the county toward greater disaster resistance while respecting the character and needs of the community.

1.2 PURPOSE

The purpose of this HMP is to minimize the effects that natural, technological, and man-made hazards have on the people, property, environment, and business operations within Delaware County. This document exists to provide the background information and rationale for the mitigation actions that the Steering Committee, Planning Team, and municipal representatives have chosen to implement across the county.

The document is governed by the Disaster Mitigation Act of 2000 (DMA 2000) and its implementing regulations (Title 44 *Code of Federal Regulations* [CFR] §201.6, published February 26, 2002). Local jurisdictions must comply with DMA 2000 and these regulations to remain eligible for funding and technical assistance from state and federal hazard mitigation programs.

1.3 SCOPE

The implementation actions outlined within this HMP apply to Delaware County and any municipalities within the county that adopt this plan. Only those municipalities that have participated in the plan update process may

adopt this plan and will be eligible for state and federal hazard mitigation funding. For the purpose of this plan, municipal participation was defined as completion and submission of an Evaluation of Identified Hazards Worksheet, Capability Assessment Survey, National Flood Insurance Program (NFIP) Survey, and/or Mitigation Strategy 5-Year Plan Review Worksheet, and attendance by an official municipal representative at a planning or public meeting, or participation in individual outreach conducted as part of the planning process.

1.4 AUTHORITY AND REFERENCE

This HMP was prepared in accordance with the following regulations and guidance:

- FEMA "Local Mitigation Planning Handbook," March 2013
- FEMA "Integrating Hazard Mitigation into Local Planning," March 1, 2013
- FEMA "Plan Integration: Linking Local Planning Efforts," July 2015
- Local Mitigation Plan Review Guide, October 1, 2011
- DMA 2000 (Public Law 106-390), October 30, 2000
- 44 CFR Parts 201 and 206 (including Feb. 26, 2002, Oct. 1, 2002; Oct. 28, 2003; and Sept. 13, 2004 Interim Final Rules)
- FEMA "How-To Guide for Using HAZUS-MH for Risk Assessment" (Document No. 433), February 2004
- FEMA Mitigation Planning How-To Series (FEMA 386-1 through 4), 2002
  Available online at: http://www.fema.gov/fima/planhowto.shtm.
- FEMA "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards," January 2013
- Commonwealth of Pennsylvania's All-Hazard Mitigation Planning Standard Operating Guide, 2020

Appendix A contains a full set of references used in updating this HMP.

SECTION 2 COUNTY PROFILE

Section 2 of the Delaware County Hazard Mitigation Plan (HMP) discusses the geography and environment, community facts, population and demographics, and land use and development in Delaware County.

2.1 GEOGRAPHY AND ENVIRONMENT

Delaware County is located in the southeastern portion of Pennsylvania (Figure 2-1) and encompasses approximately 191 square miles. The county has 49 municipalities and is the oldest settled section of Pennsylvania. Delaware County is bordered to the northwest by Chester County; to the northeast by Montgomery County; to the east by Philadelphia County; and to the south by the Delaware River, the State of Delaware, and the State of New Jersey.

Delaware County is 66 percent urban developed land with bands of development radiating from Philadelphia. It is the second most densely developed county in the region and the fifth most populous county in the Commonwealth. The northern and western regions of the county are suburban and, in some instances, rural and agricultural. The county's natural and cultural resources are abundant and play a major role in attracting residents and new industry. The county contains 36 Natural Heritage Areas, 800 acres of agricultural land, and approximately 29,000 acres of recreational land and open space accounting for 23 percent of its land use. There are over 20,000 public and private historic and cultural resources (Delaware County Planning Department 2013).

Ridley Creek State Park is located within the county and consists of 2,606 acres of woodlands and meadows. The John Heinz National Wildlife Refuge includes 200 acres of tidal marsh and is home to a variety of bird species. These natural resources aid Delaware County in managing stormwater runoff and reduce flood risk while improving the quality of life for residents. The county's comprehensive plan prioritizes directing future growth to existing developed areas to maintain green and open space (Delaware County Planning Department 2013).

2.1.1 Topography and Geology

Delaware County has low to moderate relief, with the highest point being approximately 500 feet and the lowest point being along the Delaware River. The county is composed of two distinct physiographic regions. Its southern area along the Delaware River is within the Atlantic Coastal Plain. The area is low, flat, and composed of poorly drained sand and gravel. The underlying rock is schist. The remainder of the county is in the Piedmont Plateau and is characterized by rolling uplands, low hills, and well-drained soils. The county mostly consists of dark crystalline rocks, light crystalline rocks, unconsolidated sediments, and limestone or dolomite (Pennsylvania Department of Conservation and Natural Resources 2008).

2.1.2 Hydrography and Hydrology

Delaware County has numerous streams and creeks constituting 13 major watersheds draining to the Delaware River basin. Figure 2-2 displays the watersheds of Delaware County.

The county is bordered by the Delaware River to the south and contains several major watercourses: Brandywine Creek, Chester Creek, Cobbs Creek, Crum Creek, Darby Creek, Gulph Creek, Hermseprota Creek, Ithan Creek, Little Darby Creek, Meadowbrook Run, Muckinpattis Creek, Naamans Creek, Naylors Run, Ridley Creek, and Stoney Creek. In 1931, Crum Creek was dammed to create Springton Reservoir – a drinking water reservoir.

Drainage Basins and Watersheds

A watershed is the area of land that drains into a body of water, such as a river, lake, stream, or bay. It is separated from other systems by high points in the area, such as hills or slopes. It includes not only the waterway itself but also the entire land area that drains to it. For example, the watershed of a lake would include not only the streams

entering the lake but also the land area that drains into those streams and eventually the lake. The county's watersheds include Brandywine Creek, Chester Creek, Ridley Creek, Crum Creek, Darby Creek, Gulph Creek, Mill Creek, Schuylkill River, Cobbs Creek, Stoney Creek, Marcus Hook Creek, Delaware River, and Naamans Creek. Drainage basins generally refer to large watersheds that encompass the watersheds of many smaller rivers and streams. Delaware County is within the Delaware River basin.

2.1.3 Climate

Delaware County has a humid continental climate. While the average high temperature in July is 78.8 degrees, winters average 34.2 degrees (National Oceanic And Atmospheric Administration n.d.). Rainfall distribution throughout the year is relatively consistent. Typically, the highest annual rainfall occurs in July. However, thunderstorms or the occasional summer tropical storm or hurricane can dramatically increase rainfall totals for any given month. On average, the county receives 45 inches of precipitation per year (National Oceanic And Atmospheric Administration n.d.).

Figure 2-1. Base Map of Delaware County

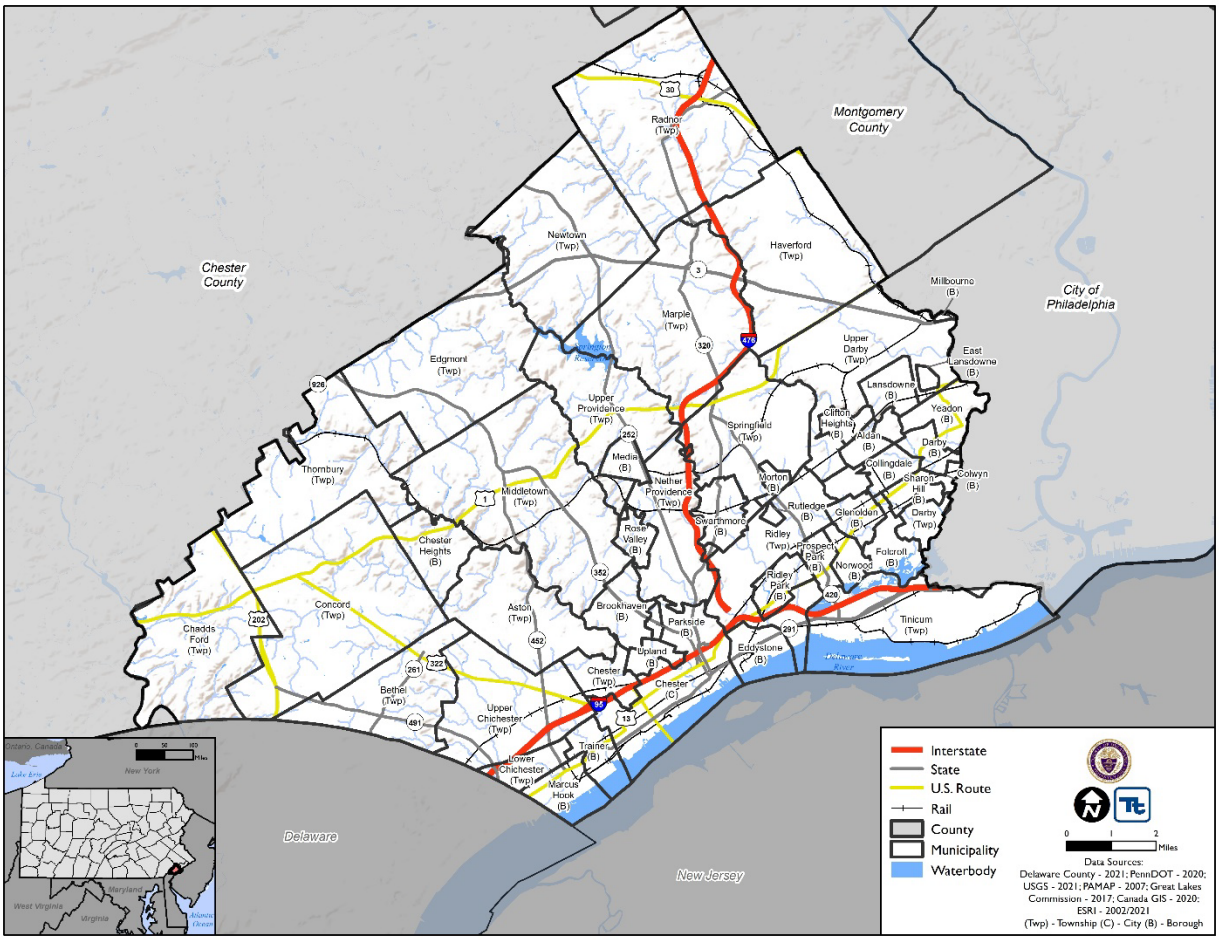
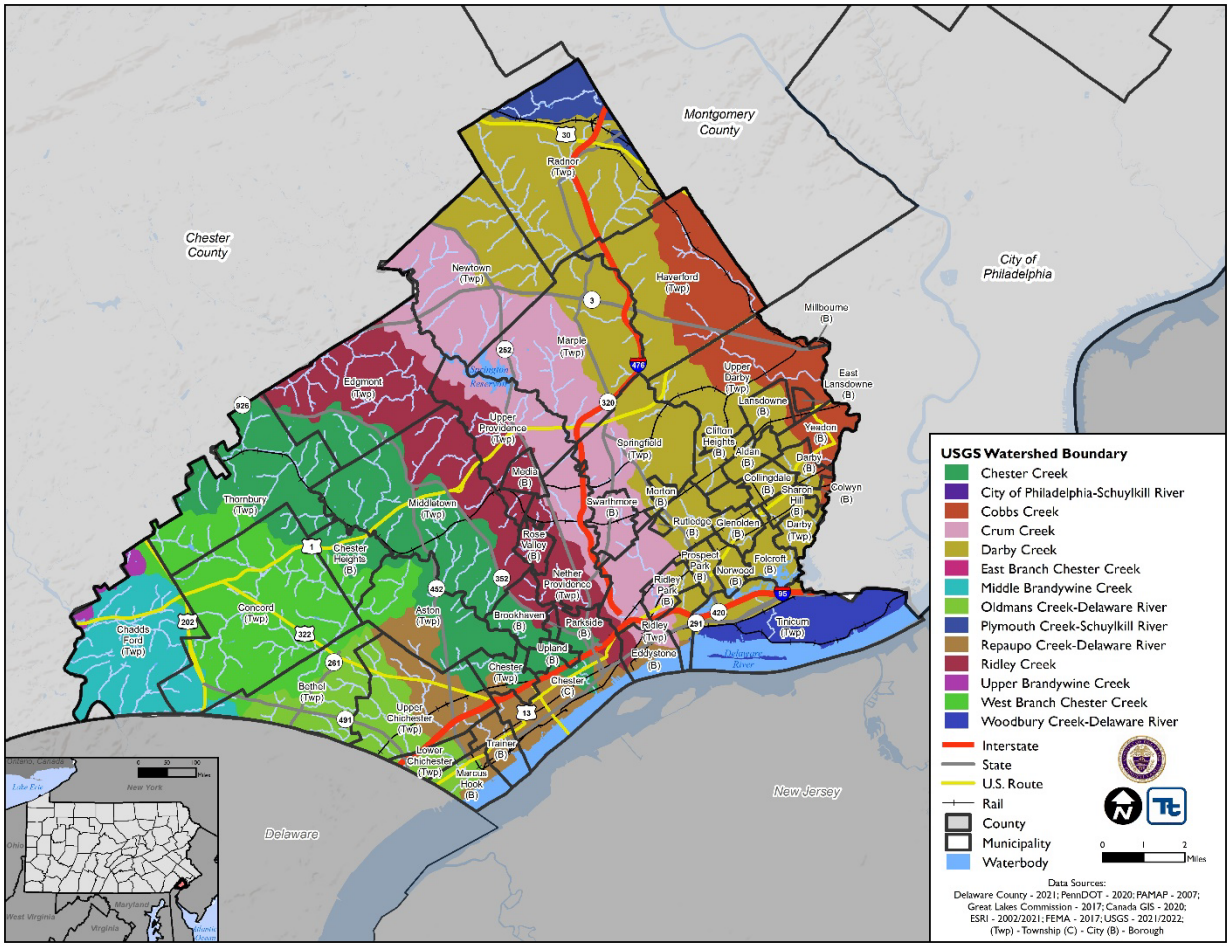


Figure 2-2. Watersheds Located Within Delaware County



2.2 COMMUNITY FACTS

Delaware County was created in 1789 from parts of Chester County. It was named after the Delaware River, which makes up the southern border of Delaware County (Delaware County n.d.). The county operates under a home rule charter that was adopted in 1972 (Delaware County n.d.). Delaware County consists of 49 municipalities composed of the following: one city, 27 boroughs, and 21 townships. These municipalities are listed below.

- Aldan Borough
- Aston Township
- Bethel Township
- Brookhaven Borough
- Chadds Ford Township
- Chester City
- Chester Heights Borough
- Chester Township
- Clifton Heights Borough
- Collingdale Borough
- Colwyn Borough
- Concord Township
- Darby Borough
- Darby Township
- East Lansdowne Borough
- Eddystone Borough
- Edgmont Township
- Folcroft Borough
- Glenolden Borough
- Haverford Township
- Lansdowne Borough
- Lower Chichester Township
- Marcus Hook Borough
- Marple Township
- Media Borough
- Middletown Township

- Millbourne Borough
- Morton Borough
- Nether Providence Township
- Newtown Township
- Norwood Borough
- Parkside Borough
- Prospect Park Borough
- Radnor Township
- Ridley Park Borough
- Ridley Township
- Rose Valley Borough
- Rutledge Borough
- Sharon Hill Borough
- Springfield Township
- Swarthmore Borough
- Thornbury Township
- Tinicum Township
- Trainer Borough
- Upland Borough
- Upper Chichester Township
- Upper Darby Township
- Upper Providence Township
- Yeadon Borough.

Media Borough has been the Delaware County seat since 1851, after being relocated from the City of Chester.

The major land uses and economic forces in Delaware County have historically been determined by its proximity to both Philadelphia and the Delaware River. Since it was first settled in the 1700s, people have been settling in concentric rings around Philadelphia to be in closer proximity to the trade and culture in the city. In the 20th century, large businesses and industrial operations began to move into Delaware County because of its proximity to trade routes along the Delaware River. These companies, including Boeing, Sun Shipbuilding, Ford Motor Company, Westinghouse Electric Company, Sun and Conoco Phillips Refineries, a portion of the Philadelphia International Airport, and numerous hospitals and universities led to opportunities for residents moving to the area (Delaware County n.d.).

2.3 POPULATION AND DEMOGRAPHICS

Population and demographic data provide baseline information about residents. Changes in demographics or population may be used to identify higher-risk populations. Maintaining up-to-date data on demographics will allow the county to better assess magnitudes of hazards and develop more specific mitigation plans. According to the 2020 U.S. Census, Delaware County had a population of 576,830, which represents a 3.2 percent increase from the 2010 U.S. Census population of 558,979. Table 2-1 presents the population statistics for Delaware County based on the 2000, 2010, and 2020 U.S. Census. Table 2-2 provides details regarding the demographics for Delaware County.

Table 2-1. Delaware County Population Statistics

Municipality	2000 Census	2010 Census	2020 Census	Population Change 2000-2020	Population Change 2000-2020 (%)	Population Density Per Square Mile
Aldan Borough	4,313	4,152	4,244	-69	-1.60%	7,129
Aston Township	16,203	16,592	16,791	588	3.63%	2,872
Bethel Township	6,421	8,791	9,574	3,153	49.10%	1,769
Brookhaven Borough	7,985	8,006	8,300	315	3.94%	4,862
Chadds Ford Township	3,170	3,640	3,972	802	25.30%	455
Chester City	36,854	33,972	32,605	-4,249	-11.53%	5,430
Chester Heights Borough	2,481	2,531	2,897	416	16.77%	1,302
Chester Township	4,604	3,940	4,080	-524	-11.38%	2,870
Clifton Heights Borough	6,779	6,652	6,863	84	1.24%	10,908
Collingdale Borough	8,664	8,786	8,908	244	2.82%	10,266
Colwyn Borough	2,453	2,546	2,474	21	0.86%	9,514
Concord Township	9,933	17,231	18,295	8,362	84.18%	1,341
Darby Borough	10,299	10,687	10,715	416	4.04%	12,758

Municipality	2000 Census	2010 Census	2020 Census	Population Change 2000-2020	Population Change 2000-2020 (%)	Population Density Per Square Mile
Darby Township	9,622	9,264	9,219	-403	-4.19%	6,511
East Lansdowne Borough	2,586	2,668	2,714	128	4.95%	13,163
Eddystone Borough	2,442	2,410	2,459	17	0.70%	1,585
Edgmont Township	3,918	3,987	4,283	365	9.32%	440
Folcroft Borough	6,978	6,606	6,792	-186	-2.67%	4,833
Glenolden Borough	7,476	7,153	7,223	-253	-3.38%	7,411
Haverford Township	48,498	48,491	50,431	1,933	3.99%	5,069
Lansdowne Borough	11,044	10,620	11,107	63	0.57%	9,423
Lower Chichester Township	3,591	3,469	3,425	-166	-4.62%	3,156
Marcus Hook Borough	2,314	2,397	2,454	140	6.05%	1,507
Marple Township	23,737	23,428	24,214	477	2.01%	2,298
Media Borough	5,533	5,327	5,901	368	6.65%	7,744
Middletown Township	16,064	15,807	16,373	309	1.92%	1,217
Millbourne Borough	943	1,159	1,212	269	28.53%	16,721
Morton Borough	2,715	2,669	2,778	63	2.32%	7,755
Nether Providence Township	13,456	13,706	14,525	1,069	7.94%	3,065
Newtown Township	11,700	12,216	15,002	3,302	28.22%	1,489
Norwood Borough	5,985	5,890	5,943	-42	-0.70%	7,300
Parkside Borough	2,267	2,328	2,321	54	2.38%	11,233
Prospect Park Borough	6,594	6,454	6,427	-167	-2.53%	8,678
Radnor Township	30,878	31,531	33,228	2,350	7.61%	2,408
Ridley Park Borough	7,196	7,002	7,186	-10	-0.14%	5,829
Ridley Township	30,791	30,768	31,053	262	0.85%	6,638
Rose Valley Borough	944	913	1,017	73	7.73%	1,387
Rutledge Borough	860	784	782	-78	-9.07%	5,472
Sharon Hill Borough	5,468	5,697	6,014	546	9.99%	7,839
Springfield Township	23,677	24,211	25,070	1,393	5.88%	3,954
Swarthmore Borough	6,170	6,194	6,543	373	6.05%	4,669
Thornbury Township	7,093	8,028	6,904	-189	-2.66%	747
Tinicum Township	4,353	4,091	3,983	-370	-8.50%	436
Trainer Borough	1,901	1,828	1,976	75	3.95%	1,422
Upland Borough	2,977	3,239	3,068	91	3.06%	4,742
Upper Chichester Township	16,842	16,738	16,898	56	0.33%	2,521
Upper Darby Township	81,821	82,795	85,681	3,860	4.72%	10,957
Upper Providence Township	10,509	10,142	10,852	343	3.26%	1,866
Yeadon Borough	11,762	11,443	12,054	292	2.48%	7,534
Delaware County	**550,864**	**558,979**	**576,830**	**25,966**	**4.71%**	**3,019**

Sources: U.S. Census Bureau 2000, 2010, and 2020

As shown in the tables above, Delaware County's 2020 Census population was 576,830. Based on these data, the population density of Delaware County is 3,019 persons per square mile, which is considerably higher than the Pennsylvania statewide average of 284 persons per square mile. Millbourne Borough has the highest

population density of all the municipalities in the county (16,721 persons per square mile). All the municipalities in Delaware County have population densities above the statewide average. Higher concentrations of people and structures can increase vulnerability to natural hazards. The potential for damage and injury in these urban areas is higher because of the greater concentration of people and property.

High-density areas pose a greater risk because a larger number of people and structures are concentrated in one area. There is the possibility for diseases to spread quicker in these areas and structural damage is expected during certain hazard events because of the proximity of buildings. It is likely that the magnitude of an emergency or disaster will increase in more populous areas. However, having a higher concentration of people in the same area will provide an opportunity to quickly disseminate information. Additional focus should be provided for evacuating and sheltering larger populations during emergencies and disasters.

Table 2-2. Demographics for Delaware County

Demographics	2010	2020
Total population	558,979	576,830
Male	266,526	271,636
Female	289,942	292,918
Median age (years)	38.5	39.0
Under 5 years	33,388	33,734
18 years and over	425,141	439,657
65 years and over	79,574	90,402
Total households	206,542	224,417
Group quarters population	23,055	20,846

Source: U.S. Census Bureau 2010 and 2020, 2005 – 2010 American Community Survey 5-Year Estimates, and 2015 – 2019 American Community Survey 5-Year Estimates

Vulnerable Populations

The DMA 2000 requires that HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events based on a number of factors, including their physical and financial ability to react or respond to a hazard and the location and construction quality of their housing.

Identifying concentrations of vulnerable populations can assist communities in targeting preparedness, response, and mitigation actions. Populations with a higher level of vulnerability may be more seriously affected during the course of an emergency or disaster.

Based upon Table 2-2, it is estimated that 3.6 percent of Delaware County's population lives in group quarters. The term "group quarters" refers to people living in communal settings, which can include inmates in a prison, students in a dorm, or elderly or mentally disabled individuals living in group care homes. Residents living in group quarters are often special needs populations. It is important to ensure that each group quarter facility has its own emergency plan to account for the unique needs of its residents during a hazard event.

Vulnerable populations have unique needs that should be taken into consideration by public officials to help ensure the safety of populations with a higher level of risk. For the purposes of this planning process, vulnerable populations in Delaware County include children, elderly, low-income, the physically or mentally disabled, and non-English speakers.

Age

Children are considered vulnerable to hazard events because they are dependent on others to safely access resources during emergencies and may experience increased health risks from hazard exposure. The elderly are more apt to lack the physical and economic resources necessary to respond to hazard events and are more likely

to suffer health-related consequences. Those living on their own may have more difficulty evacuating their homes. The elderly are also more likely to live in senior care and living facilities where emergency preparedness occurs at the discretion of facility operators.

According to the 2015-2019 American Community Survey 5-Year Estimates, the median age in Delaware County was 39 years. Approximately 16 percent of the county's total population is aged 65 and older. Older residents may have access and functional needs. For example, many may be unable to drive; therefore, special evacuation plans may be necessary. They may also have hearing or vision impairments that could make receiving emergency instructions difficult. Additionally, 6 percent of the county's total population is under the age of 5. Both older and younger populations have higher risks for contracting certain diseases. The county's combined population under 5 years of age and over 65 years of age represents approximately 22 percent of its total population.

Income

The 2015-2019 American Community Survey 5-Year Estimates indicate that median household income in Delaware County was $74,477 and the poverty rate was 9.9 percent. The U.S. Census Bureau identifies households with two adults and two children with an annual household income below $27,479 per year as living in poverty (U.S. Census Bureau 2021).

Physically or Mentally Disabled

Physically or mentally disabled individuals are defined as "Persons with a disability include those who have physical, sensory, or cognitive impairment that might limit a major life activity" (Centers for Disease Control and Prevention 2020). These impairments may increase the level of difficulty that individuals may face during an emergency. Cognitive impairments may reduce an individual's capacity to receive, process, and respond to emergency information or warnings. Individuals with a physical or sensory disability may face issues of mobility, sight, hearing, or reliance on specialized medical equipment. According to the 2015-2019 American Community Survey 5-Year Estimates, 11.5 percent of residents of Delaware County are living with a disability.

Non-English Speakers

Individuals who are not fluent or do not possess a working proficiency in English are vulnerable because they may have difficulty understanding information being conveyed to them. Cultural differences can also add complexity to how information is being conveyed to populations with limited proficiency of English (Centers for Disease Control and Prevention 2021). According to the 2015-2019 American Community Survey 5-Year Estimates, 12.3 percent of residents over the age of 5 primarily speak a language other than English at home. Of the 23,264 individuals who reported to speak English less than "very well", 32.1 percent speak Spanish, 32.6 percent speak other Indo-European languages, 42.8 percent speak Asian and Pacific Island Languages, and 35.4 percent speak other languages. Future hazard mitigation strategies should consider addressing language barriers to ensure that all residents can receive emergency instructions. Table 2-3 summarizes race and ethnicity population information for Delaware County.

Table 2-3. Race and Ethnicity in Delaware County

Race and Ethnicity	2010	% of Population	2020	% of Population
One race	548,000	98.0%	546,811	97.2%
White	405,233	72.5%	367,718	65.3%
Black or African American	110,260	19.7%	129,242	23.0%
American Indian and Alaska Native	874	0.2%	1,092	0.2%
Asian	26,277	4.7%	36,457	6.5%
Native Hawaiian and Other Pacific Islander	145	0.0%	153	0.0%
Some other race	5,211	0.9%	12,149	2.2%

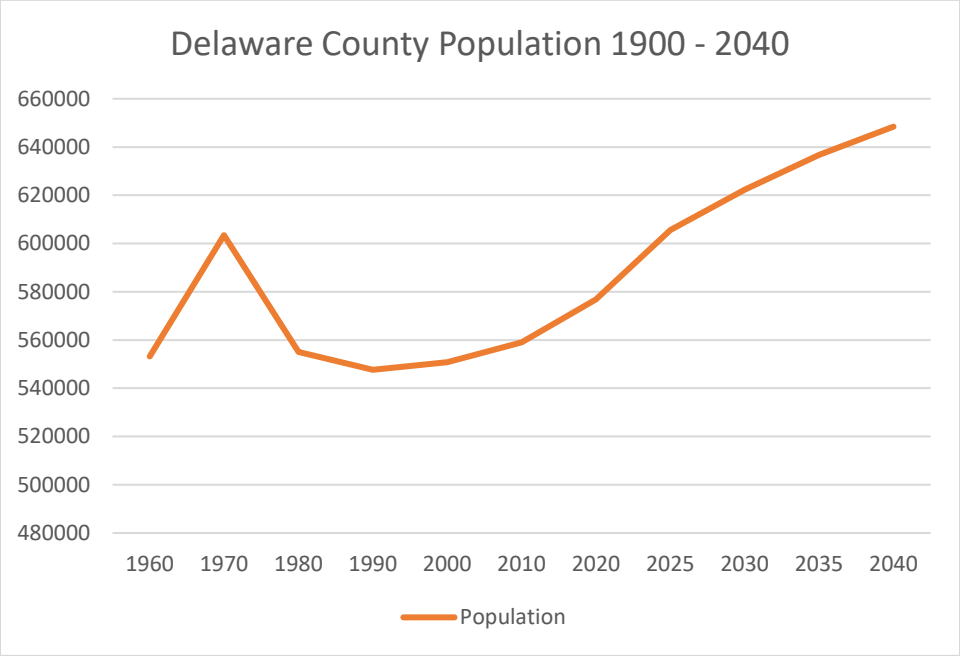
Race and Ethnicity	2010	% of Population	2020	% of Population
Two or more races	10,979	2.0%	30,019	5.3%
Foreign born	47,358	8.5%	58,846	10.5%
Speak a language other than English	56,969	10.2%	65,356	11.6%
Hispanic or Latino	16,537	3.0%	26,772	4.8%

Source: U.S. Census Bureau 2010 and 2020. 2015 - 2010 and 2014 – 2019 American Community Survey 5-Year Estimates

Population and Demographic Trends

This section discusses population trends to use as a basis for estimating future changes that could result from the seasonal character of the population and significantly change the character of the area. Population trends can provide a basis for making decisions on the type of mitigation approaches to consider and the locations in which these approaches should be applied. This information can also be used to support planning decisions regarding future development in vulnerable areas. Various Census Bureau products were used as sources for the population trends section. The Decennial Census is the official population count taken every 10 years. In addition to the U.S. Census historic counts, the population projections from the Pennsylvania State Data Center for Rural Pennsylvania and the Pennsylvania Department of Environmental Protection were utilized to provide insight into future population trends. Figure 2-3 depicts the county's population from 1900 – 2040. The county's population peaked in 1970 with a record high of 603,456. The Center for Rural Pennsylvania projects that the population will rapidly increase from 2020 to 2040 with an estimated 12.4 increase over three decades. The Department for Environmental Protection's population projections are more conservative, estimating less than a 1 percent increase between 2020 and 2040 accounting for a 2040 population of 571,458.

Figure 2-3 Delaware County Population Change and Projection, 1900 - 2040



Source: U.S. Census Bureau, Pennsylvania State Data Center for Rural Pennsylvania 2013, and PA DEP 2013

Population changes at the municipal level are also important to capture to better understand changing populations within the county and where the concentration of population resides. Table 2-4 provides population changes and projections in population for each municipality.

Table 2-4 provides population estimates and projections for each municipality in Delaware County and for the county as a whole. The Department of Environmental Protection estimates the population of the entire county to be 571,458 by the year 2040, which represents a net population increase of 19,484 people in a 30-year period. It is important to note that the population estimates calculated by the Center for Rural Pennsylvania estimate the 2040 population to be much higher at 648,439. As shown in the table below, 47 percent of municipalities in Delaware County are projected to see an increase in population with three municipalities are projected to increase population by more than 100 percent. The table also shows that 26 municipalities are projected to see a decrease in population. It should be noted that changes in population or demographics may be used to identify higher-risk populations. Maintaining up-to-date data on demographics will allow Delaware County to better assess magnitudes of hazards and develop more specific mitigation plans and strategies.

Table 2-4. Delaware County Population Projections by Municipality

Municipality	2000 Census	2010 Census	2020 Census	2030 Projection	2040 Projection	Population Change Estimate 2000 - 2040	Projected Population Change 2000- 2040 (%)
Aldan Borough	4,313	4,152	4,244	3,769	3,575	-738	-17.1%
Aston Township	16,203	16,592	16,791	17,969	18,675	2,472	15.3%
Bethel Township	6,421	8,791	9,574	12,167	13,836	7,415	115.5%
Brookhaven Borough	7,985	8,006	8,300	7,553	7,313	-672	-8.4%
Chadds Ford Township	3,170	3,640	3,972	4,239	4,528	1,358	42.8%
Chester City	36,854	33,972	32,605	28,132	25,193	-11,661	-31.6%
Chester Heights Borough	2,481	2,531	2,897	2,760	2,878	397	16.0%
Chester Township	4,604	3,940	4,080	3,263	2,922	-1,682	-36.5%
Clifton Heights Borough	6,779	6,652	6,863	6,231	6,015	-764	-11.3%
Collingdale Borough	8,664	8,786	8,908	8,513	8,362	-302	-3.5%
Colwyn Borough	2,453	2,546	2,474	2,525	2,509	56	2.3%
Concord Township	11,239	17,231	18,295	23,849	27,120	15,881	141.3%
Darby Borough	10,299	10,687	10,715	10,460	10,317	18	0.2%
Darby Township	9,622	9,264	9,219	7,868	7,151	-2,471	-25.7%
East Lansdowne Borough	2,586	2,668	2,714	2,679	2,681	95	3.7%
Eddystone Borough	2,442	2,410	2,459	2,369	2,349	-93	-3.8%
Edgmont Township	3,918	3,987	4,283	5,032	5,580	1,662	42.4%
Folcroft Borough	6,978	6,606	6,792	5,735	5,295	-1,683	-24.1%
Glenolden Borough	7,476	7,153	7,223	6,947	6,857	-619	-8.3%
Haverford Township	49,608	48,491	50,431	46,973	46,234	-3,374	-6.8%
Lansdowne Borough	11,044	10,620	11,107	9,573	9,044	-2,000	-18.1%
Lower Chichester Township	3,591	3,469	3,425	3,268	3,169	-422	-11.8%
Marcus Hook Borough	2,314	2,397	2,454	2,306	2,253	-61	-2.6%
Marple Township	23,737	23,428	24,214	23,563	23,653	-84	-0.4%
Media Borough	5,533	5,327	5,901	4,737	4,437	-1,096	-19.8%
Middletown Township	16,064	15,807	16,373	17,082	17,770	1,706	10.6%
Millbourne Borough	943	1,159	1,212	1,506	1,677	734	77.8%

Municipality	2000 Census	2010 Census	2020 Census	2030 Projection	2040 Projection	Population Change Estimate 2000 - 2040	Projected Population Change 2000- 2040 (%)
Morton Borough	2,715	2,669	2,778	2,504	2,419	-296	-10.9%
Nether Providence Township	13,456	13,706	14,525	14,187	14,427	971	7.2%
Newtown Township	11,700	12,216	15,002	13,099	13,537	1,837	15.7%
Norwood Borough	5,985	5,890	5,943	5,633	5,503	-482	-8.1%
Parkside Borough	2,267	2,328	2,321	2,317	2,308	41	1.8%
Prospect Park Borough	6,594	6,454	6,427	6,150	5,997	-597	-9.1%
Radnor Township	30,878	31,531	33,228	34,079	35,389	4,511	14.6%
Ridley Park Borough	7,196	7,002	7,186	6,449	6,168	-1,028	-14.3%
Ridley Township	30,791	30,768	31,053	30,432	30,256	-535	-1.7%
Rose Valley Borough	944	913	1,017	845	811	-133	-14.1%
Rutledge Borough	860	784	782	708	672	-188	-21.9%
Sharon Hill Borough	5,468	5,697	6,014	5,721	5,720	252	4.6%
Springfield Township	23,677	24,211	25,070	2,449	24,544	867	3.7%
Swarthmore Borough	6,170	6,194	6,543	6,233	6,252	82	1.3%
Thornbury Township	5,787	8,028	6,904	11,111	12,635	6,848	118.3%
Tinicum Township	4,353	4,091	3,983	3,710	3,523	-830	-19.1%
Trainer Borough	1,901	1,828	1,976	1,551	1,409	-492	-25.9%
Upland Borough	2,977	3,239	3,068	3,258	3,253	276	9.3%
Upper Chichester Township	16,842	16,738	16,898	18,115	18,849	2,007	11.9%
Upper Darby Township	81,821	82,795	85,681	84,474	85,305	3,484	4.3%
Upper Providence Township	10,509	10,142	10,852	10,346	10,475	-34	-0.3%
Yeadon Borough	11,762	11,443	12,054	10,887	10,612	-1,150	-9.8%
Delaware County	**551,974**	**558,979**	**562,848**	**567,327**	**571,458**	**19,484**	**3.5%**

Sources: U.S. Census Bureau 2000, 2010, and 2020 and PA DEP 2012

Housing

Delaware County has an estimated 229,208 housing units. These properties may be vulnerable to various natural hazards, particularly those located in defined hazard areas. Damage to residential properties is not only costly to repair or rebuild but is also devastating to the displaced residents.

According to the U.S. Census, approximately 6 percent of the county's residential properties are vacant; most vacancies are units available for rent. Vacant buildings are particularly vulnerable to arson and criminal activity. Because vacant properties are not inhabited year-round or may not be adequately maintained, many are structurally deficient and at risk of collapse.

Approximately 28.2 percent of the county's housing units are renter-occupied. Because renters are more transient than homeowners, communicating with renters may be more difficult than communicating with homeowners. Similarly, communications with tourists would be harder during an emergency event. Communication strategies should be developed to ensure that these populations receive proper notifications. Table 2-5 summarizes characteristics of the residential properties in Delaware County.

Table 2-5. Housing Characteristics in Delaware County

Housing Characteristics	2010	2020
Total housing units	222,249	224,417
Owner-occupied housing units	148,298	142,562
Renter-occupied housing units	58,244	64,695
Vacant housing units	16,003	17,160
Median value (dollars)	$232,300	$244,400
Housing units with a mortgage	103,926	94,149
Housing units without a mortgage	44,372	48,413

Source: 2005 - 2010 and 2014 – 2019 American Community Survey 5-Year Estimates

In 2019, the median household income in the county was $74,477, which was higher than the Commonwealth of Pennsylvania's estimated median household income of $61,744. Approximately 7.1 percent of family incomes in Delaware County were below the poverty level, and 9.9 percent of its individual incomes were below the poverty level (American Community Survey 2019). Emergency responders may have difficulty connecting with individuals within this economic bracket for several reasons, including less access to the Internet within these communities. Additionally, some low-income families and individuals may not own vehicles, and therefore could be more vulnerable during an evacuation. Table 2-6 summarizes economic characteristics of Delaware County's population and population distribution of residents with incomes below the poverty level.

Table 2-6. Economic Characteristics in Delaware County

Economic Characteristics	2010	2020
Median household income	$61,876	$74,477
Median family income	$77,879	$96,632
Per capita income	$32,408	$40,026
Families with income below the poverty level	6.9%	7.1%
Individuals with income below the poverty level	9.4%	9.9%

Source: 2005-2010 and 2015-2019 American Community Survey 5-Year Estimates

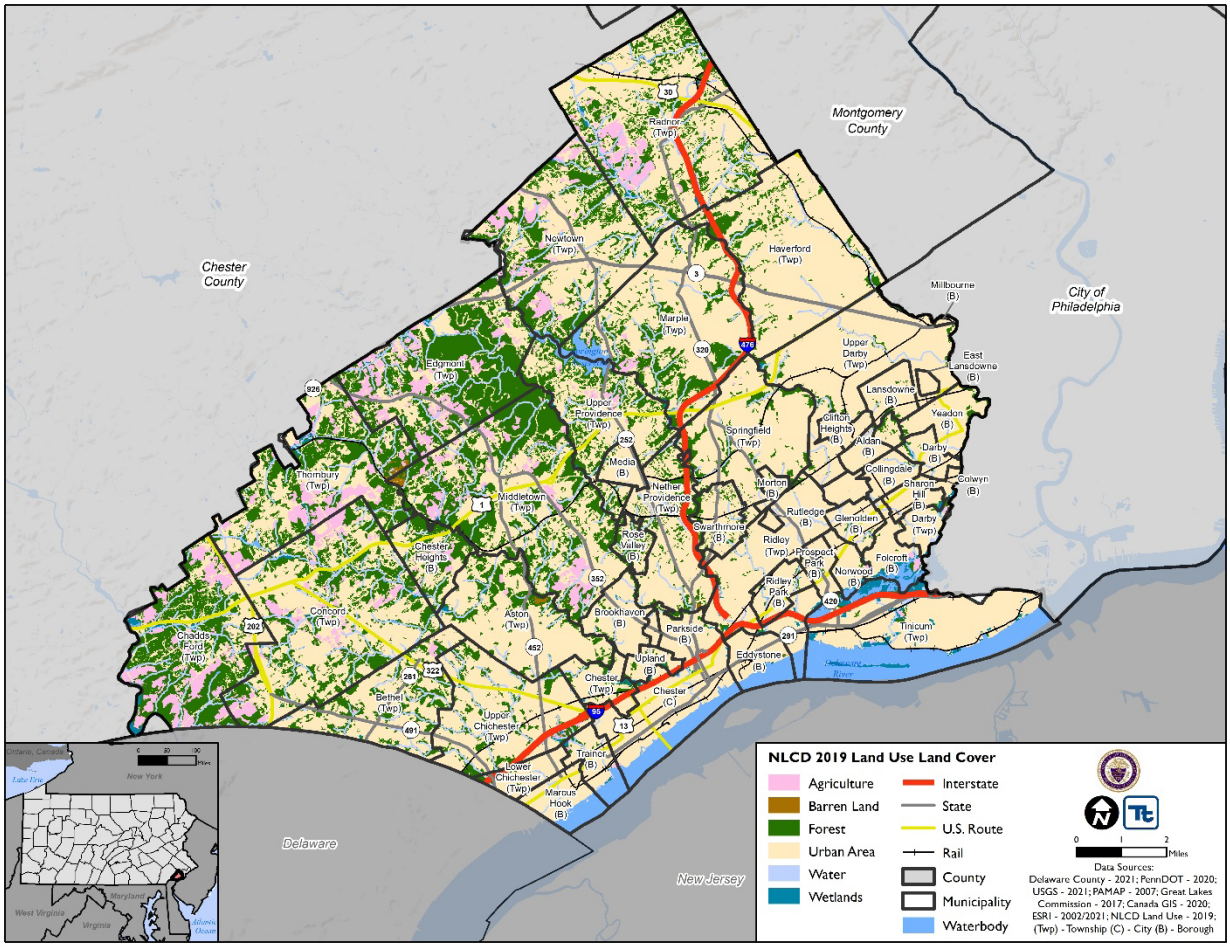
2.4 LAND USE AND DEVELOPMENT

Over 66 percent of Delaware County is developed with residential, commercial, and industrial land uses. Much of this developed land consists of single-family detached housing units and parking lots. The *Delaware County 2035 Land Use Policy Framework* states that 44 percent of the county's land use is residential, with 39 percent being single-family detached. Employment drivers, such as civic and institutional, commercial, and industrial activity, account for 15 percent of land use; 23 percent of land is dedicated to open space and 14 percent is infrastructure.

Figure 2-4 provides the current land cover map. Transportation facilities within Delaware County include highway, rail, and a major airport. Delaware County has an extensive network of major highways, including U.S. Interstates 476 (Blue Route) and 95; U.S. Routes 202, 322, 1, and 13; and PA Routes 252, 352, 452, 291, 3, 320, and 420. In addition to roadways, the county has a number of railroads, including the SEPTA regional rails, AMTRAK passenger lines, and multiple freight lines. The county also has 13 miles of waterfront along the Delaware River. The Philadelphia International Airport is in the southeast part of Delaware County.

Future growth for the county is focused on infill development to account for the majority of the county being developed. Redevelopment will be prioritized around existing infrastructure and identifying opportunities to create green spaces.

Figure 2-4. Delaware County Land Use and Land Cover



2.5 DATA SOURCES AND LIMITATIONS

The County Profile section of this HMP was developed with information from the following sources:

1. Delaware County 2035
2. Population Projection Report (PA DEP 2012)
3. U.S. Census Bureau, 2000, 2010 and 2020
4. U.S. Census Bureau, "American Factfinder – 2010 American Community Survey Delaware County"
5. U.S. Census Bureau, "American Factfinder – 2019 American Community Survey Delaware County"
6. Delaware County Conservation District

Section 1.4 lists general data sources used to develop the HMP as well as data sources used to perform geographic information system (GIS) analysis for the risk assessment. These sources were key in understanding the current demographic makeup of the community and in framing the foundation of the Plan. The sources listed provided the underlying context of the Plan and allowed the Planning Team to understand critical vulnerabilities in the county. Throughout the course of the planning process, the Planning Team continually sought additional data sources to augment the information included in the Plan. The Planning Team made multiple requests for existing jurisdictional documents (e.g., jurisdictional hazard mitigation plans and other relevant information) and municipal documents; however, the response was somewhat limited.

SECTION 3 PLANNING PROCESS

A successful planning process builds partnerships and brings together members representing government agencies, the public, and other stakeholders to reach consensus on ways the community will prepare for and respond to those hazards most likely to occur. Applying a comprehensive and transparent process adds validity to the Hazard Mitigation Plan (HMP). Participants involved in the HMP planning process gained better understanding of problems and issues and helped devise solutions and actions for the community—resulting in a revised set of common community values and widespread support for directing financial, technical, and human resources to agreed-upon actions.

The planning process was an integral part of updating the Delaware County HMP. This section describes the planning process used to update the HMP, with participation from 33 of the county's 49 municipalities and the Brandywine Conservancy and Museum of Art, a special district. This section also describes the hazard mitigation and multi-jurisdictional planning implemented by the Steering Committee and Planning Team in meetings and documentation with public and stakeholder participation during the HMP update process. Additional details about the process of updating each section of this HMP appear at the beginnings of each section.

3.1 UPDATE PROCESS AND PARTICIPATION SUMMARY

In accordance with the Disaster Mitigation Act of 2000 (DMA 2000) requirements, this plan documents the following topics:

- Planning process
- Hazard identification
- Risk assessment
- Mitigation strategy: goals, actions, and projects
- Formal adoption by the participating jurisdictions
- Pennsylvania Emergency Management Agency (PEMA) and Federal Emergency Management Agency (FEMA) approval

The PEMA All-Hazard Mitigation Planning Standard Operating Guide lays out the standard planning process in Pennsylvania to create and update HMPs (including this HMP), and is cited in Appendix A, under Authorities and References. Section 4 (Risk Assessment) describes hazard vulnerabilities and the risk assessment and Section 6 (Mitigation Strategy) describes the mitigation strategy for this HMP.

Public participation and planning meetings served as the main forum for gathering information to update the HMP. The Steering Committee and Planning Team were afforded access to information in relevant and approved plans, policies, and procedures for Delaware County. Opportunities for public participation included public meetings, distribution of information at municipal meetings, and chances to review and comment on the draft HMP update. To develop all sections of the HMP, the Planning Team used meetings, e-mail correspondence, and teleconferences to solicit input from county, municipal, and other stakeholders, including members of the general public. Most information received for this update came from Delaware County, its municipalities, and the Steering Committee. Through this planning process, the county established a comprehensive approach to reduce effects of hazards on the county and its municipalities.

3.2 THE PLANNING TEAM

Recognizing the need to manage risk within the county, and to meet the requirements of the DMA 2000, Delaware County Emergency Services led the update to the 2016 HMP. Mr. Larry Bak, Deputy Director, Emergency Management, developed a Steering Committee to provide guidance and direction to the planning effort, and to ensure the resulting document will be embraced both politically and by the constituency within the

planning area. Mr. Bak served as chair of the Steering Committee. Throughout the planning process, Mr. Bak served as the lead planner and point of contact for the planning process. The Steering Committee was comprised of the following individuals:

- Howard Lazarus, Executive Director, Delaware County
- Larry Bak, Deputy Director, Emergency Management, Delaware County Emergency Services
- Tim Boyce, Director of Emergency Services, Delaware County Emergency Services
- Sean Devlin, Emergency Management Specialist, Delaware County Emergency Services
- Sharon Jaye, Interim Director and Sustainability and Resilience Manager, Delaware County Public Works Department
- Denise Long, Office Manager, Delaware County Public Works Department
- Ed Magargee, District Manager, Delaware County Conservation District
- Sara Senkow, Emergent Threats Analyst, Delaware County Emergency Services
- Tom Shaffer, Interim Director and Manager of Transportation Planning, Delaware County Planning Department
- Anne Stauffer, Senior Planner, Delaware County Planning Department
- Tom Morgan, Emergency Management Coordinator (EMC), Aston Township
- Maryann Furlong, Tax Collector, Borough of Chester Heights
- Mark Possenti, Manager, Darby Borough
- Steven Poole, Deputy Emergency Management Coordinator (EMC), Haverford Township
- Patrick O'Connell, Emergency Management Director, Prospect Park Borough
- Steve Norcini, Township Engineer, Radnor Township
- Chris Gluck, EMC and Sergeant, Radnor Township
- John Pietrafitta, Emergency Management Coordinator (EMC), Springfield Township
- Tony Subbio, Project Manager, Tetra Tech

The Steering Committee was charged with the following tasks:

- Providing guidance and overseeing the planning process on behalf of the general planning partnership (Planning Team).
- Attending and participating in Steering Committee meetings.
- Assisting with the development and completion of certain planning elements, including:
    - Reviewing and updating the hazards of concern
    - Developing a public and stakeholder outreach program
    - Ensuring the data and information used in the plan update process is best available
    - Reviewing and updating the hazard mitigation planning goals and objectives
    - Identifying and screening appropriate mitigation strategies and activities
    - Reviewing and updating plan maintenance procedures
- Reviewing and commenting on plan documents prior to submittal to PEMA and FEMA.

A Planning Team was assembled to represent each of the municipalities participating in the HMP update, as well as invited stakeholders and members of the Steering Committee. The organizations listed below were invited to participate on the Planning Team.

Delaware County Jurisdictions				
• Delaware County	• Aldan Borough	• Aston Township	• Bethel Township	• Brookhaven Borough
• Chadds Ford Township	• Chester City	• Chester Heights Borough	• Chester Township	• Clifton Heights Borough
• Collingdale Borough	• Colwyn Borough	• Concord Township	• Darby Borough	• Darby Township
• East Lansdowne Borough	• Eddystone Borough	• Edgmont Township	• Folcroft Borough	• Glenolden Borough

• Haverford Township	• Lansdowne Borough	• Lower Chichester Township	• Marcus Hook Borough	• Marple Township
• Media Borough	• Middletown Township	• Millbourne Borough	• Morton Borough	• Nether Providence Township
• Newtown Township	• Norwood Borough	• Parkside Borough	• Prospect Park Borough	• Radnor Township
• Ridley Park Borough	• Ridley Township	• Rose Valley Borough	• Rutledge Borough	• Sharon Hill Borough
• Springfield Township	• Swarthmore Borough	• Thornbury Township	• Tinicum Township	• Trainer Borough
• Upland Borough	• Upper Chichester Township	• Upper Darby Township	• Upper Providence Township	• Yeadon Borough
Special District				
• Brandywine Conservancy and Museum of Art				
Educational Institutions				
• Chester Upland School District	• Chichester School District	• Garnet Valley School District	• Haverford Township School District	• Interboro School District
• Marple Newtown School District	• Penn-Delco School District	• Radnor Township School District	• Ridley School District	• Rose Tree Media School District
• Southeast Delco School District	• Springfield School District	• Upper Darby School District	• Wallingford-Swarthmore School District	• William Penn School District
• Cabrini College	• Cheyney University of PA	• Crozer Chester Medical School	• Delaware County Community College	• Delaware County Community College: Southeast Center
• Delaware County Community College: Upper Darby Center	• Eastern University	• Haverford College	• Neumann College	• Pennsylvania Institute of Technology
• PSU – Brandywine	• Swarthmore College	• Valley Forge Military Academy	• Villanova University	• Widener University
• Academy Of Notre Dame De Namur	• Agnes Irwin School	• Archbishop Carroll High School	• Aston DCIU Education Center	• Benchmark School
• Blessed Virgin Mary School	• Buxmont Academy/Woodlyn Center	• Cardinal Foley School	• Cardinal O'Hara High School	• Cheder Chabad
• Chi Institute	• Child Guidance Elementary Ed. Program	• Christ Memorial Classical Academy	• Christian Academy	• Church Of Atonement Day School
• Collingdale Nazarene Church	• Delaware County Christian School	• Delaware County Intermediate Unit	• Delaware County Technical High School: Marple Campus	• Delaware County Technical School: Aston Campus
• Delaware County Technical School: Folcroft Campus	• Drexel Neumann Academy	• Easterseals Southeastern Pennsylvania	• Elwyn Davidson School	• Faith Temple Christian School
• Frederick Douglass Christian School	• George Crothers Memorial School at Cades	• Glen Mills School	• Grayson School	• Haverford Friends School
• Hilltop Preparatory School	• Holy Child Academy	• Holy Cross School	• Holy Family Regional Catholic School	• Institute Of Islamic Studies
• Jack M. Barrack Hebrew Academy	• Keep Kindergarten	• Lane Montessori School	• Lansdowne Friends School	• Lansdowne Montessori School
• Life Discovery School Kindergarten	• LifeWorks School	• Little Lambs Christian Kindergarten	• Main Line Classical Academy	• Main Line Montessori

• Media Children's House	• Media Providence Friends School	• Melmark School	• Middletown Montessori School	• Monsignor Bonner and Archbishop Prendergast High School
• Mother of Providence Regional Catholic School	• Mt. Pleasant Nursery School	• Notre Dame De Lourdes	• Our Lady of Angels Regional School	• Pennington Center
• Sacred Heart Academy	• Sacred Heart School	• Saint Aloysius Academy	• Saint Anastasia School	• Saint Andrews School
• Saint Bernadette School	• Saint Cornelius School	• Saint David's Episcopal Day School	• Saint Dorothy School	• Saint Eugene School
• Saint Faith Preschool and Kindergarten	• Saint Francis Of Assisi School	• Saint James Regional Catholic School	• Saint Katharine Of Siena	• Saint Laurence
• Saint Mark's Christian School	• Saint Mary Magdalen	• Saint Pius X School	• Saint Thomas The Apostle School	• Shiloh Development Academy
• Springton Lake Montessori School	• Ss. Colman-John Neumann School	• SS. Cyril & Philomena School	• Stratford Friends School	• The Episcopal Academy
• The School in Rose Valley	• Valley Forge Military Academy	• Vision Academy Charter School	• Walden School	
Hospitals				
• Community Hospital	• Crozer-Chester Medical Center	• Delaware County Memorial Hospital	• Delaware County Memorial Hospital	• Mercy-Fitzgerald Hospital
• Mercy-Fitzgerald Hospital	• Riddle Memorial Hospital	• Springfield Hospital at the Healthplex	• Taylor Hospital	
Fire Departments				
• Aston Beechwood Fire Company	• Bethel Township Hose Company	• Boeing Fire Brigade	• Bon Aire Fire Company	• Boothwyn Fire Company # 1
• Briarcliffe Fire Company	• Brookhaven Fire Company	• Brookline Fire Company	• Broomall Fire Company	• Cardington Stonehurst Fire Company
• Chester City Fire Company	• Chester Heights Fire Company	• Clifton Heights Fire Company	• Collingdale Fire Company # 1	• Colwyn Fire Company # 1
• Concordville Fire Association	• Congoleum Fire Brigade	• Conoco Phillips Fire and Rescue	• Darby Fire Company # 1	• Darby Township Fire Company
• Drexel Hill Fire Company	• East Lansdowne Fire Company # 1	• Eddystone Fire Company	• Edgemont Fire Company	• Essington Fire Company
• Excelon Fire and Rescue	• Felton Fire Company	• Feltonville Fire Company	• Folcroft Fire Company # 1	• Folsom Fire Company
• Garden City Fire Company	• Glenolden Fire Company # 1	• Goodwill Fire Company	• Green Ridge Fire Company	• Highland Park Fire Company
• Holmes Fire Company	• Lansdowne Fire Company	• Leedom Fire Company	• Lenni Fire Company # 1	• Lennox Park Fire Company # 1
• Lester Fire Company	• Lima Fire Company	• Linwood Fire Company	• Llanerch Fire Company	• Lyondel Chemical Fire Brigade
• Manoa Fire Company	• Marcus Hook Fire Company	• Media Fire Company	• Middletown Fire Company	• Milbourne Fire Company
• Milmont Fire Company	• Morton Fire Company	• Newtown Square Fire Company # 1	• Norwood Fire Company	• Oakmont Fire Company # 1
• Ogden Fire Company	• Parkside Fire Company # 1	• Primos/Secane Fire Company	• Prospect Park Fire Company	• Radnor Fire Company
• Reliance Hook & Ladder Company	• Ridley Park Fire Company	• Rose Tree Fire Company	• Rutledge Fire Company	• S.M. Vauclain Fire Company
• Sharon Hill Fire Company	• South Media Fire Company	• Springfield Fire Company	• Sun Oil Fire Brigade	• Swarthmore Fire Company
• Trainer Fire Company	• Upland Fire Company	• Upper Darby Fire Company # 3	• Viscose Fire Company	• Woodlyn Fire Company
• Yeadon Fire Company				

Police Departments				
• Aldan Borough Police	• Aston Township Police	• Bethel Township Police	• Brookhaven Borough Police	• Chester City Police
• Chester Township Police	• Clifton Heights Police	• Collingdale Borough Police	• Colwyn Borough Police	• Darby Borough Police
• Darby Township Police	• East Lansdowne Police	• Eddystone Police Department	• Folcroft Borough Police	• Glenolden Borough Police
• Haverford Township Police	• Lansdowne Borough Police	• Lower Chichester Police	• Marcus Hook Borough Police	• Marple Township Police
• Media Borough Police	• Millbourne Borough Police	• Morton Borough Police	• Nether Providence Police	• Newtown Township Police
• Norwood Borough Police	• Parkside Borough Police	• Pennsylvania State Police	• Prospect Park Police	• Radnor Township Police
• Ridley Park Police	• Ridley Township Police	• Sharon Hill Borough Police	• Springfield Township Police	• Swarthmore Borough Police
• Tinicum Township Police	• Trainer Borough Police	• Upland Borough Police	• Upper Chichester Police	• Upper Darby Township Police
• Upper Providence Police	• Yeadon Borough Police			
Additional Emergency Medical Services (EMS) Agencies				
• CKHS EMS	• Crozer EMS	• EMStar Medical Transport	• Event Medical Staffing Solutions	• Marple Township Ambulance Corps
• Mercy Fitzgerald EMS	• National Event Services	• On Time Ambulance, Inc.	• Premium Care Medical Transport LLC	• Riddle Advanced Life Support Unit
• Ridley Emergency Medical Services, Inc.	• Springfield Ambulance Corps	• Stat Medical Transport LLC	• Tinicum EMS	• Villanova Emergency Medical Service
Neighboring Jurisdictions				
• Chester County Department of Emergency Services	• Gloucester County, NJ Office of Emergency Management	• Montgomery County Planning Commission	• Montgomery County Public Safety	• New Castle County Emergency Management
• Philadelphia Office of Emergency Management				
Other Stakeholders				
• American Red Cross	• Delaware Valley Regional Planning Commission	• Federal Emergency Management Agency	• Pennsylvania Department of Environmental Protection	• Pennsylvania Emergency Management Agency
• Pennsylvania Turnpike Commission	• Southeastern Pennsylvania Regional Task Force	• Southeastern Pennsylvania Transit Authority		

Appendices C, D and E include complete lists of individual invitees and participants, attendance at meetings, completion of worksheets, and submittal of comments.

The Planning Team acknowledged that important steps in developing a comprehensive HMP included identifying hazards that specifically affect Delaware County, and assessing their likelihood of occurrence, along with potential damage to the people, property, and environment of the county. The Planning Team chose to focus on an all-hazards approach rather than to narrow the focus to natural disasters only.

As the contract consultant, Tetra Tech guided the Steering Committee and Planning Team through the HMP update planning process. More specifically, Tetra Tech was tasked with:

- Assisting with the organization of a Steering Committee and Planning Team
- Assisting with the development and implementation of a public and stakeholder outreach program
- Collecting data
- Facilitating and recording attendance at meetings
- Assisting with the review, update, and ranking of the hazards of concern, and hazard profiling, and risk assessment
- Assisting with the review and update of mitigation planning goals and objectives
- Assisting with the review of progress of past mitigation strategies
- Assisting with the screening of mitigation actions and the identification of appropriate actions
- Assisting with the prioritization of mitigation actions
- Authoring of the draft and final HMP documents

3.3 MEETINGS AND DOCUMENTATION

Tetra Tech assisted the county in drafting planning documents, preparing meeting materials, and facilitating meetings. The Steering Committee reviewed documentation, provided validation, and acted as an advocate for the HMP update.

Table 3-1 lists dates and descriptions of meetings held by the Delaware County Steering Committee and Planning Team as part of the process of updating the Delaware County HMP.

Table 3-1. Public and Planning Meetings

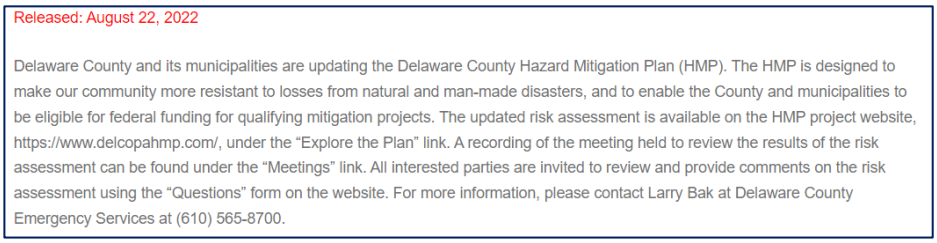
Date	Description of Meeting
October 25, 2021	Kickoff meeting with the Steering Committee
November 16, 2021	Kickoff Meeting with Planning Team members, including 5-year plan review and plan update process, evaluation of identified hazards, capability assessment, and mitigation strategy review.
December 8, 2021	Hazard mitigation planning discussed at the Delaware County Local Emergency Planning Committee (LEPC) Meeting
March 9, 2022	Hazard mitigation planning discussed at the 1Q22 Emergency Management Coordinator (EMC) Training
June 14, 2022	Planning Team Meeting to review the results of the risk assessment. The Planning Team members identified problem areas and issues throughout the County for each hazard.
June 21, 2022	Hazard mitigation planning discussed at the 2Q22 Emergency Management Coordinator (EMC) Training
June 22, 2022	Hazard mitigation planning discussed at the Delaware County Local Emergency Planning Committee (LEPC) Meeting
June 29, 2022	Mitigation Strategy Workshop to review mitigation goals, objectives, actions, and current plan status with the Planning Team.
June 29 – August 12, 2022	Direct outreach and teleconference discussions with municipalities, to garner as much participation in the planning process as possible.
October 18, 2022	Public HMP Draft Review Meeting to receive comments on the draft HMP.
TBD	HMP adoption by County Commissioners.

The Steering Committee followed up each meeting with meeting notes that documented all agenda topics, decisions, and action items identified. The meeting minutes were posted to the project website. Appendix C includes documentation from all meetings.

Delaware County residents were informed of the planning process through various sources, including newspaper-announced public notices and announcements on the Delaware County HMP project website (delcopahmp.com). Two individuals submitted comments on the draft HMP through the project website; those comments are included in Appendix E.

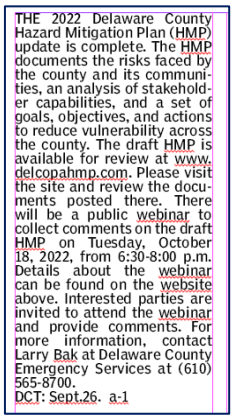
Though an administrative error prevented a public notice from being published to advertise the Risk Assessment Review Meeting, Delaware County subsequently issued a public notice alerting the whole community of the availability of the updated risk assessment information and requested feedback. That notice was also issued as a press release and published on external websites. Delaware County also issued a public notice to advertise the Draft Review Meeting. Figure 3-1 includes copies of these notices. No members of the general public attended. Any subsequent supporting documentation provided by county residents will be included in Appendix E (Public and Stakeholder Participation).

Figure 3-1. Public Notices



Released: August 22, 2022

Delaware County and its municipalities are updating the Delaware County Hazard Mitigation Plan (HMP). The HMP is designed to make our community more resistant to losses from natural and man-made disasters, and to enable the County and municipalities to be eligible for federal funding for qualifying mitigation projects. The updated risk assessment is available on the HMP project website, https://www.delcopahmp.com/, under the "Explore the Plan" link. A recording of the meeting held to review the results of the risk assessment can be found under the "Meetings" link. All interested parties are invited to review and provide comments on the risk assessment using the "Questions" form on the website. For more information, please contact Larry Bak at Delaware County Emergency Services at (610) 565-8700.



THE 2022 Delaware County Hazard Mitigation Plan (HMP) update is complete. The HMP documents the risks faced by the county and its communities, an analysis of stakeholder capabilities, and a set of goals, objectives, and actions to reduce vulnerability across the county. The draft HMP is available for review at www.delcopahmp.com. Please visit the site and review the documents posted there. There will be a public webinar to collect comments on the draft HMP on Tuesday, October 18, 2022, from 6:30-8:00 p.m. Details about the webinar can be found on the website above. Interested parties are invited to attend the webinar and provide comments. For more information, contact Larry Bak at Delaware County Emergency Services at (610) 565-8700.
DCT: Sept.26. a-1

3.4 PUBLIC AND STAKEHOLDER PARTICIPATION

To maximize effectiveness of the HMP, the Planning Team fostered continual public and stakeholder engagement. Input was encouraged and collected through a variety of methods. Five worksheets/surveys— the Hazard/Risk Identification Survey, Municipal Risk Factor Analysis, Capabilities Assessment Survey, NFIP Survey, and Mitigation Strategy 5-Year Plan Review Worksheet (Mitigation Review Worksheet) —were given to representatives from each municipality in Delaware County. Of the county's 49 municipalities, and the Brandywine Conservancy and Museum of Art special district, 35 jurisdictions (the county, 33 municipalities, and the special district) provided information so that their input could be reviewed and incorporated into the updated HMP.

The following entities with vested interest in development of the updated HMP were given the opportunity to participate in the planning process by attending a Planning Team or public meeting, completing a stakeholder survey (no responses were received through the publicly-available stakeholder surveys), or by offering comments on the project website: local, state, and federal agencies; neighboring jurisdictions (i.e., Chester and Montgomery Counties and the City of Philadelphia in Pennsylvania; New Castle County in Delaware; and Gloucester County in New Jersey); community leaders; educators; healthcare facilities; and other relevant private and nonprofit groups. Invitations to participate in meetings were sent to those stakeholders. Appendix E includes a copy of the Planning Team meeting invitation list and sample copies of invitation letters sent. Meeting invitations were also sent to all municipalities, including elected officials and Emergency Management Coordinators. Additionally, direct outreach by phone or one-on-one meetings was conducted with municipality

representatives unable to attend other meetings or who had questions about worksheets, participation requirements, the planning process, or mitigation project selection. Of the 49 municipalities and the special district, 30 of these partners had representatives attend at least one meeting; one more of the participating municipalities provided information through individual contact.

Through public notices published in the local newspapers, the groups listed in Section 3.2 and the general public were invited to visit the project website, review the draft county HMP update, and send comments to Delaware County Emergency Services. Appendix E includes copies of the public notices and other forms of public and stakeholder outreach.

Throughout the course of the entire planning process, the following stakeholder organizations participated:

• Adelphia	• Aqua America	• Boeing	• Braskem
• Chester City Bureau of Fire	• Constellation Energy	• Crozer Health	• Delaware County Local Emergency Planning Committee
• Delaware Valley Regional Planning Commission	• Eastern Delaware County Stormwater Collaborative	• Eddystone Police Department	• Energy Transfer
• Federal Emergency Management Agency Region 3	• Hepaco	• Iceworks	• Lewis
• Liberty Electric	• Main Line Health	• Menzies	• MIPC, LLC, a subsidiary of Monroe Energy
• Monroe Energy	• Ogden Fire Company	• Pennsylvania Emergency Management Agency	• Radnor Township Police Department
• SKC Hangar	• Upper Darby Fire Department	• US Coast Guard	

Table 3-2 in Section 3.5 shows overall municipal participation in the planning process.

3.5 MULTI-JURISDICTIONAL PLANNING

Delaware County took a multi-jurisdictional approach to preparing the HMP, so that the HMP would apply to the county and all participating municipalities. The county was able to provide resources (e.g., data, geographic information system [GIS], etc.) to which the municipalities may not have had access. However, Delaware County depended on municipal buy-in because the municipalities have the legal authority to enforce compliance with land use planning and development directives. Delaware County undertook an intensive effort to involve all 49 municipalities and the Brandywine Conservancy and Museum of Art special district in the update process.

Each municipality was given the opportunity to participate in this process. Municipal officials and representatives were invited to attend Planning Team and public meetings, were provided with worksheets to update the hazards of concern capabilities and mitigation strategy, and were asked to review and prioritize the mitigation actions. Municipal participation culminated in formal adoption of the HMP; copies of municipal adoption resolutions are in Appendix F. Table 3-2 indicates the ways each municipality participated in the planning process. In some cases, a municipality was unable to attend a Planning Team meeting; therefore, an individual follow-up meeting with each municipality was held by Delaware County Steering Committee representatives to cover the meeting material and provide municipal support on the topics presented.

Table 3-2. Participation Matrix

Jurisdiction	Meetings								Indiv. Contact	Worksheets					2022 Plan Adoption Date
	Planning Team Kick-Off Meeting 11/16/21	LEPC Meeting 12/8/21	1Q22 EMC Trng. 3/9/22	Risk Assess. Meeting 6/14/22	June 2Q22 EMC Trng. 6/21/22	LEPC Meeting 6/22/22	Mit. Strategy Work. 6/29/22	HMP Draft Review Meeting 10/18/ 22		Risk Assess. Survey	Mun. Risk Factor Form	Cap. Assess. Survey	NFIP Survey	Mit. Review Wksht.	
Delaware County	x	+	x	x	x	x	x	x			N/A		N/A		TBD
Aldan Borough	x	+													TBD
Aston Township	x	+	x				x	x							TBD
Bethel Township		+	x	x	x					x		x	x	x	TBD
Brookhaven Borough		+								x	x	x	x	x	TBD
Chadds Ford Township	x	+													TBD
Chester City	x	+	x		x	x	x					x	x	x	TBD
Chester Heights Borough		+	x		x					x	x	x	x	x	TBD
Chester Township		+		x											TBD
Clifton Heights Borough		+								x	x				TBD
Collingdale Borough		+													TBD
Colwyn Borough		+													TBD
Concord Township	x	+	x	x	x	x	x	x		x	x	x	x	x	TBD
Darby Borough	x	+													TBD
Darby Township		+										x			TBD
East Lansdowne Borough		+													TBD
Eddystone Borough		+	x		x					x		x		x	TBD
Edgmont Township		+													TBD
Folcroft Borough		+													TBD
Glenolden Borough		+													TBD
Haverford Township	x	+			x		x	x							TBD
Lansdowne Borough		+													TBD
Lower Chichester Township		+													TBD
Marcus Hook Borough		+								x		x	x	x	TBD
Marple Township	x	+	x		x					x		x	x	x	TBD
Media Borough	x	+	x		x										TBD

Jurisdiction	Meetings								Indiv. Contact	Worksheets					2022 Plan Adoption Date
	Planning Team Kick-Off Meeting 11/16/21	LEPC Meeting 12/8/21	1Q22 EMC Trng. 3/9/22	Risk Assess. Meeting 6/14/22	June 2Q22 EMC Trng. 6/21/22	LEPC Meeting 6/22/22	Mit. Strategy Work. 6/29/22	HMP Draft Review Meeting 10/18/ 22		Risk Assess. Survey	Mun. Risk Factor Form	Cap. Assess. Survey	NFIP Survey	Mit. Review Wksht.	
Middletown Township	x	+	x			x	x			x		x	x	x	TBD
Millbourne Borough		+													TBD
Morton Borough		+													TBD
Nether Providence Township		+													TBD
Newtown Township	x	+	x		x		x	x		x	x	x	x	x	TBD
Norwood Borough		+													TBD
Parkside Borough		+													TBD
Prospect Park Borough		+	x		x		x			x		x	x	x	TBD
Radnor Township	x	+	x		x		x			x	x	x	x	x	TBD
Ridley Park Borough		+			x										TBD
Ridley Township		+			x										TBD
Rose Valley Borough		+													TBD
Rutledge Borough		+	x		x										TBD
Sharon Hill Borough		+													TBD
Springfield Township	x	+	x		x										TBD
Swarthmore Borough		+			x										TBD
Thornbury Township	x	+	x				x			x		x	x	x	TBD
Tinicum Township		+			x										TBD
Trainer Borough		+													TBD
Upland Borough	x	+	x				x			x	x	x		x	TBD
Upper Chichester Township	x	+	x	x	x										TBD
Upper Darby Township		+	x		x										TBD
Upper Providence Township		+		x											TBD
Yeadon Borough		+	x												TBD
Brandywine Conservancy and Museum of Art Special District									x	*		*	N/A	*	TBD

Notes:
EMC = Emergency Management Coordinator
Mun. = Municipal
LEPC = Local Emergency Planning Committee
N/A = Not applicable
TBD = To be determined after plan is approved-pending adoption by FEMA Region III.
* = Though the worksheet was not received, the related information was collected during an interview with officials.
+ = An attendance list for the December 2021 LEPC Meeting was not available.

SECTION 4 RISK ASSESSMENT

4.1 UPDATE PROCESS AND PARTICIPATION SUMMARY

In accordance with the Federal Emergency Management Agency (FEMA) Local Mitigation Planning Handbook, risk is defined as the potential for damage, loss, or other impacts created by the interaction of natural hazards with community assets. Delaware County's risk assessment is organized into the following sections:

- Section 4.2 outlines the hazard identification process for both natural and human-caused hazards of concern for further profiling and evaluation.
- Section 4.3 profiles the hazards of concern (location and extent, range of magnitude, past occurrence, and future occurrence) and assesses vulnerability.
- Section 4.4 summarizes the risk assessment methodology, ranking results, potential losses, and future development and vulnerability.

The Steering Committee and Planning Team evaluated the 2017 Delaware County Hazard Mitigation Plan (HMP) hazards of concern by examining the historic events that have taken place in the county since the last plan update and reviewing the Commonwealth's 2018 Hazard Mitigation Plan. In addition, the Steering Committee and Planning Team completed the risk assessment worksheet (Hazard Identification and Risk Evaluation Worksheet). The worksheet listed hazards profiled in the 2017 HMP and requested that participants identify whether the frequency of occurrence, magnitude of impact, and/or geographic extent of each hazard has increased, decreased, or not changed since the 2017 HMP was issued. The worksheet also provided participants with the opportunity to assess hazards not profiled in the 2017 HMP to determine if those hazards should be included as part of the update. The Steering Committee reviewed responses from the worksheets to identify a list of hazards to profile in the 2022 HMP, including one additional hazard of concern. The new hazard of concern is Environmental Hazards – Gas/Liquid Pipeline. Each hazard profile also includes an additional subsection that discusses the effect of climate change on vulnerability. Appendix H includes copies of the completed worksheets.

4.2 HAZARD IDENTIFICATION

4.2.1 Disaster Declarations

In reviewing and updating Delaware County's hazards of concern, the Steering Committee and Planning Team reviewed additional information and historical records from a wide range of sources. The following section discusses the Presidential Disaster and Emergency Declarations, Gubernatorial Disaster Declarations or Proclamations, and Small Business Administration Disaster Declarations that have affected Delaware County.

Presidential Disaster and Emergency Declarations are issued when it has been determined that state and local governments need assistance in responding to a disaster event. Since 1955, declarations have been issued for various hazard events, including hurricanes or tropical storms, severe winter storms, and flooding. Presidential Emergency Declaration 3235, issued in September 2005, was unique. Through this declaration, President George W. Bush declared that a state of emergency existed for the Commonwealth of Pennsylvania and ordered federal aid to supplement Commonwealth and local response efforts to help people evacuate from their homes because of Hurricane Katrina.

Table 4.2-1 lists Presidential Disaster and Emergency Declarations issued from 1972 through 2021 that have affected Delaware County. Additional declarations can be found on the Federal Emergency Management Agency (FEMA) website at: https://www.fema.gov/disasters.

Table 4.2-1. Presidential Disaster and Emergency Declarations affecting Delaware County

Declaration Number	Date	Event
DR-4618	September 2021	Remnants of Hurricane Ida
DR-4506	March 2020	Covid-19 Pandemic
EM-3441	March 2020	Covid-19
EM-3367	February 2014	Severe Winter Storm
DR-4099	January 2013	Hurricane Sandy
EM-3356	October 2012	Hurricane Sandy
DR-4030	September 2011	Tropical Storm Lee
EM-3340	September 2011	Remnants of Tropical Storm Lee
DR- 4025	September 2011	Hurricane Irene
EM-3339	August 2011	Hurricane Irene
DR-1898	April 2010	Severe Winter Storms and Snowstorms
EM-3235	September 2005	Hurricane Katrina Evacuation
DR-1557	September 2004	Tropical Depression Ivan
DR-1555	September 2004	Severe Storms and Flooding Associated with Tropical Depression Frances
DR-1538	August 2004	Severe Storms and Flooding
EM-3180	March 2003	Snowstorm
DR-1294	September 1999	Hurricane Floyd
DR-1093	January 1996	Flooding
DR-1085	January 1996	Blizzard
DR-1015	March 1994	Winter Storm, Severe Storm
EM-3105	March 1993	Blizzard
DR-400	July 1973	Severe Storms, Flooding
DR-340	June 1972	Flood (Agnes)
DR-312	September 1971	Floods
DR-206	August 1965	Water Shortage

Source: FEMA 2022

In addition to the Presidential Disaster and Emergency Declarations listed above, 64 events warranted Gubernatorial Disaster Declarations or Proclamations. Table 4.2-2 lists Gubernatorial Disaster Declarations or Proclamations issued for Delaware County between 1958 and 2021, according to PEMA (PEMA 2018, 2022).

Table 4.2-2. Gubernatorial Disaster Declarations or Proclamations affecting Delaware County

Date	Event
August 2021	Proclamation of Disaster Emergency – Hurricane Ida
August 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
May 2021	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19) (Proclamation was terminated by concurrent resolution of the General Assembly on June 19, 2021.)
May 2021	Amendment to Proclamation of Disaster Emergency – Civil Disturbance
May 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
April 2021	Amendment to Proclamation of Disaster Emergency – Civil Disturbance
February 2021	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
February 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
February 2021	Proclamation of Disaster Emergency- Winter Weather
February 2021	Proclamation Terminating the Disaster Emergency- Winter Weather
December 2020	Proclamation of Disaster Emergency – Winter Weather
November 2020	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
November 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
August 2020	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
August 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
June 2020	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
May 2020	Proclamation of Disaster Emergency
May 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
March 2020	Proclamation of Disaster Emergency – Coronavirus (COVID-19)
February 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
December 2019	Amendment to Opioid Crisis Emergency Proclamation
September 2019	Amendment to Opioid Crisis Emergency Proclamation
June 2019	Amendment to Opioid Crisis Emergency Proclamation
March 2019	Amendment to Opioid Crisis Emergency Proclamation
January 2019	Proclamation of Disaster Emergency for Severe Winter Event
December 2018	Amendment to Opioid Crisis Emergency Proclamation
September 2018	Amendment to the Opioid Crisis Emergency Proclamation
August 2018	Proclamation of Disaster Emergency for Severe Weather Event
June 2018	Amendment to Opioid Crisis Emergency Proclamation
April 2018	Amendment to Opioid Crisis Emergency Proclamation
March 2018	Proclamation of Emergency-- Opioid Crisis, Severe Winter Storms
January 2018	Opioid Crisis Emergency Proclamation
March 2017	Proclamation of Emergency – Severe Winter Storm
March 2017	Proclamation of Emergency – Severe Winter Storm

Date	Event
January 2016	Proclamation of Emergency – Severe Winter Storm
August 2015	Proclamation of Emergency – Severe Storms
January 2015	Proclamation of Disaster Emergency – Severe Winter Storms
February 2014	Proclamation of Disaster – Severe Winter Storms
February 2014	Severe Ice Storm
January 2014	Proclamation of Disaster Emergency – Extreme Weather, Utility Interruption
June 2013	Proclamation of Emergency – High Winds, Thunderstorms, Heavy Rain, Tornado, Flooding
October 2012	Proclamation of Emergency – Hurricane Sandy
April 2012	Proclamation of Emergency – Spring Winter Storms
August 2011	Proclamation of Emergency - Severe Storms and Flooding (Lee/Irene)
January 2011	Proclamation of Emergency - Severe Winter Storm
February 2010	Proclamation of Emergency - Severe Winter Storm
February 2007	Proclamation of Emergency - Severe Winter Storm
February 2007	Proclamation of Emergency - Regulations
April 2007	Proclamation of Emergency – Severe Winter Storm
September 2006	Proclamation of Emergency - Tropical Depression Ernesto
September 2005	Proclamation of Emergency - Hurricane Katrina
February 2002	Drought and Water Shortage
July 1999	Drought
December 1998	Drought
May 1998	I-95 Highway Disaster
September 1995	Drought
November 1980	Drought Emergency
February 1978	Blizzard
January 1978	Heavy Snow
February 1974	Truckers' Strike
February 1972	Heavy Snow
January 1966	Heavy Snow
February 1958	Heavy Snow
September 1955	Drought

Source: PEMA 2018, PEMA 2022

Delaware County has also received Small Business Administration (SBA) Disaster Assistance for a number of disaster events. A Small Business Administration Disaster Declaration qualifies communities for access to affordable, timely, and accessible financial assistance. Table 4.2-3 lists Small Business Administration Disaster Declarations issued for Delaware County between 1989 and 2021 (PEMA 2018; SBA 2021).

Table 4.2-3. Small Business Administration Disaster Declarations affecting Delaware County

Date	Event
September 2021	Remnants of Hurricane Ida
August 2020	Tropical Storm Isaias
July 2020	Apartment Complex Fire
May 2020	Civil Unrest
April 2020	Freeze and Frost
August 2019	Drought
June 2019	Severe Weather and Flooding
December 2018	Apartment Building Fire
December 2018	Flooding
June 2018	Excessive Rain, Flooding, Hurricane Florence
June 2018	Heat and Drought
April 2014	Severe Winter Storms
January 2009	Fire
September 2008	Fire
August 2008	Fire
November 2007	Fire
April 2007	Severe Storms and Flooding
May 2001	Fire
March 2001	Fire
August 1991	Flash Flood
July 1989	Flood

Source: PEMA 2018, SBA 2021

4.2.2 Summary of Hazards

As part of the plan update process, the Steering Committee and Planning Team reviewed the hazards of concern detailed in the 2017 Delaware County HMP as well as those identified in the Commonwealth's HMP. They considered the history of hazard events occurring in Delaware County as well as additional events that occurred after the completion of the 2017 HMP. This review of historical events included an evaluation of all emergency and disaster declarations in the Commonwealth, with a focus on those in which Delaware County was designated for federal assistance.

Further, all municipalities participating in the plan update process were provided a *Hazard Identification/ Evaluation of Risk* worksheet to help identify the hazards—natural and non-natural—that each community believed posed significant risk to Delaware County, including any that may not have been considered in either the 2017 version of the plan or the Commonwealth's HMP. Appendix D includes completed worksheets submitted by the municipalities. Following the review of the 2017 hazards list and completion of the *Hazard Identification/Evaluation of Risk* worksheet, additional hazards were considered in need of a risk assessment. The Steering Committee and Planning Team decided to retain all 2017 hazards of concern and add the Environmental Hazard – Gas/Liquid Pipeline hazard of concern.

Based on all available information and input from the municipalities, the Steering Committee and Planning Team selected the following natural and non-natural hazards for consideration in this plan:

- Civil Disturbance
- Dam Failure
- Drought and Water Supply Deficiencies
- Earthquake
- Environmental Hazards- Hazardous Materials Release
- Environmental Hazards – Oil and Natural Gas Pipelines
- Extreme Temperature
- Flood, Flash Flood, Ice Jam
- Hailstorm
- Hurricane, Tropical Storm, Nor'easter
- Landslide
- Levee Failure
- Lightning
- Pandemic and Infectious Disease
- Radon Exposure
- Subsidence and Sinkholes
- Terrorism
- Tornado, Windstorm
- Transportation Accident
- Urban Fire and Explosions
- Utility Interruption
- Wildfire
- Winter Storm

Section 4.3 includes individual profiles for these hazards.

4.3 HAZARD PROFILES

The following sections profile and assess vulnerability for each hazard of concern. For each hazard, the profile includes: the hazard description; its location and extent; range of magnitude, past occurrence, future occurrence, and vulnerability assessment. The vulnerability assessment for each hazard includes: an overview of vulnerability and data and methodology used; the impact to life, health and safety; impact to general building stock and critical facilities; impact to the economy; impact to the environment; impact to future growth and development; and effect of climate change on vulnerability.

4.3.1 Civil Disturbance

This section provides a profile and vulnerability assessment for the civil disturbance hazard for Delaware County. According to the Pennsylvania State Hazard Mitigation Plan (PA State HMP), "Civil disturbance is a broad term that is typically used by law enforcement to describe one or more forms of disturbance caused by a group of people. Civil disturbances are typically a symptom of and a form of protest against major socio-political problems." (PEMA 2019)

Civil disturbance hazards include famine, economic collapse or recession, misinformation, public unrest, mass hysteria, riot, and strike or labor dispute (PEMA 2019). Civil disturbances can also arise from large celebrations that become disorderly.

Location

Civil disturbances often are concentrated around areas where crowds may gather, including government facilities, landmarks, prisons, and universities. They also have a greater chance of occurrence in the more populated areas of the county. However, these areas also tend to have police forces better equipped and trained to handle this sort of disturbance (Delaware County Department of Planning 2016).

Magnitude

Civil disturbances can vary in size from small, peaceful gatherings to large groups blocking or impeding access to buildings or disrupting normal activities. They can range from a peaceful sit-in to a full-scale riot. The duration of a civil disturbance can vary greatly; however, the majority are relatively short-lived (PEMA 2019).

Past Occurrence

There is no comprehensive list of past civil disturbances in the county. However, the PA State HMP includes a list of significant civil disturbances across the Commonwealth since the 1700s in Section 4.3.18.3 of the PA State HMP. While none of the events listed are specific to Delaware County, most are the result of labor disputes or racial tension.

Probability of Future Occurrence

As previously mentioned, Delaware County does not record a comprehensive list of civil disturbance events; however, there is the possibility of a civil disturbance event occurring in Delaware County. The location of civil disturbance events is unpredictable, yet spatial distribution patterns of riots in the past suggest that cities, universities, sporting events, and where large crowds gather are probable areas for a civil disturbance event to ensue. Local law enforcement should continue to anticipate these types of events and be prepared to handle a crowd so that peaceful gatherings do not turn into unruly public disturbances. Overall, the probability of future civil disturbance events can be considered *unlikely*, as defined by the Risk Factor Methodology (See Section 4.4).

Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the area identified. The following sections discuss the potential impacts of the civil disturbance hazard on Delaware County, including:

- Overview of vulnerability
- Data and methodology used for the evaluation

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; and (5) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist in understanding this hazard over time.

Overview of Vulnerability

The most vulnerable areas for civil disturbance are the higher populated areas of the county. However, these areas also have well-trained, professional police forces that are capable of addressing the disturbance in the most appropriate manner to limit harm and disruption.

Impact on Life, Health, and Safety

Civil disturbance events can have great negative impacts on life, health, and safety. In extreme cases of mob events, crowds have incited violence against law enforcement, residents, and anyone near the event. Violent actions include striking out physically, destroying property, and setting fires. Crowds can also exhibit nonviolent behavior, which can involve name-calling, demonstrations, yelling, chanting, singing, and dancing. These events can impede the functions of a particular area, and their actions can be in direct conflict with authorities.

Impact on General Building Stock

All infrastructure, commercial and industrial businesses, and residential structures within Delaware County are vulnerable to damage because of civil disturbance, most likely due to vandalism. This vulnerability is increased for buildings where crowds may gather, including government facilities, landmarks, and universities.

Impact on Critical Facilities

The vulnerability of critical facilities depends on the type and function of each individual entity as well as the greater geographic context of the facility. As visible symbols of government, government facilities and monuments are more vulnerable to civil disturbance events, but the vulnerability of each facility may change based on hot-button issues.

Impact on the Economy

Civil disturbances may impede foot and vehicle traffic, therefore impacting the economy depending on the scale of the event. They can also cause damage to businesses, therefore resulting in closures, recovery costs, and lost investments.

Impact on the Environment

The impacts of civil disturbance events are contingent upon numerous factors, including causes, politics, and method of response. Generally, the impact of civil disturbance events is nominal and short-lived unless acts of sabotage are performed. There may be minor injuries to first responders or participants from physical confrontations, and vandalism may cause minimal damage to property, facilities, and infrastructure. Adequate law enforcement at planned civil disturbance events and around likely target locations like the offices of state agencies minimizes the chances of a small assembly of individuals turning into a significant disturbance (PEMA 2019).

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Delaware County (further discussed in Section 2.4 of this HMP). Any areas of growth could be potentially impacted by the civil disturbance hazard because Delaware County is exposed and potentially vulnerable.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Delaware County's population will continue to increase into 2040, with a total population of approximately 648,439 persons (The Center of Rural Pennsylvania 2013). As more persons move into susceptible areas, an increased amount of the population will be vulnerable to the effects of civil disturbance.

There are many factors for the potential of civil disturbance, including economic conditions and political change. An improving or declining economy can greatly affect and increase or decrease the chance of disturbance as well as political transitions. We will continue to review the effects of COVID-19 and its impact on the economy and any correlation to civil disturbance as well as any tensions from the current political climate in future updates.

Effect of Climate Change on Vulnerability

There are no direct impacts of climate change on civil disturbance events. However, climate change is expected to increase the number of displaced peoples and exacerbate inequalities due to extreme temperatures and weather events. As economic, social, and political conditions are linked with the number of civil disturbances, it is expected these types of events will increase in frequency with a changing climate. Furthermore, civil disobedience has become a popular means of fighting climate change and demanding climate-friendly policies. With a worsening climate, it is expected these types of events will increase (Kyllonen 2014).

Additional Data and Next Steps

Any additional information regarding localized concerns and past impacts will be collected and analyzed for the HMP update. These data will be developed to support future revisions to the plan.

4.3.2 Dam Failure

This section provides a profile and vulnerability assessment of the dam failure hazard in Delaware County. A dam is an artificial barrier allowing storage of water, wastewater, or liquid-borne materials for many reasons (flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control). Many dams fulfill a combination of these stated functions (Association of State Dam Safety Officials 2022).

Man-made dams can be classified according to type of construction material used, methods applied in construction, slope or cross-section of the dam, how a dam resists forces of water pressure behind it, means used to control seepage, and occasionally, purpose of the dam. Materials used for construction of dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, miscellaneous materials (plastic or rubber), and any combination of these materials (Association of State Dam Safety Officials 2022).

Dams typically fail when spillway capacity is inadequate and excess flow overtops the dam or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled water that rushes downstream, damaging or destroying anything in its path (FEMA 2018).

Dam failures can result from the following:

- Overtopping caused by floods that exceed capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Movement or failure of the foundation supporting the dam
- Settling and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate maintenance and upkeep (FEMA 2018)

Location and Extent

There are 53 dams located throughout Delaware County, as shown on Figure 4.3.2-1. The vast majority of these dams pose little risk; however, 8 Hazard Category 1 “high-hazard” dams require EAPs. Table 4.3.2-1 lists dam classification definitions. Table 4.3.2-2 is a complete list of dams in Delaware County with “high-hazard” dams listed first.

Figure 4.3.2-1. Dams in Delaware County

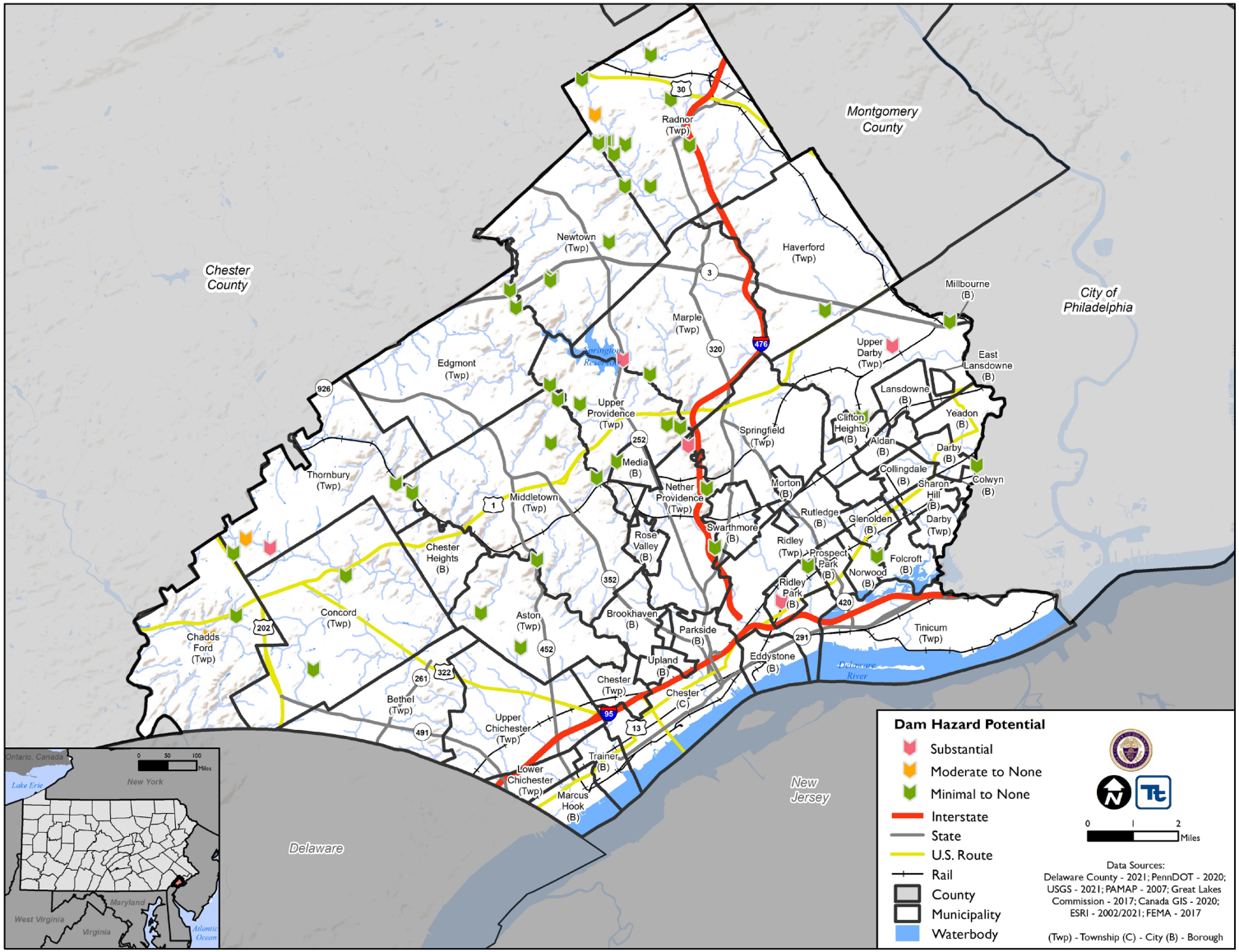


Table 4.3.2-1. Dam Classification Definitions

Size Category		
Category	**Impoundment Storage (Acre-feet)**	**Dam Height (Feet)**
A	Equal to or greater than 50,000	Equal to or greater than 100
B	Less than 50,000 but greater than 1,000	Less than 100 but greater than 40
C	Equal to or less than 1,000	Equal to or less than 40
Hazard Potential Category		
Category	**Population at Risk**	**Economic Loss**
1	Substantial (Numerous homes or small businesses or a large business or school)	Excessive, such as extensive residential, commercial, or agricultural damage, or substantial public inconvenience
2	Few (A small number of homes or small businesses)	Appreciable, such as limited residential, commercial, or agricultural damage or moderate public inconvenience
3	None expected (no permanent structures for human habitation or employment)	Significant damage to private or public property and short-duration public inconvenience such as damage to storage facilities or loss of critical stream crossings
4	None expected (no permanent structures for human habitation or employment)	Minimal damage to private or public property and no significant public inconvenience

Source: Commonwealth of Pennsylvania 2011

Table 4.3.2-2. Dams in Delaware County

Dam Name	Municipality	Stream	Class	Permittee
High-Hazard Dams				
Hilloch	Chadds Ford Township	Tr Harvey Run	C-3	Hilloch Homeowners Association
Brinton Lake	Thornbury Township	West Branch Chester Creek	C-1	New Brinton Lake Club
Ridley Park Lake	Ridley Park Borough	Little Crum Creek	C-1	Borough of Ridley Park
Cherry Farm Basin #1	Thornbury Township	Tr West Br Chester Creek	C-3	Cherry Farm Home Owners Assoc
Mill Club	Radnor Township	Little Darby Creek	C-3	Mill Dam Club
Naylors Run	Upper Darby Township	Naylors Run	C-1	Commissioners of Upper Darby Township
Springton (Geist)	Upper Providence Township	Crum Creek	B-1	Aqua Pennsylvania, Inc.
Crum Creek	Springfield Township	Crum Creek	C-1	Aqua Pennsylvania, Inc.
Other Dams				
Broomall Lake	Media Borough	Tr Ridley Creek	C-4	Broomalls Lake Country Club
Swarthmore+A40:E92 College	Springfield Township	Crum Creek	C-4	Swarthmore College
Rockdale	Middletown Township	Chester Creek	C-4	Tom King
Ridley Creek Wtf	Middletown Township	Ridley Creek	C-4	Aqua Pennsylvania, Inc.
Llewellen Mill	Aston Township	West Branch Chester Creek	C-4	Iaobucci Associates
Millbourne	Upper Darby Township	Cobbs Creek	C-4	Fairmount Park Commission
Concord Mills	Concord Township	Tr West Branch Chester Creek	C-4	Nicholas Newlin Foundation
Hanson Lower	Thornbury Township	Chester Creek	C-4	Hanson Glenn Mills and HMA Plant
Hanson Upper	Thornbury Township	Chester Creek	C-4	Hanson Glenn Mills and HMA Plant
Earles Lake	Newtown Township	Tr Darby Creek	C-4	Kyle & Ashley Wilson

Dam Name	Municipality	Stream	Class	Permittee
Earles Lake	Newtown Township	Tr Darby Creek	C-4	Greene Countrie Village Owners Association
Earles Lake	Newtown Township	Tr Darby Creek	C-4	Harvey & Nadine Hensley
Kent	Upper Darby Township	Darby Creek	C-4	Mr. and Mrs. Wilischek, Jr.
Victoria Mills	Springfield Township	Crum Creek	C-4	Barrow Partnership
Woodland	Yeadon Borough	Cobbs Creek	C-4	City of Philadelphia
Sycamore Mills	Prospect Park Borough	Ridley Creek	C-4	DCNR
Thirteenth Ave Lake	Prospect Park Borough	Stony Creek	C-4	Borough of Prospect Park
Folcroft	Folcroft Borough	Muckinipattis Creek	C-4	Pennsylvania Railroad Company
Fetter	Radnor Township	Tr Gulph Creek	C-4	Kenneth Fetter
Digirolomo	Aston Township	Marcus Hook Creek	C-4	Lewis Digirolomo
Sposato	Radnor Township	Tr Gulph Creek	C-4	Richard P. Sposato
Detention Basin	Radnor Township	Abrahams Run	C-4	Inverary Homeowners Association
Edgemont County Fair	Edgemont Township	Tr Crum Creek	C-4	Claude Debotton
Runnymeade Farms	Edgemont Township	Tr Crum Creek	C-4	Holloway Development Corporation
Rose Tree Hunt Detention Basin #1	Upper Providence Township	Tr Crum Creek	C-4	Toll Brothers, Inc.
Rose Tree Hunt Basin No 2	Upper Providence Township	Tr Crum Creek	C-4	Toll Brothers, Inc.
Maple Lane Farm	Concord Township	Tr West Branch Chester Creek	C-4	Pulte Home Corporation of The Delaware Valley
Painters Crossing Condominium	Chadds Ford Township	Tr Harvey Run	C-4	Painters Crossing Condominium Association
Ravenscliff Duck Pond No. 1	Radnor Township	Julip Run	C-4	Radnor Township
Ravenscliff Duck Pond No. 2	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Ravenscliff Duck Pond No. 3	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Ravenscliff Duck Pond No. 4	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Ravenscliff Duck Pond No. 5	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Cherry Farm Basin # 2	Thornbury Township	Tr West Br Chester Creek	C-4	Cherry Farm Home Owners Assoc
Fenimore Park	Radnor Township	Gulph Creek	C-4	Radnor Township
Crum Creek	Upper Providence Township	Crum Creek	C-4	Jack Fetsko
Drexel Lodge Park Pond 1	Newtown Township	Preston Run	C-4	Newtown Township
Drexel Lodge Park Pond 2	Newtown Township	Preston Run	C-4	Newtown Township
Greer Park Pond 3	Newtown Township	Foxes Run	C-4	Newtown Township
Hole No. 13 Pond	Radnor Township	Ithan Creek	C-4	Radnor Valley Country Club
Muetterties	Middletown Township	Spring Run	C-4	Kurt and Ellen Muetterties
Gurvins Pond	Upper Providence Township	Tr Ridley Creek	C-4	Phil Gurvin
Overbrook Golf Course	Radnor Township	Miles Run	C-4	Overbrook Golf Course
Delco Angler Water	Middletown Township	Tr Ridley Creek	C-4	Delco Anglers and Conservationists
Llanerch Irrigation Pond	Haverford Township	Trib To Naylors Run	C-4	Llanerch Golf Course

Source: PADEP 2020

Range of Magnitude

Extent or magnitude of a dam failure event can be measured in terms of classification of the dam. FEMA has three classification levels of dam hazard potential: low, significant, and high. The classification levels build on each other. The hazard potential classification system should be used with the understanding that failure of any dam or water-retaining structure could represent a danger to downstream life and property (FEMA, FEMA National Dam Safety Program Overview 2021). Each FEMA classification level of dam hazard potential is described as follows:

- Low-hazard potential dams are those where failure or misoperation would result in no probable loss of human life and low economic or environmental losses. Losses are principally limited to the owner's property.
- Significant-hazard potential dams are those where failure or misoperation would result in no probable loss of human life but could cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant-hazard potential dams are often located in predominantly rural or agricultural areas.
- High-hazard potential dams are those where failure or misoperation will probably cause loss of human life.

Table 4.3.2-4 lists USACE-developed classifications of hazard potentials of dam failures, based only on potential consequences of a dam failure; this classification does not consider probability of failure.

Table 4.3.2-3. U.S. Army Corps of Engineers Hazard Potential Classification

Hazard Category[1]	Direct Loss of Life[2]	Lifeline Losses[3]	Property Losses[4]	Environmental Losses[5]
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

[1] Categories are assigned to overall projects, not individual structures at a project.

[2] Loss-of-life potential is based on inundation mapping of area downstream of the project. Analysis of loss-of-life potential should consider the population at risk, time of flood wave travel, and warning time.

[3] Lifeline losses include indirect threats to life caused by the interruption of lifeline services from project failure or operational disruption; for example, loss of critical medical facilities or access to them.

[4] Property losses include damage to project facilities and downstream property and indirect impact from loss of project services, such as impact from loss of a dam and navigation pool, or impact from loss of water or power supply.

[5] Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: USACE 2016

Regulatory Oversight of Dams

Potential for catastrophic flooding caused by dam failures led to enactment of the National Dam Safety Act (Public Law 92-367), which has protected Americans from dam failures for 30 years. The National Dam Safety Program (NDSP) is a partnership among states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most dams in the United States (FEMA, FEMA National Dam Safety Program Overview 2021).

Pennsylvania Department of Environmental Protection

The Pennsylvania Department of Environmental Protection (PADEP) holds responsibility for dam safety. Hazard Potential Category 1 dams are those "where its failure could result in significant loss of life, excessive economic losses, and significant public inconvenience." Hazard Potential Category 2 dams are those "where its failure could result in the loss of a few lives, appreciable property damage, and short-duration public inconvenience." Owners of dams classified as Hazard Categories 1 or 2 ("high-hazard" dams) are required to create an Emergency Action Plan (EAP) that describes the dam, the inundation area if the dam were to catastrophically fail, and procedures for responding to the dam failure (such as notification to the vulnerable population) (PADEP 2022). Delaware County receives copies of EAPs and inundation maps for high-hazard dams whose failure could impact local residents.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers (USACE) is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and has surveyed each state's and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of the dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 2021). The USACE National Inventory of Dams (NID) provides the most recent dates of inspection of the following Delaware County dams (USACE, National Inventory of Dams 2022):

Table 4.3.2-4. Delaware County Dams and Inspection Dates

Dam Name	Hazard Potential Classification	Most Recent Inspection Date
Brinton Lake	High	12/18/2019
Broomall Lake	Low	6/22/2014
Cherry Farm Basin #1	Significant	1/23/2020
Crum Creek	High	11/24/2020
Hilloch	Significant	9/18/2018
Mill Club	Significant	3/13/2019
Naylors Run	High	11/24/2020
Ridley Park Lake	High	12/9/2020
Springton (Geist)	High	11/19/2020

Source: USACE 2022

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more

recently, homeland security. FERC staff inspect hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with terms and conditions of a license (FERC 2022)

Every 5 years, an independent consulting engineer, approved by FERC, must inspect and evaluate projects with dams higher than 32.8 feet (10 meters) or with total storage capacity of more than 2,000 acre-feet (FERC 2022).

FERC monitors and evaluates seismic research in geographic areas where seismic activity is a concern. This information is applied to investigate and analyze structures of hydroelectric projects within these areas. FERC staff also evaluates effects of potential and actual large floods on safety of dams. FERC staff visit dams and licensed projects during and after floods, assess extents of damage, and direct any studies or remedial measures the licensee must undertake. FERC's *Engineering Guidelines for the Evaluation of Hydropower Projects* guides FERC engineering staff and licensees in evaluations of dam safety. The publication is frequently revised to reflect current information and methodologies (FERC, Guidance Manual for Environmental Report Preparation 2017).

FERC requires licensees to prepare EAPs and conducts training sessions on developing and testing these plans. The plans outline an early warning system in the event of an actual or potential sudden release of water from a dam failure. The plans include operational procedures that may be implemented during regulatory measures, such as reducing reservoir levels and downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that all applicable parties are informed of the proper procedures in emergencies (FERC, Guidance Manual for Environmental Report Preparation 2017).

Past Occurrence

Dam failures can occur suddenly, without warning, and may occur during normal operating conditions, referred to as a "sunny-day" failure. Dam failures can also occur during a large storm event. Significant rainfall can quickly inundate an area and cause floodwaters to overwhelm a reservoir. If the spillway of the dam cannot safely pass the resulting flows, water will begin flowing in areas not designed for such flows, and a failure may occur. For the 2022 HMP update, known dam failure events that have impacted Delaware County between 2016 and 2022 were researched; however, no events were found to have occurred during this time period (NPDP 2018).

Future Occurrence

Likelihood of a dam failure in Delaware County is difficult to predict. Dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt. However, the risk of such an event increases for each dam as the dam's age increases or frequency of maintenance decreases. "Residual risk" to dams is risk that remains after implementation of safeguards. Residual risk to dams is associated with events beyond those that the facility was designed to withstand. However, probability of any type of dam failure is low in today's dam safety regulatory and oversight environment.

Based on Risk Factor Methodology Probability Criteria (further defined in Section 4.4), and assuming regular maintenance and inspections of the dams in Delaware County, dam failures are considered *unlikely* in the county.

Vulnerability Assessment

Dam failure events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Dam failure inundation maps and downstream hazard areas are considered sensitive information and are not made available in the Delaware County Hazard Mitigation Plan. To assess the county's risk to dam failure, a qualitative review was implemented.

Impact on Life, Health, and Safety

The entire population residing within a dam failure inundation zone is considered exposed and vulnerable to an event. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living within these areas. Those most at risk include the economically disadvantaged and the population over the age of 65. The 2019 American Community Survey population estimates indicate there were 90,402 persons over 65 years old and 54,356 living below the poverty level in Delaware County. These populations are more at risk during a dam failure event because economically disadvantaged populations are likely to evaluate their risk and make the decision to evacuate based upon the net economic impact to their family, while elderly populations are likely to seek or need medical attention. The availability of medical attention may be limited due to isolation during a flood event and other difficulties in evacuating. There is often limited warning time for a dam failure event. Populations without adequate warning of the event are highly vulnerable.

Dam failure can cause persons to become displaced if flooding of structures occurs. Dam failure may mimic flood events, depending on the size of the dam reservoir and breach. Understanding potential outcomes of flooding for each dam in Delaware County would require intensive hydraulic modeling.

Other than the population in the dam failure inundation zone, the safety of the first responders on-scene are also at risk. First responders would be responsible for traffic control and responding to transportation accidents. There would be a higher-than-normal call volume and demand of first responders during a dam failure. Continuity of operations including continued delivery of services may be impeded and additional personnel would potentially be needed due to the lack of fire and police personnel in the county.

Dam failure events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. The shaking associated with earthquakes may weaken the structure of a dam, particularly earthen dams, causing them to fail. Landslides can directly impact a dam, causing damage or failure. Likewise, landslides of the ground around a dam may weaken the ground on which the dam exists, causing the potential for the dam structure to fail. Landslides into the water being impounded by the dam can cause a wave to travel the length of the dam's impoundment area, ultimately crashing on the dam itself. Severe weather can result in large quantities of rain upstream of the dam that will ultimately be impounded by the dam, which could raise water levels behind the dam, resulting in overtopping of the dam and/or flooding of properties upstream of the dam itself. Populations without adequate warning of the event are highly vulnerable to this hazard.

Impact on General Building Stock

Buildings located downstream of a dam are at risk to damages should there be a failure. Downstream inundation areas were not available to quantify any potential losses to structures. Properties located closest to the dam inundation area have the greatest potential to experience the largest, most destructive surge of water. The overall impact of flooding damages caused by dam failure will vary depending on the depth of flooding and velocity of the surge.

Impact on Critical Facilities

Dam failures may also impact critical facilities and infrastructure located in the downstream inundation zone. Consequentially, dam failure can cut evacuation routes, limit emergency access, and/or create isolation issues. Dam failure can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Widespread damage to buildings and infrastructure affected by an event would result in high costs to repair these locations. In addition to physical damage costs, businesses can be closed while flood waters retreat and utilities are returned to a functioning state. Further, utilities such as overhead power lines, cable, and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Impact on the Economy

Severe flooding that follows an event like a dam failure can cause extensive structural damage and withhold essential services. The cost to recover from flood damages after a surge will vary depending on the hazard risk of each dam. Severe flooding that follows an event like a dam failure can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur and drinking water and wastewater treatment facilities can become temporarily out of operation. Debris from surrounding buildings can accumulate should the dam mimic major flood events, such as the 1 percent annual chance flood event that is discussed in Section 4.3.8 (Flood, Flash Flood, Ice Jam).

Impact on the Environment

The environment is vulnerable to several risks in the event of a dam failure. Water releases from dams usually contain very little suspended sediment; this can lead to scouring of riverbeds and banks. The inundation may introduce foreign elements into local waterways, resulting in destruction of downstream habitat and impacting many animal and plant species, especially endangered species. The subsequent rush of water downstream can rapidly increase flow rate and turbidity of streams and rivers in minor dam failures or overwhelm terrestrial habitat with floodwaters in severe dam failures.

Future Growth and Development

An increase in development and population can increase likelihood of a dam failure incident. Future migration to larger jurisdictions may also increase the likelihood of an incident. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to dam inundation areas.

Estimated population projections provided by the Center of Rural Pennsylvania indicate that Delaware County's population will continue to increase into 2040, increasing total population to approximately 648,439 persons (The Center of Rural Pennsylvania 2013). Persons that move into dam inundation areas are at greater risk to be impacted if there is a dam failure event.

Effect of Climate Change on Vulnerability

The June 2009 Pennsylvania Climate Impact Assessment indicated that Pennsylvania is very likely to undergo increased temperatures and precipitation in the 21st century (PADEP 2009). Increased precipitation will occur in the form of heavy rainfalls, which have the potential to increase the risk to dam failures. Increases in precipitation may stress the dam wall. Existing dams may not be able to retain and manage increases in water flow from more frequent, heavy rainfall events. Heavy rainfalls may result in more frequent overtopping of these dams and flooding of the county's assets in adjacent inundation areas. However, the probable maximum flood used to design each dam may be able to accommodate changes in climate.

Additional Data and Next Steps

Because of the sensitive nature of the dam failure inundation zones, potential losses have not been quantified and presented in this plan. To estimate potential losses to population, buildings, critical facilities, and infrastructure, dam inundation areas and depths of flooding may be used to generate depth grids. Hazus may be used to estimate potential losses for the county and participating municipalities.

4.3.3 Drought and Water Supply Deficiencies

This section provides a profile and vulnerability assessment of the drought hazard in Delaware County. Drought is defined as a deficiency of precipitation experienced over an extended period of time (National Drought Mitigation Center [NDMC] 2018). Drought conditions occur in virtually all climatic zones, yet the characteristics of droughts vary significantly from one region to another, relative to normal precipitation within respective regions. Droughts can occur any time of year but have the greatest impact to society during the warm summer months. Drought and water supply deficiencies can affect agriculture, water supply, aquatic ecology, wildlife, and plant life. Drought is a temporary irregularity in typical weather patterns and differs from aridity, which reflects low rainfall within a specific region and is a permanent feature of the climate of that area.

Drought can be defined or grouped into four categories:

- Meteorological drought is a measure of departure of precipitation from normal, defined solely by reference to relative degree of dryness. Because of climatic differences, dryness considered a drought at one location of the country may not be considered drought at another location.
- Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels, and other parameters. Agricultural drought occurs when not enough water is available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demands of plant life, primarily crops.
- Hydrological drought is associated with below-normal surface or subsurface water supply resulting from periods of precipitation shortfalls (including snowfall). Hydrological drought is related to effects of precipitation shortfalls on stream flows and water levels in reservoirs, lakes, and groundwater.
- Socioeconomic drought is associated with supply and demand of an economic good, with elements of meteorological, hydrological, and agricultural drought categories. This differs from the aforementioned types of drought because its occurrence depends on supply and demand to identify or classify droughts. Supplies of many economic goods such as water, silage, food grains, fish, and hydroelectric power depend on weather. Socioeconomic drought occurs when demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply (NDMC 2017).

Drought and water supply deficiencies can affect many sectors of an economy and can reach beyond an area undergoing physical drought. Because water is essential for producing goods and providing services, drought can reduce crop yield, increase fire hazard, lower water levels, and damage wildlife and fish habitats. Further consequences include reductions in crop yields, rangeland, and forest productivity that may lower incomes of farmers and agribusinesses; increase in prices of food and timber; increase in unemployment; reduction of tax revenues as expenditures decline; increase in crime, foreclosures, and migration; and depletion of disaster relief funds. The many impacts of drought can be categorized as economic, environmental, or social.

4.3.3.1 Location

Droughts and water supply deficiencies are regional in scope and may affect the entirety of Delaware County rather than only individual municipalities within the county. Droughts and water supply deficiencies may also concurrently affect counties near Delaware County or even the entire Commonwealth. Generally, areas along waterways will reveal drought conditions later than areas away from waterways.

The impact of a drought is generally felt first by the agricultural sector, which is dependent upon precipitation and groundwater. According to the county's Comprehensive Plan, Delaware County is not known for its agricultural lands. Furthermore, locations where citizens rely on surface water for drinking water, water supplies

are vulnerable to effects of drought and thus can impact the severity of a drought. Residents depending on well water can more easily handle short-term droughts without major inconveniences than can populations that rely on surface water. However, longer-term droughts inhibit groundwater aquifers from recharging and can thus extend the problems of well owners for an indeterminate amount of time. Delaware County residents who depend on private domestic wells have this greater "hidden vulnerability" to droughts. According to the United States Geological Survey (USGS) National Water Information System, the average daily domestic self-supplied groundwater withdrawals of fresh water in Pennsylvania was 501 million gallons per day (Mgal) to 1 billion gallons per day in 2015 (USGS n.d.).

Table 4.3.3-1 lists the number of reported domestic wells within each municipality of Delaware County. The well data were obtained from the Pennsylvania Groundwater Information System (PaGWIS). PaGWIS is maintained by PA DCNR and relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the county. It is, however, the most complete data set of domestic wells available.

Table 4.3.3-1. Domestic Wells in Delaware County

Municipality	Number of Reported Domestic Wells	Municipality	Number of Reported Domestic Wells
Borough of Aldan	1	Borough of Morton	5
Township of Aston	76	Township of Nether Providence	10
Township of Bethel	93	Township of Newtown	117
Borough of Brookhaven	31	Borough of Norwood	4
Chadds Ford	237	Borough of Parkside	1
Chester	89	Borough of Prospect Park	7
Borough of Clifton Heights	3	Township of Radnor	141
Township of Concord	228	Borough of Ridley Park	15
Township of Darby	21	Township of Ridley	61
Borough of East Lansing	14	Borough of Rose Valley	11
Borough of Eddystone	16	Borough of Sharon Hill	4
Township of Edgemont	156	Township of Springfield	22
Borough of Folcroft	3	Borough of Swarthmore	20
Borough of Glenolden	7	Township of Thornbury	337
Township of Haverford	77	Township of Tinicum	13
Borough of Landsdown	7	Borough of Trainer	44
Township of Lower Chichester	22	Township of Upper Chichester	90
Borough of Marcus Hook	42	Township of Upper Darby	61
Township of Marple	86	Township of Upper Providence	50
Borough of Media	17	Borough of Yeadon	13
Township of Middletown	105	Unknown	25
Total			**2,382**

Source: PA DCNR 2017

In addition to domestic wells in the county, residents may also receive their water from public water companies; Aqua Pennsylvania and Chester Water Authority. These companies are interconnected, allowing water to be redirected as needed throughout the county. The majority of their water is obtained from surface water sources, with a small amount coming from wells. Additionally, a portion of the water used by these companies come from sources outside of the county (Delaware County 2016).

Jurisdictions that are designated for agricultural use are particularly vulnerable to drought. As of 2017, 2,385 acres of farmland were recorded in Delaware County. It continues to have a number of farms (61); most are relatively small, with an average size of 39 acres. Areas designated for agricultural use are illustrated in Figure 2-3 in Section 2.

4.3.3.2 Magnitude

Effects of droughts vary depending on their severity, timing, duration, and location. Some droughts may exert their greatest impact on agriculture, while others may have stronger effects on water supply or recreational activities. Droughts can adversely affect the following significantly:

- Public water supplies for human consumption
- Rural water supplies for livestock consumption and agricultural operations
- Water quality
- Natural soil water or irrigation water for agriculture
- Water for forests and for fighting forest fires
- Water for navigation and recreation

PA DEP and Pennsylvania Emergency Management Agency (PEMA) manage water supply droughts according to the following four conditions of drought, as defined in the Commonwealth of Pennsylvania 2018 Standard Hazard Mitigation Plan (PA HMP):

- Drought Watch: This is a period to alert government agencies, public water suppliers, water users, and the public regarding potential for future drought-related problems. Drought watches are invoked when three or more drought indicators are present for a county or group of counties. The focus is on increased monitoring, awareness, and preparation for response in the event that conditions worsen. A request for voluntary water conservation is issued. The objective of voluntary water conservation measures during a drought watch is to reduce water use by 5 percent within the affected areas. Because of varying conditions, individual water suppliers or municipalities may propose more stringent conservation actions.
- Drought Warning: This is a drought stage involving a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages; relieve stressed sources; develop new sources; and, if possible, forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water use by 10 to 15 percent within the affected areas. Because of varying conditions, individual water suppliers or municipalities may propose more stringent conservation actions.
- Drought Emergency: During this drought stage, water management entities assemble all available resources to respond to actual emergency conditions, avoid depletion of water sources, ensure at least minimum water supplies to protect public health and safety, support essential and high-priority water uses, and avoid unnecessary economic upsets. If deemed necessary and if ordered by the Governor during this stage, imposition of mandatory restrictions on nonessential water usage could occur, as provided for in 4 *Pa. Code,* Chapter 119. Objectives of water use restrictions (mandatory or voluntary) and other conservation measures during a drought emergency are to reduce consumptive water use

within the affected areas by 15 percent and to reduce total use to the extent necessary to preserve public water system supplies, avoid or mitigate local or area shortages, and ensure equitable sharing of limited supplies.

- Local Water Rationing: This fourth condition of drought is not defined as a drought stage. Local municipalities may, with the approval of the PEMA Council, implement local water rationing to share a rapidly dwindling or severely depleted water supply within designated water supply service areas. These individual water rationing plans, authorized through provisions of 4 *Pa. Code* Chapter 120, require specific limits on individual water consumption to achieve significant reductions in use. Under both mandatory restrictions imposed by the Commonwealth and local water rationing practices, procedures are specified for granting variances in consideration of individual hardships and economic dislocations (PEMA 2019).

Pennsylvania uses five parameters to assess drought conditions: precipitation deficits, stream flows, groundwater level, soil moisture, and reservoir storage levels. These parameters are detailed below:

- Precipitation Deficits: Because rainfall provides the basis for ground surface water resources, measuring the difference in precipitation from the normal (30-year average) tends to be the earliest indicator that a drought is possible in an area. The PA DEP will compare the cumulative precipitation for varying time periods (minimum of 3 months, maximum of 12 months) each month against the normal, 30-year average value for each same time period. Any duration that has less than the normal is considered to have had a deficit, represented by a percentage less than the normal precipitation. Table 4.3.3-2 shows what the deficit values need to be for each time period in order to qualify for each drought stage.

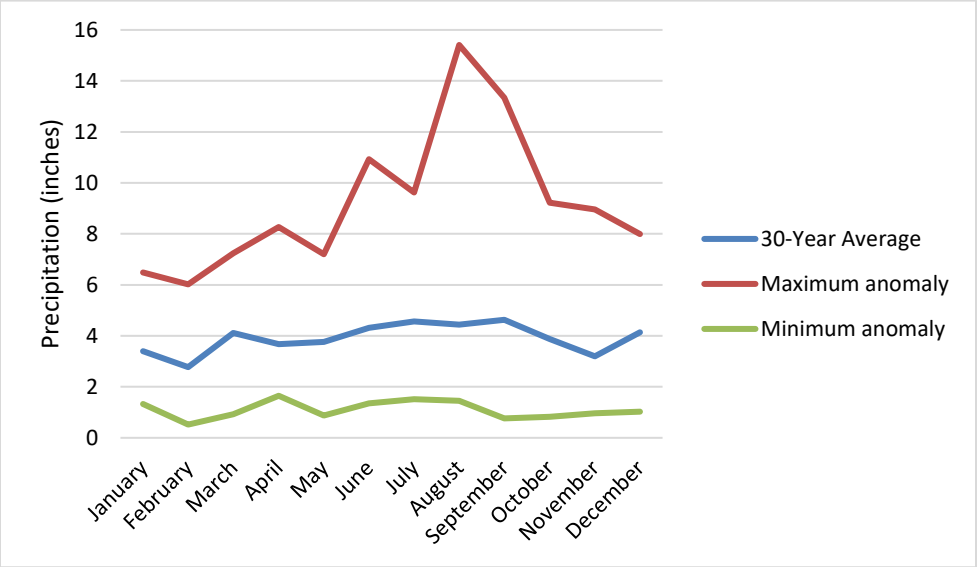
Table 4.3.3-2. Precipitation Deficit Drought Indicators for Pennsylvania

Duration of Deficit Accumulation (Months)	Drought Watch (deficit as percent of normal precipitation)	Drought Warning (deficit as percent of normal precipitation)	Drought Emergency (deficit as percent of normal precipitation)
3	25%	35%	45%
4	20%	30%	40%
5	20%	30%	40%
6	20%	30%	40%
7	18.5%	28.5%	38.5%
8	17.5%	27.5%	37.5%
9	16.5%	26.5%	36.5%
10	15%	25%	35%
11	15%	25%	35%
12	15%	25%	35%

Source: PEMA 2019

Figure 4.3.3-1 presents the average, maximum, and minimum precipitation by month from 1991 to 2020 (the most current three-decade data available) in Delaware County (NOAA NCDC 2021). Average 30-year annual precipitation was 46.94 inches.

Figure 4.3.3-1. 30-Year precipitation (average, minimum, and maximum) in Delaware County



Source: NOAA NCDC 2021

- Stream Flows: The next earliest indicator that a drought is developing is stream flow measurements. There are 61 USGS stream gages that the DEP currently uses to monitor droughts across the state. The DEP calculates and maintains 30-day average values for stream flow based on the entire period of recording for each gage. Compared to precipitation, stream flow measurements lag by about a month or two when signaling a drought. Drought status is determined from stream flows based on percentiles, or exceedances, rather than percentages. Exceedances are similar to percentiles; a 75 percent exceedance flow value means that the current 30-day average flow is exceeded in the stream 75 percent of the time; in other words, the 30-day average flow in the stream is less than that value only 25 percent of the time. Similarly, with a 90 percent exceedance flow value, the 30-day average flows in the stream would be less than that value only 10 percent of the time, and only 5 percent of the time for a 95 percent exceedance. For stream flows, the 75, 90, and 95 percent exceedance 30-day average flows are used as indicators for drought watch, warning, and emergency, respectively.
- Groundwater Levels: There is about 80 trillion gallons of groundwater stored in the soil beneath Pennsylvania. Groundwater levels for each day are used to calculate the average level of the preceding 30 days. This 30-day value is compared to the values derived from historical records yielding a percentile indicating how much time the groundwater levels have been below the historical average levels. The USGS also maintains a network of groundwater monitoring wells, just recently upgraded to at least one well in each county. Groundwater is used to indicate drought status in a manner similar to stream flows. Groundwater level exceedances of 75, 90, and 95 percent are used to indicate watch, warning, and emergency status. In this case, it is the 30-day average depth to groundwater that is measured and monitored, again in relation to long-term 30-day averages based on the period of record for each county well.
- Soil Moisture: Soil moisture is measured using an algorithm calibrated for relatively homogeneous regions which measures dryness based on temperature and precipitation in the area, information which is provided by NOAA. This generates a value called the Palmer Drought Severity Index (PDSI), which is compiled by the Climate Prediction Center of the National Weather Service on a weekly basis. Table 4.3.3-3 lists PDSI classifications. The PDSI uses 0 to reflect normal status, and

negative numbers indicate droughts. For example, 0 is no drought, -2 is moderate drought, and -4 is extreme drought. Positive numbers signify excess precipitation (NDMC 2013).

Table 4.3.3-3. PDSI Classifications

Severity Category	PDSI Value	Drought Status
Extremely wet	4.0 or more	None
Very wet	3.0 to 3.99	None
Moderately wet	2.0 to 2.99	None
Slightly wet	1.0 to 1.99	None
Incipient wet spell	0.5 to 0.99	None
Near normal	0.49 to -0.49	None
Incipient dry spell	-0.5 to -0.99	None
Mild drought	-1.0 to -1.99	None
Moderate drought	-2.0 to -2.99	Watch
Severe drought	-3.0 to -3.99	Warning
Extreme drought	-4.0 or less	Emergency

Source: NDMC 2013

- Reservoir Storage Levels: Water level storage in several large public water supply reservoirs (especially three New York City reservoirs in the Upper Delaware River Basin) is the fifth indicator that the PA DEP uses for drought monitoring. Depending on the total quantity of storage and the length of the refill period for the various reservoirs, PA DEP uses varying percentages of storage draw-down to indicate the three drought stages for each of the reservoirs. (PA HMP 2018).

The availability and management of water supply are discussed in the 2009 Pennsylvania State Water Plan (PADEP 2009b), a joint effort by the Statewide Water Resources Committee and PADEP. In 2009, the PADEP Secretary approved an updated State Water Plan to guide management of Pennsylvania's water resources over a 15-year planning horizon. As a functional planning tool for all Pennsylvania municipalities, counties, and regional planning partnerships, the State Water Plan profiles drought and resource constraints and encourages implementation of new technology and use policies to facilitate reduced water uses and resource demands at critical peak times. The State Water Plan provides inventories of water availability and an assessment of current and future water use demands and trends. It also offers strategies for improving management of water resources and waterway corridors that aim to reduce damage from extreme drought and flooding conditions (PADEP 2009b).

4.3.3.3 Past Occurrence

Historical information has been drawn from many sources regarding previous occurrences and losses associated with drought events throughout Pennsylvania and Delaware County. Because so many sources were reviewed for the purpose of developing this plan, loss and impact information pertaining to many events could vary depending on the source. Therefore, accuracy of cited monetary values is based only on the available information identified during research for this plan.

According to NOAA's National Centers for Environmental Information storm events database, Delaware County underwent forty-four drought events between January 1, 1950, and December 1, 2021. No county-wide crop or property losses were reported because of the droughts; statewide losses would have included damages in other counties.

Since 1930, the Commonwealth of Pennsylvania has undergone 10 significant droughts. Since 1955, the Commonwealth has undergone 12 drought events that resulted in a Governor's proclamation or a Federal Emergency Management Agency (FEMA)-declared disaster or emergency. In addition to these events, between

1980 and 2018, PADEP indicated that Delaware County has undergone 17 drought watch declarations, 19 drought warning declarations, and 12 drought emergency declarations (PADEP 2020).

According to FEMA, between 1954 and 2020, Pennsylvania underwent one drought-related disaster (DR) or emergency (EM) classified as one or a combination of the following disaster types: drought or water shortage (DR-206). The disaster was declared on August 18, 1965, and impacted 13 counties in Pennsylvania, including Delaware County (FEMA 2022).

Based on all sources researched, drought events between 1980 and 2021 that have affected Delaware County are identified in Table 4.3.3-4. However, not all sources have been identified or researched, and therefore may not include all events that have occurred throughout the county.

Table 4.3.3-4. Past Occurrences of Drought Events from 1980 to 2021

Dates of Event	Event Type	FEMA Declaration Number	USDA Disaster Designation Number	County Designated?	Losses / Impacts / PDSI Value
Nov 18, 1980 - Apr 20, 1982	Drought	N/A	N/A	N/A	Drought Emergency (Eastern portion only)
Apr 26, 1985 - Oct 22, 1985	Drought	N/A	N/A	N/A	Drought Watch (Eastern portion only)
Oct 22, 1985 - Dec 19, 1985	Drought	N/A	N/A	N/A	Drought Watch
Jul 7, 1988 - Aug 24, 1988	Drought	N/A	N/A	N/A	Drought Watch
Nov 18, 1980 – Apr 20, 1982	Drought	N/A	N/A	N/A	Drought Emergency
Apr 26, 1985 – Dec 19, 1985	Drought	N/A	N/A	N/A	Drought Watch
July 7, 1988 – Aug 24, 1988	Drought	N/A	N/A	N/A	Drought Watch
Aug 24, 1988 – Dec 12, 1988	Drought	N/A	N/A	N/A	Drought Warning
Mar 3, 1989 – May 15, 1989	Drought	N/A	N/A	N/A	Drought Watch
June 28, 1991 – July 24, 1991	Drought	N/A	N/A	N/A	Drought Warning
July 24, 1991 – Apr 20, 1992	Drought	N/A	N/A	N/A	Drought Emergency
Apr 20, 1992 – June 23, 1992	Drought	N/A	N/A	N/A	Drought Warning
June 23, 1992 – Sept 11, 1992	Drought	N/A	N/A	N/A	Drought Watch
Sept 1, 1995 – Sept 20, 1995	Drought	N/A	N/A	N/A	Drought Warning
Sept 20, 1995 – Nov 8, 1995	Drought	N/A	N/A	N/A	Drought Emergency
Nov 8, 1995 – Dec 18, 1995	Drought	N/A	N/A	N/A	Drought Warning
Jul 17, 1997 – Nov 13, 1997	Drought	N/A	N/A	N/A	Drought Watch
Sept 1, 1995 - Dec 18, 1995	Drought	N/A	N/A	N/A	Drought Watch
Dec 3, 1998 - Dec 8, 1998	Drought	N/A	N/A	N/A	Drought Watch

Dates of Event	Event Type	FEMA Declaration Number	USDA Disaster Designation Number	County Designated?	Losses / Impacts / PDSI Value
Dec 9, 1998 - Dec 16, 1998	Drought	N/A	N/A	N/A	Drought Warning
Dec 16, 1998 - Mar 15, 1999	Drought	N/A	N/A	N/A	Drought Emergency
Dec 3, 1998 – Dec 14, 1998	Drought	N/A	N/A	N/A	Drought Watch
Dec 14, 1998 – Mar 15, 1999	Drought	N/A	N/A	N/A	Drought Warning
Mar 15, 1999 – June 10, 1999	Drought	N/A	N/A	N/A	Drought Watch
June 10, 1999 – July 20, 1999	Drought	N/A	N/A	N/A	Drought Warning
July 20, 1999 – September 30, 1999	Drought	N/A	N/A	N/A	Drought Emergency
Sept 30, 1999 – May 5, 2000	Drought	N/A	N/A	N/A	Drought Watch
Aug 24, 2001 – May 13, 2002	Drought	N/A	N/A	N/A	Drought Watch
Sept 5, 2002 – Nov 7, 2002	Drought	N/A	N/A	N/A	Drought Watch
Apr 11, 2006 – June 30, 2006	Drought	N/A	N/A	N/A	Drought Watch
Aug 8, 2007 – Sept 5, 2007	Drought	N/A	N/A	N/A	Drought Watch
Oct 5, 2007 – Jan 11, 2008	Drought	N/A	N/A	N/A	Drought Watch
Nov 7, 2008 – Jan 26, 2009	Drought	N/A	N/A	N/A	Drought Watch
Sept 16, 2010 – Nov 10, 2010	Drought	N/A	N/A	N/A	Drought Watch
Aug 5, 2011 – Sept 2, 2011	Drought	N/A	N/A	N/A	Drought Watch
July 16, 2015 – September 29, 2015	Drought	N/A	N/A	N/A	N/A
April 1, 2016 – September 19, 2016	Drought	N/A	N/A	N/A	N/A
July 16, 2015 – September 29, 2015	Excessive Heat and Drought	NA	S3932	Yes	N/A
April 1, 2016 – September 19, 2016	Combined effects of freeze, excessive heat, and drought	NA	S4071	Yes	N/A
November 2016 – April 2017	Drought	NA	N/A	N/A	(-3.62 PDSI)
June 24, 2018 – July 21, 2018	Excessive Heat and Drought Conditions	N/A	S4425	N/A	N/A
August 15. 2019 – October 16, 2019	Drought	N/A	S4602	Yes	N/A

Sources: USDA 2022, NRCC 2021, NOAA NCEI 2022, PADEP 2021
Notes: FEMA-Federal Emergency Management Agency, N/A- Not applicable, PDSI- Palmer Drought Severity Index

Table 4.3.3-5 lists the crop loss insurance payments on claims in Delaware County caused by drought events since 2015.

Table 4.3.3-5. Crop Loss Insurance Claims Due to Drought, 2015 to 2021

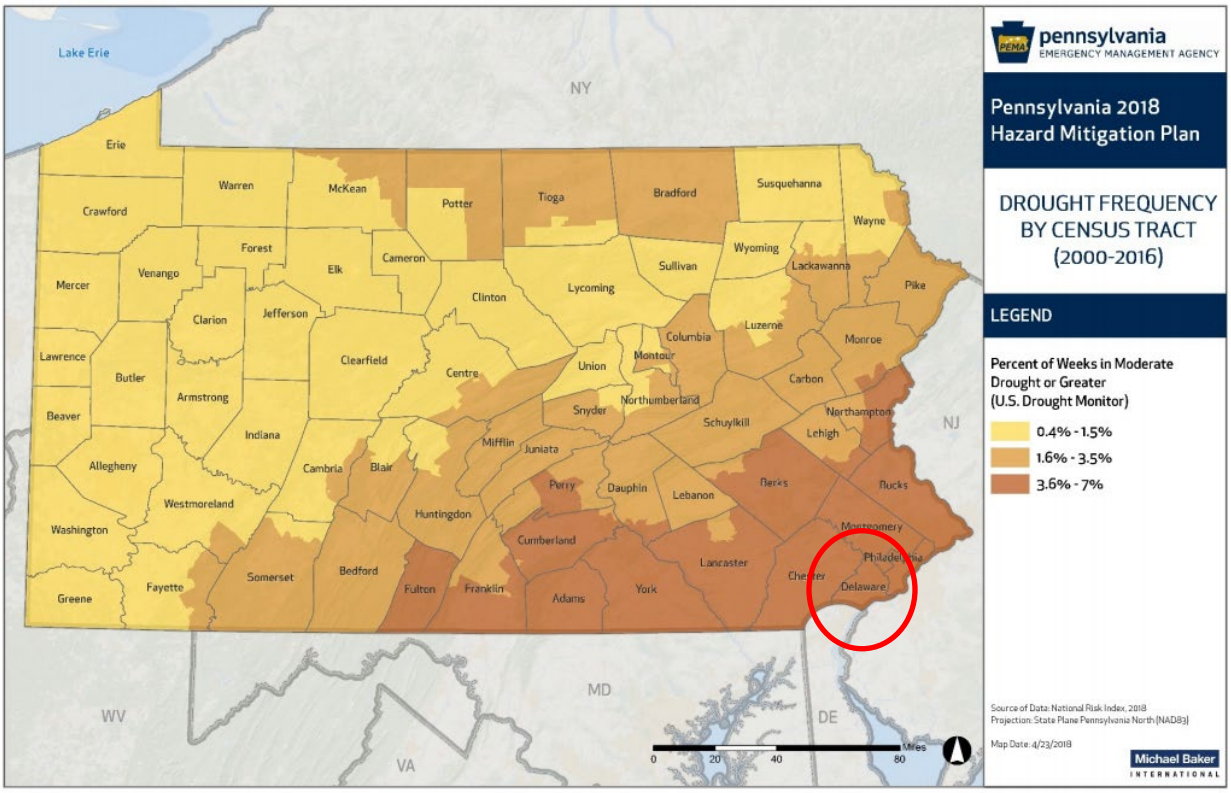
Crop Year	Total Claims
2015	None
2016	$85
2017	None
2018	None
2019	None
2020	None
2021	None

Source: USDA 2022

4.3.3.4 Probability of Future Occurrences

Frequency of droughts is difficult to forecast. Based on data from a 16-year period, the majority of Delaware County underwent severe or extreme drought conditions less than 7 percent of the time (illustrated on Figure 4.3.3-1). Based on the Risk Factor Methodology probability criteria (described in Section 4.4), future occurrences of drought events are considered *likely*.

Figure 4.3.3-2. Percentage of Weeks with Moderate Drought or Greater



Source: PEMA 2019
Note: Delaware County circled in red

4.3.3.5 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. For the drought hazard, all of Delaware County has been identified as the hazard area. Therefore, all assets (population, structures, critical facilities, and lifelines) described in the County Profile (Section 2) are potentially vulnerable to a drought. The following text evaluates and estimates the potential impact of the drought and water supply deficiency hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

Drought conditions can cause a shortage of water available for human consumption and can reduce local firefighting capabilities. Social impacts of a drought include mental and physical stress, public safety threats (increased threat from forest/grass fires), health threats, conflicts among water users, reduced quality of life, and inequities in distribution of impacts and disaster relief. The infirm, young, and elderly are particularly susceptible to drought and extreme temperatures, sometimes associated with drought conditions, because of their age; health conditions; and limited ability to mobilize to shelters, cooling centers, and medical sources. Impacts on the economy and environment may have social implications as well (New York State Disaster Preparedness Commission [NYSDPC] 2011). For the purposes of this plan, the entire population of the county is considered vulnerable to drought events.

Impact on General Building Stock and Critical Facilities

A drought is not expected to directly affect any structures, and all are expected to be operational during a drought event. However, droughts contribute to conditions conducive to wildfires. Risk to life and property is greatest in regions where forested areas adjoin urbanized areas (high-density residential, commercial, and industrial), also known as the WUI. Therefore, all assets in and adjacent to the WUI zone, including population, structures, critical facilities, lifelines, and businesses, are considered vulnerable to wildfire.

Impact on the Economy

A prolonged drought can exert serious direct and indirect economic impacts on a community or across the county. A summary of impacts on the economy is presented in Table 4.3.3-6.

Table 4.3.3-6. Impacts on the Economy

Losses to Agricultural Producers	Losses to Livestock Producers	Losses of Timber Production
Annual and perennial crop losses	Reduced productivity of rangeland	Wildland fires
Damage to crop quality	Reduced milk production	Tree disease
Income loss for farmers because of reduced crop yields	Forced reduction of foundation stock	Insect infestation
Reduced productivity of cropland (wind erosion, long-term loss of organic matter, etc.)	High cost/unavailability of water for livestock	Impaired productivity of forest land
Insect infestation	Cost of new or supplemental water resource development (wells, dams, pipelines)	Direct loss of trees, especially young ones
Plant disease	High cost/unavailability of feed for livestock	**Losses to Transportation Industry**
Wildlife damage to crops	Increased feed transportation costs	Loss from impaired navigability of streams, rivers, and canals

Losses to Agricultural Producers	Losses to Livestock Producers	Losses of Timber Production
Increased irrigation costs	High livestock mortality rates	**Decline in Food Production/Disrupted Food Supply**
Cost of new or supplemental water resource development (wells, dams, pipelines)	Disruption of reproduction cycles (delayed breeding, more miscarriages)	Increase in food prices
Losses of Fishery Production	Decreased stock weights	Increased importation of food (higher costs)
Damage to fish habitat	Increased predation	**Losses to Water Suppliers**
Loss of fish and other aquatic organisms because of decreased flows	Grass fires	Revenue shortfalls and/or windfall profits
Losses to Recreation and Tourism Industry	**Energy-Related Effects**	Cost of water transport or transfer
Loss to manufacturers and sellers of recreational equipment	Increased energy demand and reduced supply because of drought-related power curtailments	Cost of new or supplemental water resource development
Losses related to curtailed activities: hunting and fishing, bird watching, boating, etc.	Costs to energy industry and consumers associated with substituting more expensive fuels (oil) for hydroelectric power	

Source: NYSDPC 2011

Loss estimates are based on lost agricultural revenues throughout Delaware County. Table 4.3.3-7 below enumerates the county's farmland acreage exposure to the drought hazard as well as the annual market value of all agricultural products sold, as documented in the 2017 USDA Census of Agriculture. If the county loses its agricultural yield because of drought, total losses could amount to nearly $9.5 million. Livestock, poultry, and associated products have a potential loss value of nearly $214,000 (USDA 2017).

Table 4.3.3-7. Estimated County Losses Relating to Agricultural Production

Impacted Farmland Acreage	Market Value of All Agricultural Products
2,385	$9,494,000

Source: USDA 2017

Impact on the Environment

As summarized in the 2018 PA HMP, environmental impacts of drought include:

- Hydrologic effects – lower water levels in reservoirs, lakes, and ponds; reduced streamflow; loss of wetlands; estuarine impacts; groundwater depletion and land subsidence; and effects on water quality, such as increases in salt concentration and water temperature
- Damage to animal species – lack of feed and drinking water; disease; loss of biodiversity; migration or concentration; and reduction and degradation of fish and wildlife habitat
- Reduced stream flow
- Loss of wetlands
- Increased groundwater depletion, land subsidence, and reduced groundwater recharge
- Water quality impacts like salinity, water temperature increases, pH changes, dissolved oxygen, or turbidity
- Loss of biodiversity (PEMA 2019)

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across the county (further discussed in Section 2.4 of this HMP). Exposure of any new development and new residents to the drought hazard is anticipated.

Effect of Climate Change on Vulnerability

Climate is defined not simply as average temperature and precipitation but also by type, frequency, and intensity of weather events. Both globally and at the local level, climate change can alter prevalence and severity of weather extremes, such as droughts. While predicting changes in drought events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating effects of future climate change on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).

According to the Pennsylvania Climate Impacts Assessment 2015 Update, the likelihood of drought will decrease by the middle of the 21st century as months with above-normal precipitation increase; however, drying of surface soil across the coterminous United States in all seasons is still projected because of enhanced evapotranspiration. Soil moisture at root depth of crops is more useful for estimating agricultural drought. Resolution constraints and lack of detailed evapotranspiration process representation will lead to lower confidence in projections with the soil moisture budget being less constrained (Wehner et al. 2017).

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Delaware County's vulnerability assessment.

4.3.4 Earthquake

An earthquake is sudden movement of the Earth's surface caused by release of stress accumulated within or along the edge of the Earth's tectonic plates, a volcanic eruption, or a man-made explosion (Shedlock and Pakiser 1997). Most earthquakes occur at the boundaries where the Earth's tectonic plates meet (faults); less than 10 percent of earthquakes occur within plate interiors. As plates continue to move and plate boundaries change geologically over time, weakened boundary regions become part of the interiors of the plates. These zones of weakness within the continents can cause earthquakes, which are a response to stresses that originate at the edges of the plate or in the deeper crust (Shedlock and Pakiser 1997).

According to the U.S. Geological Survey (USGS) Earthquake Hazards Program, an earthquake hazard is any disruption associated with an earthquake that may affect residents' normal activities. This category includes surface faulting, ground motion (shaking), landslides, liquefaction, tectonic deformation, tsunamis, and seiches. Each of these terms is defined below:

- Surface faulting: Displacement that reaches the Earth's surface during a slip along a fault. This commonly occurs with shallow earthquakes—those with an epicenter of less than 20 kilometers (km).
- Ground motion (shaking): Movement of the Earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source, and the waves travel through the Earth and along its surface.
- Landslide: Movement of surface material down a slope.
- Liquefaction: A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like the wet sand near the water at the beach. Earthquake shaking can cause this effect.
- Tectonic deformation: Change in the original shape of a material caused by stress and strain.
- Tsunami: A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major sub-marine slides, or exploding volcanic islands.
- Seiche: Sloshing of a closed body of water, such as a lake or bay, from earthquake shaking (USGS 2012).

Ground shaking is the primary cause of earthquake damage to man-made structures. Damage can be increased when soft soils amplify ground shaking. Soils influence damage in different ways. Soft soils can amplify the motion of earthquake waves, producing greater ground shaking and increasing stresses on built structures on the land surface. Loose, wet, sandy soils also can cause damage when they lose strength and flow as a fluid when shaken, causing foundations and underground structures to shift and break (Stanford 2003).

The National Earthquake Hazard Reduction Program (NEHRP) developed five soil classifications (A to E) distinguished by soil shear-wave velocity that alters severity of an earthquake; each classification is listed in Table 4.3.4-1. Class A soils (hard rock) reduce ground motion from an earthquake, and Class E soils (soft soils) amplify and magnify ground shaking and increase building damage and losses.

Table 4.3.4-1. NEHRP Soil Classifications

Soil Classification	Description
A	Hard rock
B	Rock
C	Very dense soil and soft rock
D	Stiff soils
E	Soft soils

Source: Federal Emergency Management Agency (FEMA) 2013

The following sections discuss location and extent, range of magnitude, previous occurrence, future occurrence, and vulnerability assessment associated with the earthquake hazard in Delaware County.

Location and Extent

Focal depth and geographic position of the epicenter of an earthquake commonly determine its location. Focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter of an earthquake is the point on the Earth's surface directly above the hypocenter. Earthquakes usually occur without warning, and their effects can be felt in areas at great distances from the epicenter.

Earthquake epicenters in Pennsylvania are not evenly distributed. There is a large concentration in the southeastern region of the state, specifically in southeastern Pennsylvania and particularly the Lancaster area. Three earthquake epicenters have been measured in Delaware County. Earthquake events in the Pennsylvania region, including Delaware County, are mild. When events occur, they impact very small areas less than 100 kilometers in diameter.

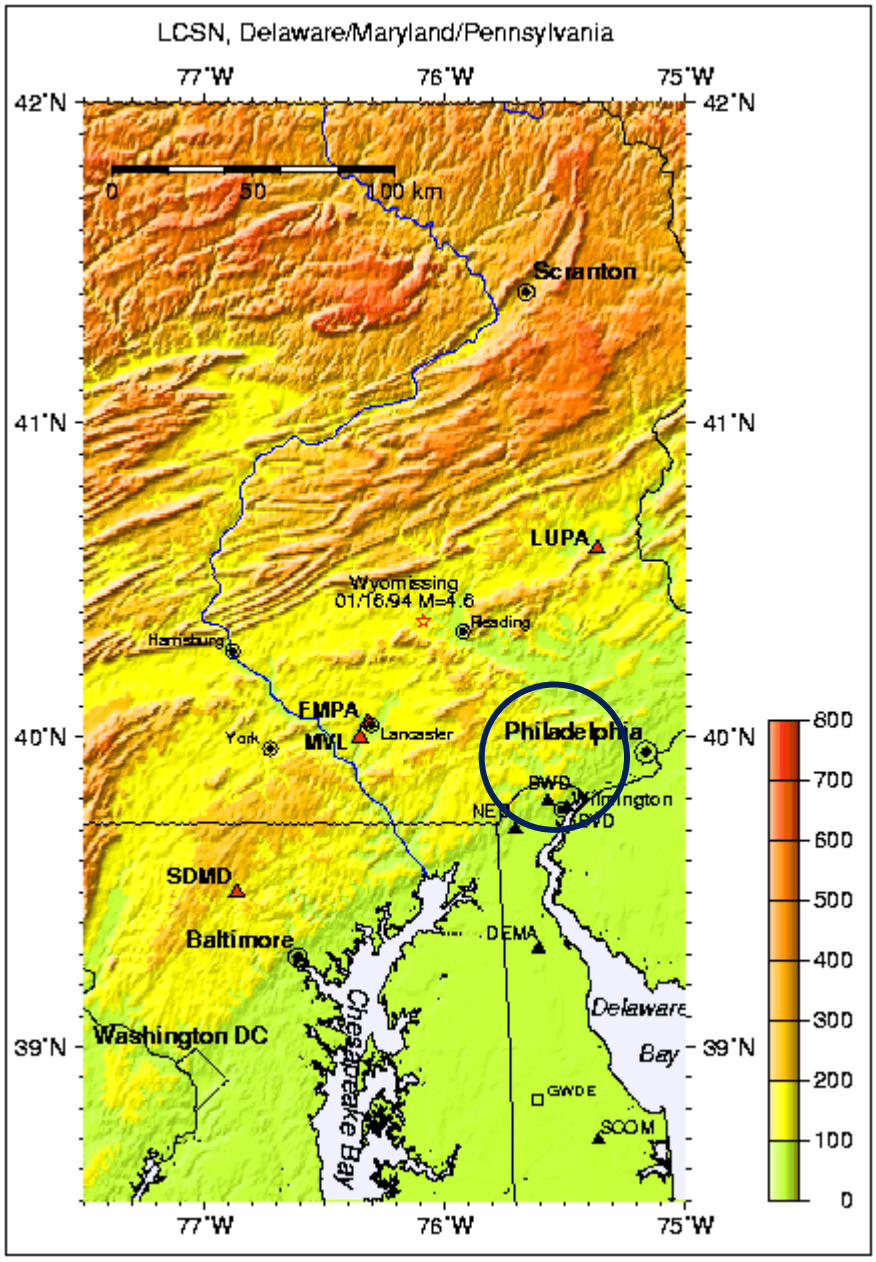
Figure 4.3.4-1 shows relative seismic hazard zones in Pennsylvania, as determined by the USGS National Seismic Hazard Mapping Project. Earthquake hazards are highest in the southeastern region, which includes Delaware County, and far northwestern region of the Commonwealth. (USGS 2018).

Figure 4.3.4-1. Pennsylvania Earthquake Hazard Zones

Source: PEMA 2019
Note: Delaware County is within the blue oval on the map.

The Lamont-Doherty Cooperative Seismographic Network (LCSN) monitors earthquakes that occur primarily in the northeastern United States. Goals of the project are to compile a complete earthquake catalog for this region, assess earthquake hazards, and study causes of earthquakes in the region. LCSN operates 40 seismographic stations in the following seven states: Connecticut, Delaware, Maryland, New Jersey, New York, Pennsylvania, and Vermont. Figure 4.3.4-2 shows locations of seismographic stations in eastern Pennsylvania. The figure shows two stations, Franklin & Marshall College and Millersville University. The network is composed of broadband and short-period seismographic stations (LCSN 2012).

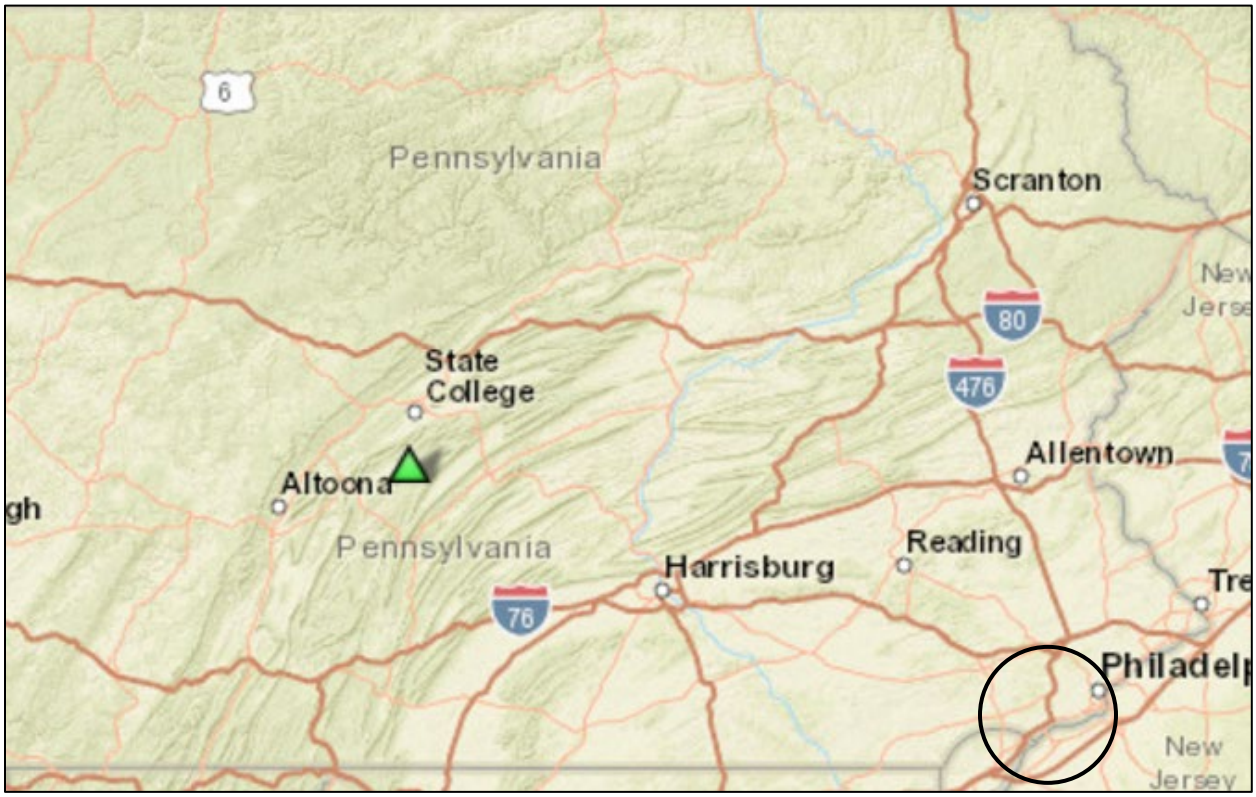
Figure 4.3.4-2. Lamont-Doherty Seismic Stations Locations in Eastern Pennsylvania



Source: LCSN 2012
Note: Delaware County is within the oval on the map.

In addition to the Lamont-Doherty Seismic Stations, USGS operates a global network of seismic stations to monitor seismic activity. While no seismic stations are within Delaware County, a nearby station is found in State College, Pennsylvania. Figure 4.3.4-3 shows its location.

Figure 4.3.4-3. USGS Seismic Stations



Source: *USGS 2017*
Note: *Seismic station location is indicated by green triangle, and Delaware County is within the black oval.*

The USGS provides the website *Did You Feel It?* (http://earthquake.usgs.gov/earthquakes/dyfi/) for citizens to report earthquake experiences and to share information regarding the earthquake and its effects. The website is intended to gather citizens' experiences during an earthquake and incorporate the information into detailed maps to illustrate shaking intensity and damage assessments (USGS 2017).

Earthquakes above a magnitude 5.0 can cause damage near their epicenters, and larger-magnitude earthquakes can cause damage over larger, wider areas. A discussion of previous occurrences of earthquakes in Delaware County appears in the Previous Occurrence section (Section 4.3.3.3) of this profile.

Range of Magnitude

Seismic waves are vibrations from earthquakes that travel through the Earth and are recorded on instruments called seismographs. The magnitude or extent of an earthquake is a given value of the earthquake size, or amplitude of the seismic waves, as measured by a seismograph. The Richter magnitude scale (Richter scale) was developed in 1932 as a mathematical device to compare sizes of earthquakes. The Richter scale is the most widely known scale that measures magnitude of earthquakes. It has no upper limit and is not used to express damage. An earthquake in a densely populated area that results in many deaths and considerable damage may have the same magnitude and shock in a remote area that did not undergo any damage. Table 4.3.4-2 lists Richter scale magnitudes and corresponding earthquake effects associated with each magnitude. Based on historical data of earthquakes with a recorded intensity, little damage is expected from earthquake events. However, since the worst earthquake recorded in Pennsylvania was a magnitude 5.2, a worst-case scenario for this hazard would be if an earthquake of similar magnitude occurred in Delaware County or near the border in an adjacent county, causing mild damage in populated areas.

Table 4.3.4-2. Richter Scale Magnitudes

Richter Magnitude	Earthquake Effects
3.5 or less	Generally not felt, but recorded
3.5 to 5.4	Often felt, but rarely causes damage
Under 6.0	At most, slight damage to well-designed buildings; can cause major damage to poorly constructed buildings over small regions
6.1 to 6.9	Can be destructive up to about 100 kilometers from epicenter
7.0 to 7.9	Major earthquake; can cause serious damage over large areas
8.0 or greater	Great earthquake; can cause serious damage in areas several hundred kilometers across

Source: PEMA 2019

The intensity of an earthquake is based on observed effects of ground shaking on people, buildings, and natural features and varies with location. The Modified Mercalli Intensity (MMI) scale expresses the intensity of an earthquake and is a subjective measure that describes the strength of a shock felt at a particular location. The MMI scale records intensity of an earthquake's effects in a given locality according to a scale from I to XII. Descriptions of MMI scales appear in Table 4.3.4-3. Earthquakes that occur in Pennsylvania originate deep within the Earth's crust and not on an active fault. No injury or severe damage from earthquake events has been reported in Delaware County.

Table 4.3.4-3. Modified Mercalli Intensity Scale with Associated Impacts

Scale	Intensity	Description Of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs	<4.2
II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.	
III	Slight	Felt quite noticeably indoors, especially on upper floors. Most people do not recognize it as an earthquake (i.e., a truck rumbling).	
IV	Moderate	Can be felt by people walking; dishes, windows, and doors are disturbed.	
V	Slightly Strong	Sleepers are awoken; unstable objects are overturned.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves; damage is slight.	<5.4
VII	Very Strong	Damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, and considerable in [poorly built or badly designed structures; some chimneys are broken.	<6.1
VIII	Destructive	Damage is slight in specially designed structures; considerable in ordinary, substantial buildings. Moving cars become uncontrollable; masonry fractures, poorly constructed buildings damaged.	<6.9
IX	Ruinous	Some houses collapse; ground cracks; pipes break open; damage is considerable in specially designed structures; buildings are shifted off foundations.	
X	Disastrous	Some well-built wooden structures are destroyed; most masonry and frame structures are destroyed along with foundations. Ground cracks profusely; liquefication and landslides are widespread.	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables are destroyed.	<8.1
XII	Catastrophic	Total destruction; trees fall; lines of sight and level are distorted; ground rises and falls in waves; objects are thrown upward into the air.	>8.1

Source: PEMA 2019

Seismic hazards are often expressed in terms of Peak Ground Acceleration (PGA) and Spectral Acceleration (SA). USGS defines PGA and SA as the following: "PGA is what is experienced by a particle on the ground. SA is approximately what is experienced by a building, as modeled by a particle mass on a massless vertical rod having the same natural period of vibration as the building" (USGS 2012). Both PGA and SA can be measured

in *g* (the acceleration caused by gravity) or expressed as a percent acceleration force of gravity (percent g). For example, at 100 percent g PGA (equivalent to 1.0 g) during an earthquake (an extremely strong ground motion), objects accelerate sideways at the same rate as when they drop from a ceiling. At 10 percent g PGA, ground acceleration is 10 percent that of gravity (New Jersey Office of Emergency Management [NJOEM] 2011). PGA and SA hazard maps provide insight into location-specific vulnerabilities (New York State Disaster Preparedness Commission [NYSDPC] 2011).

PGA is a common earthquake measurement that indicates three factors: (1) geographic area affected, (2) probability of an earthquake at each level of severity, and (3) strength of ground movement (severity) expressed in percent g. In other words, PGA expresses the severity of an earthquake and is a measure of how hard the earth shakes (or accelerates) in a given geographic area (NYSDPC 2011). Damage levels from an earthquake vary with intensity of ground shaking and with seismic capacity of structures, as noted in Table 4.3.4-4.

Table 4.3.4-4. Damage Levels Experienced in Earthquakes

Ground Motion Percentage	Explanation of Damages
1-2% g	Motions are widely felt by people; hanging plants and lamps swing strongly, but damage levels, if any, are usually very low.
Below 10% g	Usually causes only slight damage, except in unusually vulnerable facilities.
10-20% g	May cause minor-to-moderate damage in well-designed buildings, with higher levels of damage in poorly designed buildings. At this level of ground shaking, only unusually poor buildings would be subject to potential collapse.
20-50% g	May cause significant damage in some modern buildings and very high levels of damage (including collapse) in poorly designed buildings.
≥50% g	May cause higher levels of damage in many buildings, even those designed to resist seismic forces.

Source: NJOEM 2011
Note: % g Peak Ground Acceleration

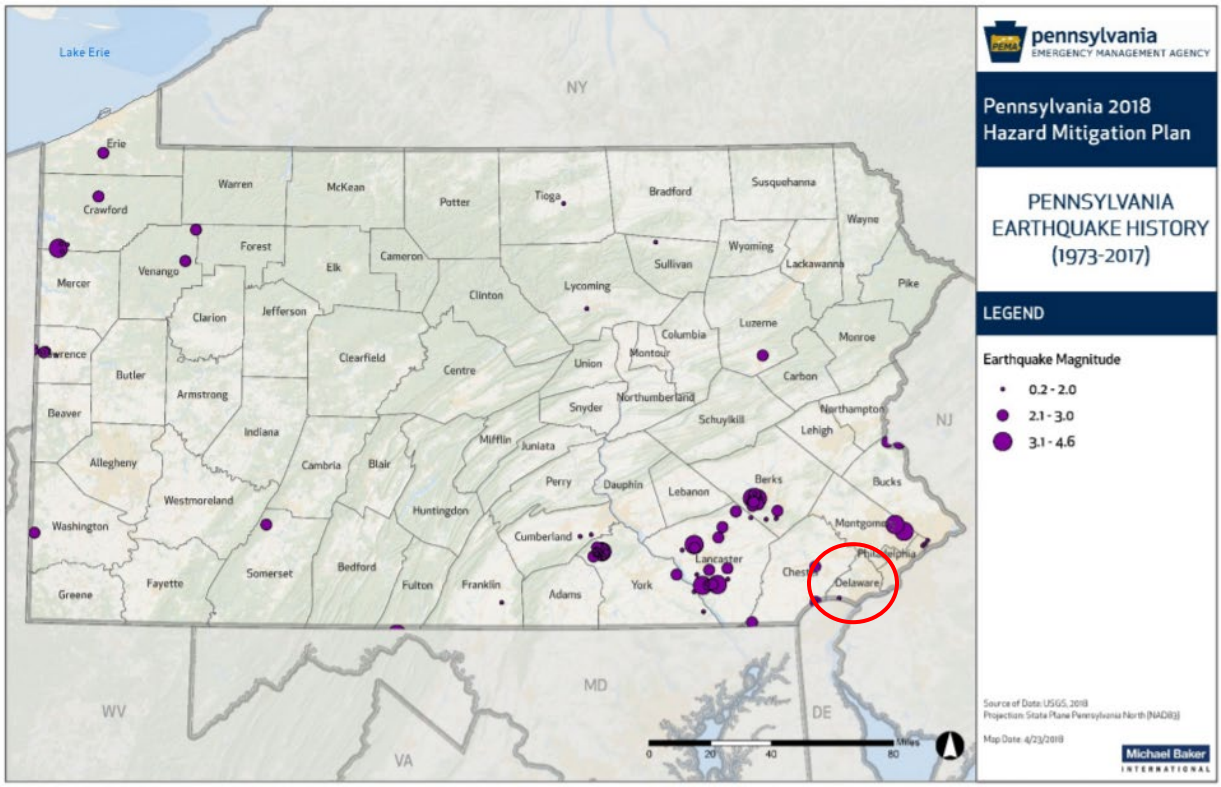
National maps of earthquake shaking hazards have been produced since 1948. These maps provide information essential for creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities, and land use planning applied in the United States. Scientists frequently revise these maps to reflect new information and knowledge. Buildings, bridges, highways, and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better than those designed earlier, with less damage and disruption. After thoroughly reviewing the studies, professional organizations of engineers update seismic-risk maps and seismic design requirements specified in building codes (Brown and others 2001).

Past Occurrence

The historical record of earthquakes goes back approximately 200 years. In Pennsylvania, about 35 earthquakes have caused light damage since the Colonial period. Nearly one-half of these damaging events had out of state epicenters (USGS 2018). Figure 4.3.4-4 is a map of earthquake epicenters in Pennsylvania from 1973 to 2018.

According to USGS, there has been one earthquake epicenter in Delaware County during this time span. On July 5, 1996, a 2.6 magnitude earthquake took place at Glen Mills. No damage was reported in Delaware County. Two other earthquakes were reported in the county in 1737 and 1763. These quakes were estimated to have moderate and slight intensity (DCNR 2004; PEMA 2019).

Figure 4.3.4-4. Earthquake Epicenters in Pennsylvania



Source: USGS 2018; PEMA 2019
Note: Delaware County is within the red circle.

However, there are earthquakes that have occurred in Delaware County that predate the data shown above. Delaware County has record of several earthquakes whose effects were felt in the County. On December 8, 1737, a strong earthquake was felt in New York, Boston, Philadelphia, and New Castle. On November 11 and 14, 1840, earthquakes at Philadelphia were accompanied by an unusual swell on the Delaware River.

A strong shock (V intensity) on May 31, 1884, in Allentown had reports of dishes being thrown from tables. An earthquake centered in New York City in August of 1884 was felt in 30 towns from Hartford, Connecticut to West Chester, Pennsylvania. A strong earthquake (VI intensity) was centered in Allentown in May of 1908, shaking down a few chimneys. The disturbance was felt for 93 miles. The area around Sinking Spring near Reading experienced minor damage (VI intensity) with plaster falling from walls, dishes, and bottles tumbling from shelves, and furniture being upset during an event on January 7, 1954. Tremors were felt in the area for a month afterwards. A moderate earthquake on September 14, 1961, centered in the Lehigh Valley shook buildings over a broad area and alarmed many residents. Minimal damage was reported (V intensity), but citizens were upset. A small earthquake on December 10, 1968, with an epicenter in New Jersey, had effects in the Darby Borough area as well as the City of Philadelphia (V intensity). The shock only measured 2.5 on the Richter scale, but it was strong enough to shake tollbooths on the Benjamin Franklin and Walt Whitman Bridges and broke windows in some locations in New Jersey (Delaware County 2016).

Historically, large earthquakes in eastern North America have occurred in three regions: (1) Mississippi Valley near the Town of New Madrid, Missouri; (2) St. Lawrence Valley region of Quebec, Canada; and (3) Charleston, South Carolina. In February 1925, one of the region's largest earthquakes on record occurred (magnitude near 7.0) with its epicenter in a region of Quebec. If a similar-magnitude earthquake would occur in the western part of the Quebec region, some moderate damage might be expected in one or more counties of Pennsylvania's

northern tier. An earthquake with an estimated magnitude of about 7.5 occurred on August 31, 1886, in Charleston, South Carolina. The earthquake was felt in most of Pennsylvania. More recently, a magnitude 5.8 earthquake with an epicenter in rural Louisa County, Virginia, was felt throughout Pennsylvania, triggering evacuations, emergency bridge and tunnel inspections, and minor damage to buildings. This shallow earthquake occurring along the Spotsylvania Fault was felt as far north as Ontario, Canada, and as far south as Alabama. (PEMA 2019).

Other earthquakes have occurred in East Coast areas, including eastern Massachusetts, southeastern New York, and northern New Jersey. Moderate earthquakes occurred in southeastern New York and northern New Jersey and were felt in eastern Pennsylvania. If an earthquake of magnitude 6.0 or greater would occur in that area, damage would likely result in the easternmost counties of Pennsylvania, including Delaware County.

Future Occurrence

Earthquakes cannot be predicted and could occur any time of the day or year. Major earthquakes are infrequent in the Commonwealth and in Delaware County and may occur only once every few hundred years or longer, but the consequences of major earthquakes may potentially be very high. Based on the historic record, the future probability of damaging earthquakes impacting Delaware County is low.

According to the USGS earthquake catalog, between 1950 and 2021, there has been one earthquake with an epicenter in Delaware County. Based on available historical data, future occurrences of earthquake events can be considered *possible* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4 of this plan).

Vulnerability Assessment

A probabilistic assessment was conducted for the 500-year Mean Return Period (MRP) through a Level 2 analysis in Hazus to analyze the earthquake hazard and provide a range of loss estimates. To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the earthquake hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time

Impact on Life, Health, and Safety

Overall, the entire population of Delaware County is exposed to the earthquake hazard event. According to the 2020 U.S. Census, Delaware County has a population of 576,830 people. The impact of an earthquake on life, health, and safety would depend on the severity of the event. First responder safety may be at risk as well responding to earthquake hazard events. First responders may have difficulty traveling to earthquake incidents due to limited access to roads. Risks to public safety and loss of life from an earthquake in Delaware County are minimal, with higher risk occurring in buildings as a result of damage to the structure or people walking below building ornamentation and chimneys that may be shaken loose and fall as a result of the earthquake.

Populations considered most vulnerable are located in the built environment, particularly near unreinforced masonry construction. In addition, the vulnerable population includes the elderly (persons over the age of 65) and individuals living below the Census poverty threshold. These socially vulnerable populations are most susceptible based on several factors, including their physical and financial ability to react or respond during a hazard and locations and construction quality of their housing.

Residents may be displaced or require temporary to long-term sheltering as a result of the event. The number of people requiring shelter is generally less than the number displaced, as some displaced persons use hotels or stay with family or friends after a disaster event. Table 4.3.4-5 summarizes the estimated sheltering needs for Delaware County.

Table 4.3.4-5. Summary of Estimated Sheltering Needs for Delaware County

Jurisdiction	500-Year Mean Return Period Earthquake Event	
	Displaced Households	Persons Seeking Short-Term Sheltering
Aldan (B)	1	0
Aston (Twp)	0	0
Bethel (Twp)	0	0
Brookhaven (B)	1	0
Chadds Ford (Twp)	0	0
Chester City (C)	3	3
Chester (Twp)	0	0
Chester Heights (B)	0	0
Clifton Heights (B)	1	1
Collingdale (B)	1	1
Colwyn (B)	0	0
Concord (Twp)	1	1
Darby (B)	1	1
Darby (Twp)	0	0
East Lansdowne (B)	0	0
Eddystone (B)	0	0
Edgmont (Twp)	0	0
Folcroft (B)	0	0
Glenolden (B)	1	1
Haverford (Twp)	3	1
Lansdowne (B)	2	1
Lower Chichester (Twp)	0	0
Marcus Hook (B)	0	0
Marple (Twp)	1	1
Media (B)	1	0
Middletown (Twp)	1	0
Millbourne (B)	0	0
Morton (B)	0	0
Nether Providence (Twp)	0	0
Newtown (Twp)	1	0
Norwood (B)	0	0
Parkside (B)	0	0
Prospect Park (B)	1	0
Radnor (Twp)	2	1
Ridley (Twp)	3	1
Ridley Park (B)	1	0
Rose Valley (B)	0	0
Rutledge (B)	0	0
Sharon Hill (B)	0	0
Springfield (Twp)	1	0
Swarthmore (B)	0	0
Thornbury (Twp)	0	0

Jurisdiction	500-Year Mean Return Period Earthquake Event	
	Displaced Households	Persons Seeking Short-Term Sheltering
Tinicum (Twp)	1	0
Trainer (B)	0	0
Upland (B)	0	0
Upper Chichester (Twp)	1	1
Upper Darby (Twp)	12	7
Upper Providence (Twp)	1	0
Yeadon (B)	1	1
Brandywine Conservancy and Museum of Art Special District	N/A	N/A
Delaware County (Total)	**45**	**28**

Source: HAZUS v 5.1
Note: B – Borough; Twp. – Township

Structural building damage correlates strongly to the number of injuries and casualties from an earthquake event (NYCEM 2003). Furthermore, different sectors of the community would be exposed to the hazard depending on time of day of occurrence. For example, Hazus considers that maximum residential occupancy occurs at 2:00 a.m.; educational, commercial, and industrial sectors maximum occupancy at 2:00 p.m.; and peak commute time at 5:00 p.m. Whether affected directly or indirectly, the entire population would have to contend with consequences of earthquakes to some degree. Business interruption could prevent people from working, road closures could isolate populations, and loss of functions of utilities could affect populations that suffered no direct damage from an event. Table 4.3.4-6 summarizes the estimated number of injuries, hospitalizations, and casualties as a result of the 500-year MRP event.

Table 4.3.4-6. Estimated Number of Injuries, Hospitalizations, and Casualties from the 500-Year MRP Earthquake Event

Level of Severity	Time of Day		
	2:00 AM	2:00 PM	5:00 PM
Injuries	26	23	20
Hospitalization	3	2	2
Casualties	0	0	0

Source: HAZUS v 5.1

Impact on General Building Stock

For this HMP update, a Hazus probabilistic model was run to estimate annualized dollar losses for Delaware County. Annualized losses are useful for mitigation planning because they provide a baseline upon which to (1) compare the risk of one hazard across multiple jurisdictions and (2) compare the degree of risk of all hazards for each participating jurisdiction. Annualized loss does not, however, predict what losses will occur in any particular year.

According to NYCEM, where earthquake risks and mitigation were evaluated in the New York, New Jersey, and Connecticut region, most damage and loss caused by an earthquake would directly or indirectly result from ground shaking (NYCEM 2003). NYCEM found a strong correlation between PGA and damage a building might undergo. The Hazus model is based on the best available earthquake science and aligns with these statements. Hazus methodology and model were used to analyze the earthquake hazard for the general building stock within Delaware County.

In addition, according to NYCEM (NYCEM 2003), a building's construction determines how well it can withstand the force of an earthquake. The NYCEM report indicates that unreinforced masonry buildings are most at risk during an earthquake because the walls are prone to collapse outward, whereas steel and wood buildings absorb more of the earthquake's energy. Additional attributes that affect a building's capability to withstand an earthquake's force include its age, number of stories, and quality of construction. Hazus considers building construction and age of buildings in its analysis. Default building ages and building types already incorporated into the inventory were used because the default general building stock was used for this Hazus analysis.

Potential building damage was evaluated by Hazus the following damage categories: none, slight, moderate, extensive, and complete. Table 4.3.4-7 provides definitions of these categories of damage for a light wood-framed building; definitions for other building types are included in the Hazus technical manual documentation.

Table 4.3.4-7. Example of Structural Damage State Definitions for a Light Wood-Framed Building

Damage Category	Description
Slight	Small plaster or gypsum-board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.
Moderate	Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.
Extensive	Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates or slippage of structure over foundations; partial collapse of room-over-garage or other soft-story configurations.
Complete	Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse because of the crippled wall failure or the failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Source: FEMA 2015

Table 4.3.4-8 summarizes the damage estimated for the 500-year MRP earthquake event. Damage loss estimates include structural and non-structural damage to the building and loss of contents. Residential homes have the greatest number of buildings that would experience complete destruction.

Table 4.3.4-8. Estimated Buildings Damaged by General Occupancy for 500-year MRP Earthquake Event

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Earthquake 500-Year	
			Building Count	Percent Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	180,403	None	175,880	97.5%
		Slight	3,354	1.9%
		Moderate	1,027	0.6%
		Extensive	134	0.1%
		Complete	8	<0.1%
Commercial Buildings	11,075	None	10,716	96.8%
		Slight	267	2.4%
		Moderate	82	0.7%
		Extensive	9	0.1%
		Complete	0	0.0%

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Earthquake 500-Year	
			Building Count	Percent Buildings in Occupancy Class
Industrial Buildings	2,948	None	2,860	97.0%
		Slight	66	2.2%
		Moderate	20	0.7%
		Extensive	2	0.1%
		Complete	0	0.0%
Government, Religion, Agricultural, and Education Buildings	2,030	None	1,970	97.1%
		Slight	44	2.2%
		Moderate	14	0.7%
		Extensive	2	0.1%
		Complete	0	0.0%

Source: Hazus v 5.1, Census 2010
Notes: Census 2010 tract boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 building data may under or overestimate the number of buildings with expected damages.

Table 4.3.4-9 presents the estimated replacement cost values for buildings damaged by the 500-year MRP earthquake event. An estimated $71.6 million in damage would occur to buildings in the county during a 500-year earthquake event.

Table 4.3.4-9. Estimated Building Value Damaged by the Annualized, 500-Year MRP Earthquake Event

Jurisdiction	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event for Residential Structures Only	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event for Commercial Structures Only	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event for Industrial Structures Only
Aldan (B)	$610,514	$547,340	$34,133	$17,978
Aston (Twp)	$1,804,095	$1,460,168	$207,498	$69,481
Bethel (Twp)	$1,009,512	$930,767	$57,975	$10,652
Brookhaven (B)	$822,056	$687,124	$94,122	$17,379
Chadds Ford (Twp)	$468,224	$349,216	$90,364	$20,920
Chester City (C)	$3,061,521	$2,210,251	$447,458	$188,805
Chester (Twp)	$490,151	$304,181	$92,872	$78,570
Chester Heights (B)	$284,442	$219,796	$50,296	$11,352
Clifton Heights (B)	$1,282,443	$873,580	$272,510	$82,627
Collingdale (B)	$859,851	$631,756	$145,758	$34,569
Colwyn (B)	$225,283	$195,015	$21,723	$6,674
Concord (Twp)	$1,985,693	$1,513,378	$295,553	$60,015
Darby (B)	$1,060,337	$806,310	$180,650	$17,322
Darby (Twp)	$1,053,330	$906,678	$107,837	$10,311
East Lansdowne (B)	$306,081	$245,523	$28,079	$7,865
Eddystone (B)	$328,202	$170,601	$103,695	$43,348
Edgmont (Twp)	$403,576	$362,095	$29,673	$5,134
Folcroft (B)	$875,931	$589,002	$163,490	$101,041
Glenolden (B)	$759,508	$594,415	$125,850	$16,496
Haverford (Twp)	$7,449,748	$5,774,352	$1,085,326	$139,559
Lansdowne (B)	$1,847,293	$1,533,423	$203,990	$33,597
Lower Chichester (Twp)	$247,797	$192,230	$26,898	$13,102
Marcus Hook (B)	$285,439	$164,132	$88,333	$21,282
Marple (Twp)	$2,660,164	$1,929,190	$535,930	$79,462
Media (B)	$747,587	$356,815	$299,688	$23,692
Middletown (Twp)	$1,778,548	$1,257,869	$360,389	$42,688
Millbourne (B)	$100,125	$64,099	$29,061	$2,926
Morton (B)	$277,503	$200,046	$42,420	$20,441
Nether Providence (Twp)	$1,376,765	$1,197,267	$112,847	$15,416
Newtown (Twp)	$1,448,672	$1,074,575	$282,690	$33,377
Norwood (B)	$675,840	$582,446	$52,310	$10,760

Jurisdiction	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event for Residential Structures Only	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event for Commercial Structures Only	Estimated Losses Caused by the 500-Year Mean Return Period Earthquake Event for Industrial Structures Only
Parkside (B)	$213,232	$188,610	$11,488	$4,180
Prospect Park (B)	$758,119	$623,063	$95,566	$13,649
Radnor (Twp)	$3,374,536	$2,240,660	$858,395	$67,204
Ridley (Twp)	$3,649,334	$2,726,090	$542,358	$77,860
Ridley Park (B)	$843,329	$683,983	$122,899	$12,291
Rose Valley (B)	$234,375	$215,227	$10,464	$3,525
Rutledge (B)	$81,234	$72,018	$4,078	$2,483
Sharon Hill (B)	$661,601	$452,804	$170,478	$22,338
Springfield (Twp)	$3,984,631	$2,926,401	$664,501	$76,911
Swarthmore (B)	$980,580	$598,142	$72,231	$24,827
Thornbury (Twp)	$784,986	$718,219	$41,340	$11,966
Tinicum (Twp)	$1,507,588	$723,075	$463,680	$121,314
Trainer (B)	$214,257	$116,277	$39,364	$50,076
Upland (B)	$364,369	$239,921	$83,251	$29,883
Upper Chichester (Twp)	$1,529,242	$1,133,026	$261,112	$96,774
Upper Darby (Twp)	$13,402,539	$10,602,072	$2,109,395	$267,286
Upper Providence (Twp)	$976,056	$748,368	$153,787	$19,675
Yeadon (B)	$1,458,821	$1,148,533	$153,351	$93,577
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A
Delaware County (Total)	**$71,605,064**	**$54,080,132**	**$11,527,153**	**$2,232,659**

Source: HAZUS v 5.1
Notes: Total amount is sum of damage for all occupancy classes (residential, commercial, and industrial).
B – Borough; Twp. – Township

Impact on Critical Facilities

After consideration of general building stock exposed to and damaged by each earthquake event, critical facilities were evaluated. All critical facilities (essential facilities, transportation systems, lifeline utility systems, high-potential loss facilities, and user-defined facilities) in Delaware County are considered exposed and vulnerable to the earthquake hazard. The Critical Facilities subsection of this HMP in Section 4.4 (Hazard Vulnerability Summary) discusses the inventory of critical facilities in Delaware County. Additionally, first responders may have limited access to critical facilities due to damaged infrastructure and electrical/utility fires may increase with disruptions to lines.

Hazus estimates the probability that critical facilities may sustain damage as a result of the 500-year MRP earthquake event. Additionally, Hazus estimates percent functionality of each facility days after the event. Table 4.3.4-10 (500-year MRP earthquake event) lists percent probabilities that critical facilities and utilities would sustain damage within the damage categories (column headings), and lists percent functionalities after different numbers of days following those events (column headings).

Table 4.3.4-10. Estimated Damage to and Loss of Functionality of Critical Facilities and Utilities in Delaware County for the 500-Year MRP Earthquake Event

Name	Percent Probability of Sustaining Damage					Percent Functionality			
	None	Slight	Moderate	Extensive	Complete	Day 1	Day 7	Day 30	Day 90
Essential Facilities									
Medical Facilities	99.1% - 99.8%	0.2% - 0.8%	<0.1% - 0.2%	0.0%	0.0%	99.0% - 99.8%	99.8% - 99.9%	99.9%	99.9%
Police Stations	94.8% - 98.2%	1.4% - 3.8%	0.4% - 1.2%	<0.1% - 0.1%	0.0%	94.8% - 98.2%	98.5% - 99.5%	99.8% - 99.9%	99.9%
Fire Stations/EMS	94.8% - 98.3%	1.3% - 3.8%	0.3% - 1.2%	<0.1% - 0.1%	0.0%	94.8% - 98.3%	98.5% - 99.5%	99.8% - 99.9%	99.9%
Schools	94.8% - 98.3%	1.3% - 3.8%	0.3% - 1.2%	<0.1% - 0.1%	0.0%	94.8% - 98.3%	98.5% - 99.5%	99.8% - 99.9%	99.9%
Utilities									
Communication	96.3% - 97.6%	1.7% - 2.5%	0.6% - 1.1%	<0.1%	0.0%	99.3% - 99.6%	99.9%	99.9%	99.9%
Electric Power	96.1% - 98.8%	0.8% - 2.3%	0.4% - 1.4%	<0.1% - 0.2%	0.0%	97.3% - 99.1%	99.8% - 99.9%	99.9%	99.9%
Potable Water	96.1% - 98.6%	0.8% - 2.3%	0.5% - 1.4%	<0.1% - 0.2%	0.0%	97.8% - 99.2%	99.7% - 99.9%	99.8% - 99.9%	99.9%
Wastewater	96.1% - 99.0%	0.7% - 2.3%	0.4% - 1.4%	<0.1% - 0.2%	0.0%	96.9% - 99.0%	99.6% - 99.8%	99.7% - 99.9%	99.9%
Oil	97.5% - 98.5%	0.9% - 1.5%	0.5% - 0.9%	<0.1% - 0.1%	0.0%	98.6% - 99.1%	99.4% - 99.8%	99.9%	99.9%
Transportation									
Highway Bridges	99.9% - 100.0%	0.0%	0.0%	0.0%	0.0%	99.9% - 100.0%	99.9% - 100.0%	99.9% - 100.0%	99.9% - 100.0%

Source: Hazus v 5.1; Delaware County 2021/2022; HIFLD 2018/2022

Impact on Economy

Earthquakes also impact the economy, including loss of business function, damage to inventory (buildings, transportation, and utility systems), relocation costs, wage loss, and rental loss from building repair and replacement. Hazus estimates building-related economic losses, including income losses (wage, rental, relocation, and capital-related losses) and capital stock losses (structural, non-structural, content, and inventory losses). Economic losses estimated by Hazus are summarized in Table 4.3.4-11.

Table 4.3.4-11. Building-Related Economic Losses from the 500-Year MRP Earthquake Event

Mean Return Period (MRP)	Inventory Loss	Relocation Loss	Building and Content Losses	Wages Losses	Rental Losses	Capital-Related Loss
500-year	$133,400	$11,212,200	$71,636,700	$3,591,300	$4,923,900	$2,505,400

Source: HAZUS v5.1

Although the Hazus model did not compute damage estimates for individual roadway segments and railroad tracks, assumedly these features would undergo damage, resulting in interruptions of regional transportation and of distribution of materials. Losses to the community that would result from damage to lifelines could exceed costs of repair (FEMA 2012). Earthquake events can significantly affect road bridges, many of which provide the only access to certain neighborhoods. Because softer soils generally follow floodplain boundaries, bridges that cross watercourses should be considered vulnerable. Other key factors in degree of vulnerability include the age and infrastructure of a facility, which correlate with standards in place at time of construction.

Hazus estimates volume of debris that may be generated as a result of an earthquake event to enable the study region to prepare for and rapidly and efficiently manage debris removal and disposal. Debris estimates were divided into two categories: (1) reinforced concrete and steel that require special equipment to break up before transport can occur, and (2) brick, wood, and other debris that can be loaded directly onto trucks by use of bulldozers (Hazus Earthquake User's Manual).

Table 4.3.4-12 summarizes the estimated debris generated by the 500-year MRP event. Hazus estimated the generation of over 43,000 tons of total debris during the 500-year MRP event. The Township of Upper Darby would generate the greatest amount of debris at 7,724 tons.

Table 4.3.4-12. Estimated Debris Generated by 500-year MRP Earthquake Event

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Earthquake Event**	
	Brick/Wood (tons)	Concrete/Steel (tons)
Aldan (B)	301	61
Aston (Twp)	895	187
Bethel (Twp)	463	79
Brookhaven (B)	458	89
Chadds Ford (Twp)	230	50
Chester City (C)	1,783	426
Chester (Twp)	258	65
Chester Heights (B)	154	33
Clifton Heights (B)	606	158
Collingdale (B)	500	110
Colwyn (B)	131	25

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Earthquake Event**	
	Brick/Wood (tons)	Concrete/Steel (tons)
Concord (Twp)	956	211
Darby (B)	594	138
Darby (Twp)	583	110
East Lansdowne (B)	162	35
Eddystone (B)	174	49
Edgmont (Twp)	198	36
Folcroft (B)	455	107
Glenolden (B)	421	90
Haverford (Twp)	3,326	723
Lansdowne (B)	880	196
Lower Chichester (Twp)	152	31
Marcus Hook (B)	157	41
Marple (Twp)	1,356	303
Media (B)	394	105
Middletown (Twp)	863	210
Millbourne (B)	55	13
Morton (B)	151	36
Nether Providence (Twp)	656	118
Newtown (Twp)	719	152
Norwood (B)	350	68
Parkside (B)	123	23
Prospect Park (B)	390	86
Radnor (Twp)	1,643	416
Ridley (Twp)	1,883	402
Ridley Park (B)	421	89
Rose Valley (B)	119	21
Rutledge (B)	46	8
Sharon Hill (B)	354	82
Springfield (Twp)	1,796	389
Swarthmore (B)	427	114
Thornbury (Twp)	355	71
Tinicum (Twp)	621	198
Trainer (B)	116	33
Upland (B)	195	47
Upper Chichester (Twp)	847	180
Upper Darby (Twp)	6,289	1,435
Upper Providence (Twp)	507	101
Yeadon (B)	741	171
Brandywine Conservancy and Museum of Art Special District	N/A	N/A
Delaware County (Total)	**35,253**	**7,920**

Source: HAZUS-v5.1
Notes: B – Borough; Twp. – Township

Impact on the Environment

Earthquakes can lead to numerous, widespread, and devastating environmental impacts. These impacts may include but are not limited to:

- Induced flooding or landslides
- Poor water quality
- Damage to vegetation
- Breakage in sewage, wastewater, or toxic material containment

Secondary impacts can include train derailments, roadway damage, spillage of hazardous materials (HazMat), and utility interruption.

Future Growth and Development

Human exposure and vulnerability to earthquake impacts in newly developed areas are anticipated to be similar to those currently within the county. Building codes require seismic provisions that should render new construction less vulnerable to seismic impacts than older, existing construction that may have been built to lower construction standards. Any areas of growth could also be impacted by the flood hazard if within identified hazard areas. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to dam inundation areas.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Delaware County's population will continue to increase into 2040, with a total population of approximately 648,439 persons (The Center of Rural Pennsylvania 2013). As more persons move into earthquake susceptible areas, an increased amount of the population will be vulnerable to the effects of earthquakes.

Effect of Climate Change on Vulnerability

Impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the Earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity. National Aeronautics and Space Administration (NASA) and USGS scientists found that retreating glaciers in southern Alaska might be opening the way for future earthquakes (NASA 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms could undergo liquefaction during seismic activity as a result of the increased saturation. Dams storing increased volumes of water, as a result of changes in the hydrograph, could fail during seismic events. No current models are available to estimate these impacts.

Additional Data and Next Steps

Additional data is needed to further refine and enhance the county's vulnerability assessment, which includes identifications of unreinforced masonry critical facilities and privately owned buildings (i.e., residences) via local knowledge and/or pictometry/orthophotos. These buildings may not withstand earthquakes of certain magnitudes and plans to provide emergency response/recovery efforts for these properties can be established.

Ground shaking is the primary cause of earthquake damage to man-made structures, and soft soils amplify ground shaking. One contributor to site amplification is velocity at which rock or soil transmits shear waves (S-waves). The NEHRP developed five soil classifications defined by their shear-wave velocity that alter severity

of an earthquake. These soil classifications range from A to E, whereby A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building damage and losses. When this soil information becomes available, it may be incorporated into Hazus to further refine the county's vulnerability assessment.

4.3.5 Environmental Hazards – Hazardous Materials Releases

This section provides a profile and vulnerability assessment of the environmental hazards – hazardous materials releases profile for the Delaware County Hazard Mitigation Plan (HMP).

The U.S. Department of Transportation (DOT) categorizes hazardous materials (hazmat) into the following nine classes based on chemical characteristics producing the risk:

- Class 1: Explosives
- Class 2: Gases
- Class 3: Flammable liquids
- Class 4: Flammable solids
- Class 5: Oxidizers and organic pesticides
- Class 6: Poisons and etiologic materials
- Class 7: Radioactive materials
- Class 8: Corrosives
- Class 9: Miscellaneous

Delaware County is home to many manufacturing facilities and industries, including oil refineries located along the Delaware River. Facilities that use, manufacture, or store hazardous materials in Pennsylvania must comply with both Title III of the federal Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. Delaware County currently has 17 hazardous materials waste Superfund sites that utilize, ship, or house chemicals considered hazardous, and 7 of those 17 are listed on the National Priorities List for Superfund Cleanup.

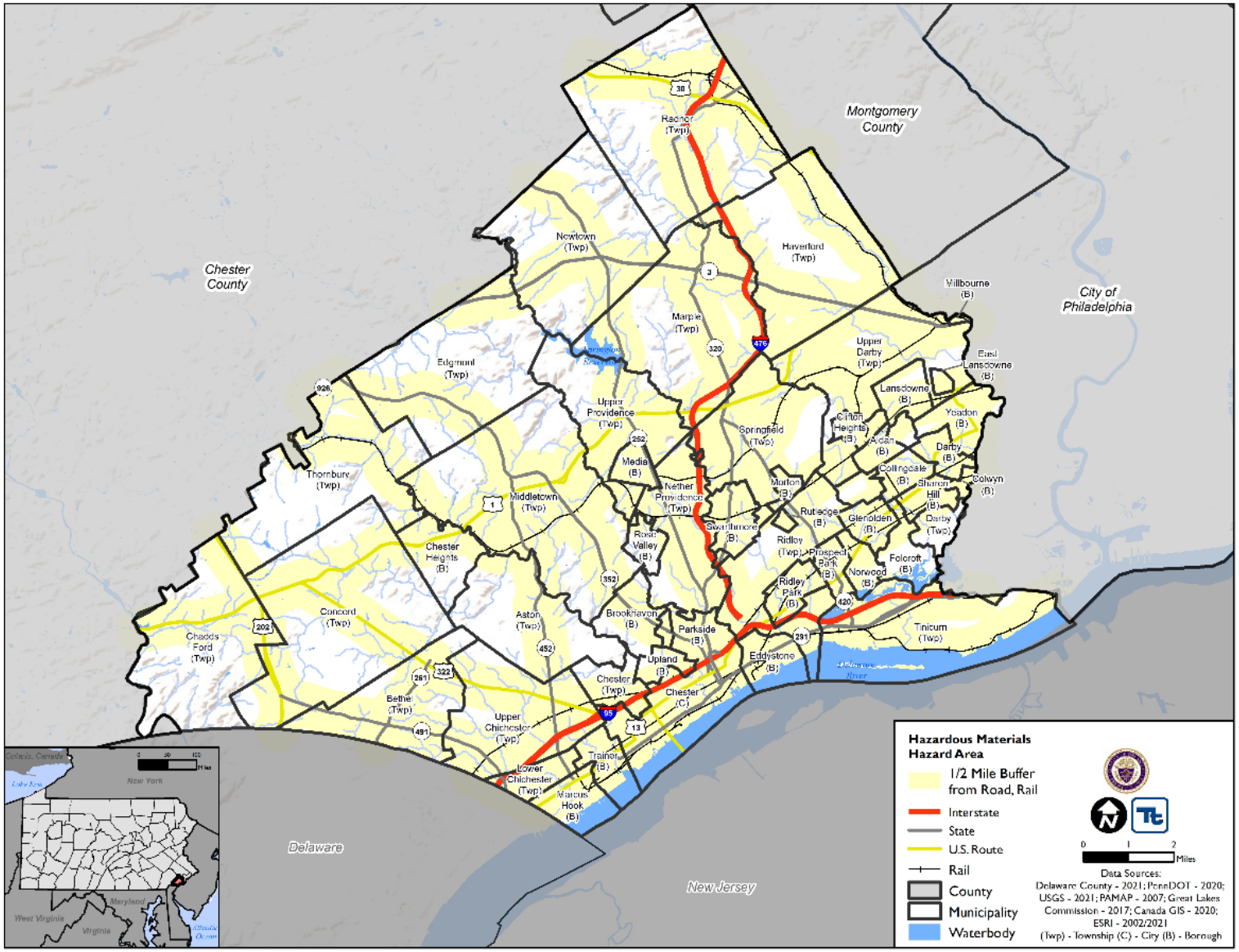
Product release into the local environment can derive from a fixed facility or occur at any location along a route of travel and may be the result of carelessness, technical failure, external incidents, or an intentional act against the facility or container. Volatility of products stored or transported, along with potential impact on a local community, may increase the risk of intentional acts against a facility or transport vehicle. Release of certain products considered “hazardous materials” can immediately and adversely impact the general population, ranging from the inconvenience of evacuations to personal injury and even death. Moreover, any release can compromise the local environment through contamination of soil, groundwater, or local flora and fauna.

4.3.5.1 Location and Extent

Based on past occurrences, hazmat releases within Delaware County have been accidental and have not been considered terrorist or criminal acts. While past occurrences have not been deemed intentional, an intentional release of any of these products in large quantity would pose a threat to the local population, economy, and environment resulting in lost revenue, injuries, and deaths. While permitted, identified hazardous substance travel routes are not maintained by the county or regional planning entities.

Rail lines that transport hazardous materials are shown in Figure 4.3.5-1. In addition to the major routes of transportation, each fixed facility identified within Delaware County poses a potential threat to the surrounding community. The U.S. Environmental Protection Agency (EPA) tracks management of over 650 toxic chemicals that pose a threat to human health and the environment through the Toxic Release Inventory (TRI). Facilities in certain industries that use or house these chemicals in amounts exceeding specified levels must submit annual reports on how each chemical is managed through recycling, energy recovery, treatment, and releases to the environment. A “release” of a chemical means emission to the air or water, or placement in some type of land disposal. EPA publishes all TRI data in a publicly accessible database in Envirofacts. In 2018, 20 TRI facilities in Delaware County reported to EPA (PECA 2020).

Figure 4.3.5-1. Major Transportation Routes and Railways with Buffer in Delaware County, Pennsylvania



4.3.5.2 Range of Magnitude

Environmental hazard incidents within Delaware County could range from minor petroleum spills to large facility-based incidents that could lead to loss of life and damage to property, environment, and economy. Severity of an incident varies with type of material released and distance and related response time for emergency response teams. Areas within closest proximity to the releases are generally at the greatest risk; however, depending on the material, a release can travel great distances or persist over a long time (e.g., nuclear radiation), resulting in far-reaching effects on people and the environment.

A hazmat release, whether accidental or intentional, can be exacerbated or mitigated by specific circumstances surrounding the event. Exacerbating conditions are characteristics that can enhance or magnify effects of a hazard, and mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard. These conditions are described below:

- Noncompliance with applicable codes (e.g., fire and building codes) and maintenance failures (e.g., fire protection and containment features) – can substantially increase damage to a facility and to surrounding buildings.
- Geographic location of hazmat site – if occurring within a Special Flood Hazard Area (SFHA), a materials release could cause large-scale water contamination during a flood incident, or a flood incident could compromise production and storage of hazardous chemicals. Stormwaters and floodwaters can also move toxic chemicals swiftly across great distances.
- Weather conditions – affect how the hazard develops.
- Micro-meteorological effects of buildings and terrain – alter dispersion of materials.
- Shielding in the form of sheltering-in-place – protects people and property from harmful effects.

A worst-case scenario for hazardous material release occurred in Delaware County on November 26, 2004, when the Athos I tanker struck a large, submerged anchor while preparing to dock at a New Jersey refinery on the opposite side of the Delaware River as Delaware County (NOAA, 2010). The tanker's bottom was punctured, and nearly 265,000 gallons of crude oil were discharged into the Delaware River and its tributaries. Delaware County resources affected by the oil spill included shorelines, aquatic creatures, wildlife, and recreational areas used by the public.

4.3.5.3 Past Occurrence

The county has undergone hazmat release accidents at facilities and along roadways. The 2016 Delaware County Hazard Mitigation Plan stated there were 686 hazardous material spill incidents between 2002 and 2009 (Delaware County 2016). Of these incidents, the majority consisted of spills of petroleum products. Table 4.3.5-1 shows hazardous material and nuclear/radiological incidents by municipality that have occurred from 2016–2021.

Table 4.3.5-1. Hazardous Material Releases in Delaware County, 2016 to 2021

Dates of Event	Event Type	Location	Losses/Impacts
October 28, 2016	Diesel Spill	Chester	Officials say multiple people were taken to the hospital after two CSX trains collided head-on in Chester, Pennsylvania. Officials say there was a diesel fuel spill that was quickly contained. The EPA has been notified and hazmat crews are cleaning up the spill.
January 23, 2019	Chemical Leak	Marcus Hook (B)	Five people working at a Pennsylvania energy plant less than two miles from Claymont were hospitalized after a hydrofluoric acid chemical leak occurred Wednesday morning. According to Monroe officials, a hose malfunctioned, during which time hydrocarbon vapors containing a small amount of hydrofluoric acid were emitted near a group of contract workers.
October 27, 2019	Uranium	Darby	A hazmat team responded a halfway house in Pennsylvania this week after a resident received an order of uranium through the mail.

Dates of Event	Event Type	Location	Losses/Impacts
May 7, 2020	Hot Tar Spill	Upper Providence (Twp)	A truck was carrying approximately 6,000 gallons of hot tar liquid which spilled into the median following a crash.

Source: Global Incident Maps 2022

4.3.5.4 Future Occurrence

Because of the wide scope of the definition of environmental hazards, ranging from a small spill to a large release of a highly volatile or toxic hazardous material, incidents can and will happen at any time. Probability of future occurrence in Delaware County is compounded by the fact that the county is home to 164 SARA facilities. Although these facilities follow applicable safety and health regulations and best practices, proximity of facilities to population centers is a concern for the county.

Hazardous materials are also transported via rail and along. Transportation of hazmats on highways involves tanker trucks or trailers; not surprisingly, trucks are responsible for the greatest number of hazmat incidents. At several points, these transportation routes cross streams within the watersheds that are part of the county's domestic water supply.

While hazmat release incidents in Delaware County have occurred in the past, they are generally considered difficult to predict. Smaller incidents, such as fuel spills, will affect the county many times each year, most likely along I-95 or during refilling of home heating oil tanks, and may not be reported. Although the county does not anticipate severe releases on any regular basis, the possibility of a significant release should not be discounted. Based on Risk Factor Methodology Probability Criteria, likelihood of future occurrences within Delaware County remains *highly likely*.

4.3.5.5 Vulnerability Assessment

To understand risk, a community must evaluate the assets exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the hazardous materials release hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist in understanding this hazard over time

A spatial analysis was conducted using various lengths of buffer radii around hazardous material facilities and transportation networks. If a hazardous material incident occurred in or on the facility, pipeline, or transportation network, these buffers would represent the toxin or radiation release area. For the purposes of the assessment, an asset (population, structures, critical facilities, and lifelines) is considered exposed and potentially vulnerable to the hazmat hazard if it is located within these hazardous material buffer areas. The analysis looked at three different hazardous material buffer areas:

- 0.5-mile from a major highway
- 0.5-mile from a rail line
- Unique radius for each SARA Type II facility

Impact on Life, Health, and Safety

Much of the population in Delaware County is exposed to some kind of environmental hazard (Table 4.3.5 2). Several incidents reported in the county are related to petroleum spills, which may have resulted from motor vehicle incidents. First responders' safety may also be at risk during on-scene operations and may have difficulty traveling to incidents due to limited access to roads. First responder resources may be exhausted during environmental hazard events due to a lack of personnel and a higher than normal call volume/demand.

Table 4.3.5-2. Estimated Delaware County Population Vulnerable to Environmental Hazards

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Hazardous Materials Hazard Areas					
		Number of Persons Located within 1/2 Mile of Hazardous Materials Roadway Routes	Percent of Total	Number of Persons Located within 1/2 Mile of Hazardous Materials Rail Routes	Percent of Total	Number of Persons Located within Selected Buffer of Hazardous Materials SARA Sites	Percent of Total
Aldan (B)	4,244	0	0.0%	4,044	95.3%	4,244	100.0%
Aston (Twp)	16,791	7,210	42.9%	841	5.0%	16,791	100.0%
Bethel (Twp)	9,574	8,550	89.3%	0	0.0%	6,523	68.1%
Brookhaven (B)	8,300	5,373	64.7%	0	0.0%	8,043	96.9%
Chadds Ford (Twp)	3,972	2,758	69.4%	0	0.0%	2,891	72.8%
Chester City (C)	32,605	32,603	100.0%	25,066	76.9%	0	0.0%
Chester (Twp)	4,080	2,250	55.1%	2,804	68.7%	4,080	100.0%
Chester Heights (B)	2,897	1,939	66.9%	308	10.6%	1,348	46.5%
Clifton Heights (B)	6,863	0	0.0%	6,197	90.3%	5,836	85.0%
Collingdale (B)	8,908	5,433	61.0%	8,330	93.5%	8,908	100.0%
Colwyn (B)	2,474	262	10.6%	2,474	100.0%	2,366	95.6%
Concord (Twp)	18,295	12,616	69.0%	0	0.0%	10,557	57.7%
Darby (B)	10,715	8,832	82.4%	8,341	77.8%	10,715	100.0%
Darby (Twp)	9,219	278	3.0%	5,273	57.2%	9,219	100.0%
East Lansdowne (B)	2,714	2,306	85.0%	2,224	82.0%	2,714	100.0%
Eddystone (B)	2,459	2,459	100.0%	2,459	100.0%	2,459	100.0%
Edgmont (Twp)	4,283	2,398	56.0%	1	0.0%	1,174	27.4%
Folcroft (B)	6,792	2,467	36.3%	3,253	47.9%	6,792	100.0%
Glenolden (B)	7,223	6,365	88.1%	7,223	100.0%	7,223	100.0%
Haverford (Twp)	50,431	24,839	49.3%	17,504	34.7%	29,655	58.8%
Lansdowne (B)	11,107	35	0.3%	9,382	84.5%	11,107	100.0%
Lower Chichester (Twp)	3,425	3,425	100.0%	3,077	89.8%	3,425	100.0%
Marcus Hook (B)	2,454	2,375	96.8%	2,453	99.9%	2,454	100.0%
Marple (Twp)	24,214	19,568	80.8%	0	0.0%	17,293	71.4%
Media (B)	5,901	4,123	69.9%	4,298	72.8%	5,901	100.0%
Middletown (Twp)	16,373	12,970	79.2%	5,242	32.0%	14,972	91.4%
Millbourne (B)	1,212	1,212	100.0%	1,212	100.0%	1,212	100.0%
Morton (B)	2,778	2,553	91.9%	2,527	91.0%	2,778	100.0%
Nether Providence (Twp)	14,525	11,070	76.2%	5,030	34.6%	6,088	41.9%
Newtown (Twp)	15,002	10,333	68.9%	0	0.0%	12,713	84.7%
Norwood (B)	5,943	5,522	92.9%	3,976	66.9%	5,943	100.0%
Parkside (B)	2,321	2,321	100.0%	0	0.0%	2,321	100.0%
Prospect Park (B)	6,427	6,427	100.0%	5,237	81.5%	6,427	100.0%
Radnor (Twp)	33,228	23,881	71.9%	19,746	59.4%	26,955	81.1%
Ridley (Twp)	31,053	18,904	60.9%	20,437	65.8%	28,823	92.8%
Ridley Park (B)	7,186	6,008	83.6%	7,186	100.0%	7,186	100.0%
Rose Valley (B)	1,017	222	21.8%	389	38.3%	357	35.1%
Rutledge (B)	782	754	96.4%	435	55.6%	782	100.0%
Sharon Hill (B)	6,014	5,912	98.3%	6,014	100.0%	6,014	100.0%
Springfield (Twp)	25,070	15,340	61.2%	14,991	59.8%	22,564	90.0%

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Hazardous Materials Hazard Areas					
		Number of Persons Located within 1/2 Mile of Hazardous Materials Roadway Routes	Percent of Total	Number of Persons Located within 1/2 Mile of Hazardous Materials Rail Routes	Percent of Total	Number of Persons Located within Selected Buffer of Hazardous Materials SARA Sites	Percent of Total
Swarthmore (B)	6,543	6,078	92.9%	5,272	80.6%	5,153	78.7%
Thornbury (Twp)	6,904	2,221	32.2%	1,162	16.8%	2,335	33.8%
Tinicum (Twp)	3,983	3,972	99.7%	3,983	100.0%	3,983	100.0%
Trainer (B)	1,976	1,976	100.0%	1,760	89.1%	1,976	100.0%
Upland (B)	3,068	2,252	73.4%	1,994	65.0%	3,068	100.0%
Upper Chichester (Twp)	16,898	13,130	77.7%	8,584	50.8%	16,898	100.0%
Upper Darby (Twp)	85,681	37,200	43.4%	60,022	70.1%	78,101	91.2%
Upper Providence (Twp)	10,852	7,323	67.5%	2,094	19.3%	8,305	76.5%
Yeadon (B)	12,054	10,406	86.3%	9,208	76.4%	12,054	100.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**366,454**	**63.5%**	**302,055**	**52.4%**	**458,726**	**79.5%**

Source: Census 2010/2020; PennDOT 2020, Delaware County 2021/2022
Notes: Census 2020 decennial population data was used to update the Census 2010 daysmetric block population estimates. Census 2010 dasymetric blocks were used to estimate the areas where development exists in each municipality. These boundaries may over or underestimate the density location of population within each municipality, impacting the exposure results.

% = Percent; B = Borough; C = City; SARA = Superfund Amendments and Reauthorization Act; Twp = Township

Impacts on General Building Stock

Potential losses to the general building stock caused by a hazmat incident is difficult to quantify. The degree of damages to the general building stock depends on the scale of the incident. Potential losses may include inaccessibility, loss of service, contamination, and/or potential structural and content losses if an explosion occurs. The closure of waterways, railroads, airports, and highways as a result of a hazmat incident has the potential to impact the ability to deliver goods and services efficiently. Potential impacts may have local, regional, or statewide effects depending on the magnitude of the event and level of service disruptions.

To estimate the buildings exposed to a hazardous material event, the hazmat buffer areas were overlaid upon the building level. The replacement cost value of the structures with their center in the buffer areas were totaled (Table 4.3.5-3). The area with the largest exposure to replacement cost value are those buffer areas that extend out along highways. However, if a hazmat release were to occur, the incident would not be located along all highways in the county but instead only a section of the total hazmat exposure area. Similarly, a railway or SARA site hazardous material incident would not occur in all areas of the structure but instead only along one section or within one site. Therefore, the total exposure does not represent a complete vulnerability should a hazard event occur.

Table 4.3.5-3. Total Building Exposed to a Roadway, Rail Route, or SARA Site Hazardous Material Incident

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located within 1/2 Mile of Hazardous Materials Roadway Routes		Estimated Building Stock Located within 1/2 Mile of Hazardous Materials Rail Routes		Estimated Building Stock Located within the Selected Buffer of SARA Sites	
		Number of Buildings	Percent of Total	Number of Buildings	Percent of Total	Number of Buildings	Percent of Total
Aldan (B)	1,673	0	0.0%	1,591	95.1%	1,673	100.0%
Aston (Twp)	6,202	2,547	41.1%	335	5.4%	6,202	100.0%
Bethel (Twp)	3,164	2,830	89.5%	0	0.0%	2,156	68.1%
Brookhaven (B)	3,185	2,183	68.5%	0	0.0%	3,091	97.0%
Chadds Ford (Twp)	1,402	974	69.5%	0	0.0%	1,013	72.3%
Chester City (C)	11,646	11,645	100.0%	9,586	82.3%	0	0.0%
Chester (Twp)	1,596	862	54.0%	1,085	68.0%	1,596	100.0%
Chester Heights (B)	1,022	590	57.7%	105	10.3%	562	55.0%
Clifton Heights (B)	2,324	0	0.0%	2,087	89.8%	1,972	84.9%
Collingdale (B)	3,130	1,877	60.0%	2,934	93.7%	3,130	100.0%
Colwyn (B)	839	92	11.0%	839	100.0%	794	94.6%
Concord (Twp)	5,400	3,718	68.9%	0	0.0%	3,224	59.7%
Darby (B)	3,569	2,958	82.9%	2,707	75.9%	3,569	100.0%
Darby (Twp)	3,763	120	3.2%	2,145	57.0%	3,763	100.0%
East Lansdowne (B)	906	774	85.4%	745	82.2%	906	100.0%
Eddystone (B)	876	876	100.0%	876	100.0%	876	100.0%
Edgmont (Twp)	1,579	915	57.9%	0	0.0%	442	28.0%
Folcroft (B)	2,500	829	33.2%	1,110	44.4%	2,500	100.0%
Glenolden (B)	2,453	2,107	85.9%	2,453	100.0%	2,453	100.0%
Haverford (Twp)	17,876	8,783	49.1%	6,537	36.6%	10,717	60.0%
Lansdowne (B)	3,838	12	0.3%	3,165	82.5%	3,838	100.0%
Lower Chichester (Twp)	1,266	1,266	100.0%	1,138	89.9%	1,266	100.0%
Marcus Hook (B)	831	804	96.8%	830	99.8%	831	100.0%
Marple (Twp)	8,652	7,001	80.9%	0	0.0%	6,174	71.4%
Media (B)	2,076	1,564	75.3%	1,415	68.2%	2,076	100.0%
Middletown (Twp)	5,161	3,994	77.4%	1,802	34.9%	4,670	90.5%
Millbourne (B)	243	243	100.0%	243	100.0%	243	100.0%
Morton (B)	927	847	91.4%	835	90.1%	927	100.0%
Nether Providence (Twp)	5,153	3,947	76.6%	1,841	35.7%	2,156	41.8%
Newtown (Twp)	4,691	3,139	66.9%	0	0.0%	3,907	83.3%
Norwood (B)	2,092	1,929	92.2%	1,323	63.2%	2,092	100.0%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located within 1/2 Mile of Hazardous Materials Roadway Routes		Estimated Building Stock Located within 1/2 Mile of Hazardous Materials Rail Routes		Estimated Building Stock Located within the Selected Buffer of SARA Sites	
		Number of Buildings	Percent of Total	Number of Buildings	Percent of Total	Number of Buildings	Percent of Total
Parkside (B)	851	851	100.0%	0	0.0%	851	100.0%
Prospect Park (B)	2,086	2,086	100.0%	1,674	80.3%	2,086	100.0%
Radnor (Twp)	8,992	6,408	71.3%	5,201	57.8%	7,270	80.8%
Ridley (Twp)	11,070	7,037	63.6%	7,386	66.7%	10,227	92.4%
Ridley Park (B)	2,403	1,892	78.8%	2,403	100.0%	2,403	100.0%
Rose Valley (B)	402	86	21.4%	154	38.3%	148	36.8%
Rutledge (B)	287	276	96.2%	165	57.5%	287	100.0%
Sharon Hill (B)	2,024	1,972	97.4%	2,024	100.0%	2,024	100.0%
Springfield (Twp)	9,233	5,698	61.7%	5,438	58.9%	8,339	90.3%
Swarthmore (B)	1,721	1,578	91.7%	1,334	77.5%	1,337	77.7%
Thornbury (Twp)	2,361	726	30.7%	436	18.5%	776	32.9%
Tinicum (Twp)	1,917	1,887	98.4%	1,917	100.0%	1,917	100.0%
Trainer (B)	678	678	100.0%	605	89.2%	678	100.0%
Upland (B)	1,297	957	73.8%	852	65.7%	1,297	100.0%
Upper Chichester (Twp)	6,005	4,840	80.6%	3,099	51.6%	6,005	100.0%
Upper Darby (Twp)	27,681	12,670	45.8%	18,488	66.8%	25,437	91.9%
Upper Providence (Twp)	3,636	2,280	62.7%	690	19.0%	2,513	69.1%
Yeadon (B)	3,741	3,252	86.9%	2,796	74.7%	3,741	100.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**196,420**	**124,599**	**63.4%**	**102,388**	**52.1%**	**156,155**	**79.5%**

Sources: U.S. Census 2010; PennDOT 2020, Delaware County 2021/2022
Notes: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 data may over or underestimate the number of buildings found in each municipality. % = Percent; B = Borough; C = City; Twp = Township

Impacts on Critical Facilities

Potential losses of critical facilities caused by a hazmat incident are difficult to quantify. Potential losses may include inaccessibility, loss of service, contamination, and/or potential structural and content losses if an explosion occurs. The tables below summarize critical facilities and lifelines located within the hazmat buffer area. A total of 1,430 critical facilities are located in Delaware County. Overall, 1,211 critical facilities are exposed to a roadway hazardous material event, 800 critical facilities are exposed to a rail line hazardous material event, and 1,259 critical facilities are exposed to a SARA site hazardous material facility event, as shown in Table 4.3.5-4 through Table 4.3.5-6.

Table 4.3.5-4. Critical Facility Exposure to a Hazardous Material Release from a SARA Site

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within the Selected Buffer of SARA Sites			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	6	100.0%	6	100.0%
Aston (Twp)	39	37	39	100.0%	37	100.0%
Bethel (Twp)	15	15	12	80.0%	12	80.0%
Brookhaven (B)	16	15	16	100.0%	15	100.0%
Chadds Ford (Twp)	17	16	10	58.8%	9	56.3%
Chester City (C)	88	83	87	98.9%	82	98.8%
Chester (Twp)	21	20	21	100.0%	20	100.0%
Chester Heights (B)	5	5	4	80.0%	4	80.0%
Clifton Heights (B)	14	12	14	100.0%	12	100.0%
Collingdale (B)	16	13	16	100.0%	13	100.0%
Colwyn (B)	7	6	7	100.0%	6	100.0%
Concord (Twp)	49	45	35	71.4%	33	73.3%
Darby (B)	31	27	31	100.0%	27	100.0%
Darby (Twp)	22	21	22	100.0%	21	100.0%
East Lansdowne (B)	7	7	7	100.0%	7	100.0%
Eddystone (B)	18	18	18	100.0%	18	100.0%
Edgmont (Twp)	16	16	8	50.0%	8	50.0%
Folcroft (B)	18	16	18	100.0%	16	100.0%
Glenolden (B)	21	20	21	100.0%	20	100.0%
Haverford (Twp)	87	83	61	70.1%	57	68.7%
Lansdowne (B)	26	24	26	100.0%	24	100.0%
Lower Chichester (Twp)	13	12	13	100.0%	12	100.0%
Marcus Hook (B)	21	20	21	100.0%	20	100.0%
Marple (Twp)	64	57	47	73.4%	42	73.7%
Media (B)	26	21	26	100.0%	21	100.0%
Middletown (Twp)	62	59	57	91.9%	54	91.5%
Millbourne (B)	4	4	4	100.0%	4	100.0%
Morton (B)	6	5	6	100.0%	5	100.0%
Nether Providence (Twp)	34	33	11	32.4%	10	30.3%
Newtown (Twp)	44	39	38	86.4%	33	84.6%
Norwood (B)	15	13	15	100.0%	13	100.0%
Parkside (B)	6	6	6	100.0%	6	100.0%
Prospect Park (B)	20	19	20	100.0%	19	100.0%
Radnor (Twp)	78	74	64	82.1%	60	81.1%
Ridley (Twp)	66	62	62	93.9%	58	93.5%
Ridley Park (B)	23	22	23	100.0%	22	100.0%
Rose Valley (B)	4	4	2	50.0%	2	50.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within the Selected Buffer of SARA Sites			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Rutledge (B)	1	1	1	100.0%	1	0.0%
Sharon Hill (B)	18	16	18	100.0%	16	100.0%
Springfield (Twp)	63	61	61	96.8%	59	96.7%
Swarthmore (B)	16	13	13	81.3%	10	76.9%
Thornbury (Twp)	22	21	7	31.8%	7	33.3%
Tinicum (Twp)	24	23	24	100.0%	23	100.0%
Trainer (B)	13	13	13	100.0%	13	100.0%
Upland (B)	14	14	14	100.0%	14	100.0%
Upper Chichester (Twp)	31	28	31	100.0%	28	100.0%
Upper Darby (Twp)	153	138	141	92.2%	127	92.0%
Upper Providence (Twp)	27	25	19	70.4%	17	68.0%
Yeadon (B)	23	22	23	100.0%	22	100.0%
Brandywine Conservancy and Museum of Art Special District	0	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**1,259**	**88.0%**	**1,165**	**87.6%**

Source: Delaware County 2021/2022; HIFLD 2018/2022

Notes: % = Percent; B = Borough; C = City; SARA = Superfund Amendments and Reauthorization Act; Twp = Township

Table 4.3.5-5. Critical Facility Exposure to a Hazardous Material Release along a Roadway

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within 1/2 Mile of Hazardous Materials Roadway Routes			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	6	100.0%	6	100.0%
Aston (Twp)	39	37	20	51.3%	18	48.6%
Bethel (Twp)	15	15	14	93.3%	14	93.3%
Brookhaven (B)	16	15	15	93.8%	14	93.3%
Chadds Ford (Twp)	17	16	16	94.1%	15	93.8%
Chester City (C)	88	83	88	100.0%	83	100.0%
Chester (Twp)	21	20	14	66.7%	13	65.0%
Chester Heights (B)	5	5	2	40.0%	2	40.0%
Clifton Heights (B)	14	12	13	92.9%	11	91.7%
Collingdale (B)	16	13	16	100.0%	13	100.0%
Colwyn (B)	7	6	7	100.0%	6	100.0%
Concord (Twp)	49	45	35	71.4%	33	73.3%
Darby (B)	31	27	30	96.8%	26	96.3%
Darby (Twp)	22	21	11	50.0%	10	47.6%
East Lansdowne (B)	7	7	7	100.0%	7	100.0%
Eddystone (B)	18	18	18	100.0%	18	100.0%
Edgmont (Twp)	16	16	7	43.8%	7	43.8%
Folcroft (B)	18	16	10	55.6%	8	50.0%
Glenolden (B)	21	20	21	100.0%	20	100.0%
Haverford (Twp)	87	83	60	69.0%	57	68.7%
Lansdowne (B)	26	24	19	73.1%	17	70.8%
Lower Chichester (Twp)	13	12	13	100.0%	12	100.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within 1/2 Mile of Hazardous Materials Roadway Routes			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Marcus Hook (B)	21	20	21	100.0%	20	100.0%
Marple (Twp)	64	57	49	76.6%	43	75.4%
Media (B)	26	21	26	100.0%	21	100.0%
Middletown (Twp)	62	59	58	93.5%	55	93.2%
Millbourne (B)	4	4	4	100.0%	4	100.0%
Morton (B)	6	5	6	100.0%	5	100.0%
Nether Providence (Twp)	34	33	34	100.0%	33	100.0%
Newtown (Twp)	44	39	36	81.8%	32	82.1%
Norwood (B)	15	13	15	100.0%	13	100.0%
Parkside (B)	6	6	6	100.0%	6	100.0%
Prospect Park (B)	20	19	20	100.0%	19	100.0%
Radnor (Twp)	78	74	56	71.8%	52	70.3%
Ridley (Twp)	66	62	53	80.3%	49	79.0%
Ridley Park (B)	23	22	23	100.0%	22	100.0%
Rose Valley (B)	4	4	2	50.0%	2	50.0%
Rutledge (B)	1	1	1	100.0%	1	0.0%
Sharon Hill (B)	18	16	18	100.0%	16	100.0%
Springfield (Twp)	63	61	56	88.9%	54	88.5%
Swarthmore (B)	16	13	16	100.0%	13	100.0%
Thornbury (Twp)	22	21	16	72.7%	15	71.4%
Tinicum (Twp)	24	23	24	100.0%	23	100.0%
Trainer (B)	13	13	13	100.0%	13	100.0%
Upland (B)	14	14	13	92.9%	13	92.9%
Upper Chichester (Twp)	31	28	30	96.8%	27	96.4%
Upper Darby (Twp)	153	138	127	83.0%	112	81.2%
Upper Providence (Twp)	27	25	23	85.2%	21	84.0%
Yeadon (B)	23	22	23	100.0%	22	100.0%
Brandywine Conservancy and Museum of Art Special District	0	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**1,211**	**84.7%**	**1,116**	**83.9%**

Source: Delaware County 2021/2022; HIFLD 2018/2022; PennDOT 2020

Table 4.3.5-6. Critical Facility Exposure to a Hazardous Material Release along a Railway

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within 1/2 Mile of Hazardous Materials Rail Routes			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	6	100.0%	6	100.0%
Aston (Twp)	39	37	3	7.7%	3	8.1%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	0	0.0%	0	0.0%
Chadds Ford (Twp)	17	16	0	0.0%	0	0.0%
Chester City (C)	88	83	81	92.0%	76	91.6%
Chester (Twp)	21	20	14	66.7%	13	65.0%
Chester Heights (B)	5	5	0	0.0%	0	0.0%
Clifton Heights (B)	14	12	13	92.9%	11	91.7%
Collingdale (B)	16	13	16	100.0%	13	100.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within 1/2 Mile of Hazardous Materials Rail Routes			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Colwyn (B)	7	6	7	100.0%	6	100.0%
Concord (Twp)	49	45	0	0.0%	0	0.0%
Darby (B)	31	27	25	80.6%	21	77.8%
Darby (Twp)	22	21	11	50.0%	10	47.6%
East Lansdowne (B)	7	7	7	100.0%	7	100.0%
Eddystone (B)	18	18	18	100.0%	18	100.0%
Edgmont (Twp)	16	16	0	0.0%	0	0.0%
Folcroft (B)	18	16	10	55.6%	8	50.0%
Glenolden (B)	21	20	21	100.0%	20	100.0%
Haverford (Twp)	87	83	25	28.7%	23	27.7%
Lansdowne (B)	26	24	19	73.1%	17	70.8%
Lower Chichester (Twp)	13	12	11	84.6%	11	91.7%
Marcus Hook (B)	21	20	20	95.2%	19	95.0%
Marple (Twp)	64	57	0	0.0%	0	0.0%
Media (B)	26	21	22	84.6%	18	85.7%
Middletown (Twp)	62	59	15	24.2%	14	23.7%
Millbourne (B)	4	4	4	100.0%	4	100.0%
Morton (B)	6	5	6	100.0%	5	100.0%
Nether Providence (Twp)	34	33	12	35.3%	11	33.3%
Newtown (Twp)	44	39	0	0.0%	0	0.0%
Norwood (B)	15	13	10	66.7%	8	61.5%
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	17	85.0%	16	84.2%
Radnor (Twp)	78	74	43	55.1%	39	52.7%
Ridley (Twp)	66	62	46	69.7%	42	67.7%
Ridley Park (B)	23	22	23	100.0%	22	100.0%
Rose Valley (B)	4	4	2	50.0%	2	50.0%
Rutledge (B)	1	1	1	100.0%	1	0.0%
Sharon Hill (B)	18	16	18	100.0%	16	100.0%
Springfield (Twp)	63	61	41	65.1%	39	63.9%
Swarthmore (B)	16	13	13	81.3%	10	76.9%
Thornbury (Twp)	22	21	14	63.6%	13	61.9%
Tinicum (Twp)	24	23	24	100.0%	23	100.0%
Trainer (B)	13	13	13	100.0%	13	100.0%
Upland (B)	14	14	12	85.7%	12	85.7%
Upper Chichester (Twp)	31	28	17	54.8%	17	60.7%
Upper Darby (Twp)	153	138	111	72.5%	97	70.3%
Upper Providence (Twp)	27	25	7	25.9%	7	28.0%
Yeadon (B)	23	22	22	95.7%	21	95.5%
Brandywine Conservancy and Museum of Art Special District	0	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**800**	**55.9%**	**732**	**55.0%**

Source: Delaware County 2021/2022; HIFLD 2018/2022

Of the 871 lifeline facilities in Delaware County located in hazardous material buffer areas, 587 are located within a ½ mile of hazardous materials roadway routes, 482 are located within ½ mile of hazardous material rail routes, and 773 are located within the SARA sites buffer. The breakdown of exposure by lifeline categories is displayed in Table 4.3.5-7.

Table 4.3.5-7. Lifeline Facility Exposure to Hazardous Material Facility Buffer Areas

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located within 1/2 Mile of Hazardous Materials Roadway Routes	Number of Lifelines Located within 1/2 Mile of Hazardous Materials Rail Routes	Number of Lifelines Located within the Selected Buffer of SARA Sites
Communications	10	8	7	9
Energy	55	49	35	51
Food, Water, Shelter	45	28	13	35
Hazardous Materials	160	148	106	160
Health and Medical	50	44	20	42
Safety and Security	968	806	525	835
Transportation	42	33	26	33
Delaware County (Total)	**1,330**	**1,116**	**732**	**1,165**

Source: Delaware County 2021/2022; HIFLD 2018/2019/2022; PennDOT 2020

Impact on the Economy

If a significant hazmat incident occurs, not only would life, safety, and building stock be at risk, but the economy of Delaware County would also be affected. A significant incident within an urban area may force businesses to close for an extended period of time because of contamination or because of direct damage caused by an explosion. Exact impacts on the economy are difficult to predict, given the uncertainty of the size and scope of potential incidents.

Hazmat incidents can lead to closures of major transportation routes in Delaware County. Closures of waterways, railroads, airports, and highways as a result of these incidents can hinder delivery of goods and services. Potential impacts may be local, regional, or statewide depending on the magnitude of the event and the extent of disruptions to services. In 2019, the United States experienced nearly $1 billion in damages from hazmat transportation incidents (DOT 2019).

Impact on the Environment

Hazardous material sites near bodies of water are at high risk in the event of an extreme storm or if high-water levels approach. Such events could release toxins, waste, and other pollutants into the water and greatly impact surrounding habitats. Many of these sites were intentionally constructed in locations believed to be removed from potential contamination or exposure-increasing factors, but floodplain boundary change increases the likelihood that water may reach hazardous material and waste sites.

Future Growth and Development

An increase in development and population can increase likelihood of a hazmat incident. Future migration to larger jurisdictions may also increase the likelihood of an incident. The tables and hazard maps included in the jurisdictional annexes in this HMP contain additional information regarding the specific areas of development that would increase county vulnerability to the hazardous materials incident hazard.

Estimated population projections provided by the Center of Rural Pennsylvania indicate that Delaware County's population will continue to increase into 2040, increasing total population to approximately 648,439 persons (Center of Rural Pennsylvania 2013). Persons that move into hazmat exposure areas are at greater risk to be impacted in the event of a spill or toxin release.

Effect of Climate Change on Vulnerability

As temperatures change, excessive heat on containers that contain hazmat may alter the material properties. In addition, hazardous substances stored at fixed locations in the floodplain may experience an increase in flood events due to the project changes in increased precipitation events, magnitude, and frequency.

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Delaware County's vulnerability assessment.

4.3.6 Environmental Hazards – Oil and Natural Gas Pipelines

This section provides a profile and vulnerability assessment of the oil and natural gas pipelines hazard profile for the Delaware County Hazard Mitigation Plan (HMP).

Product release into the local environment can derive from a fixed facility or occur at any location along a pipeline route and may be the result of carelessness, technical failure, external incidents, or an intentional act against the facility or container. Release of certain products considered hazardous materials (hazmat) can immediately and adversely impact the general population, causing effects ranging from inconvenient evacuations to personal injury and even death. Moreover, any release can compromise the local environment through contamination of soil, groundwater, or local flora and fauna.

4.3.6.1 Location and Extent

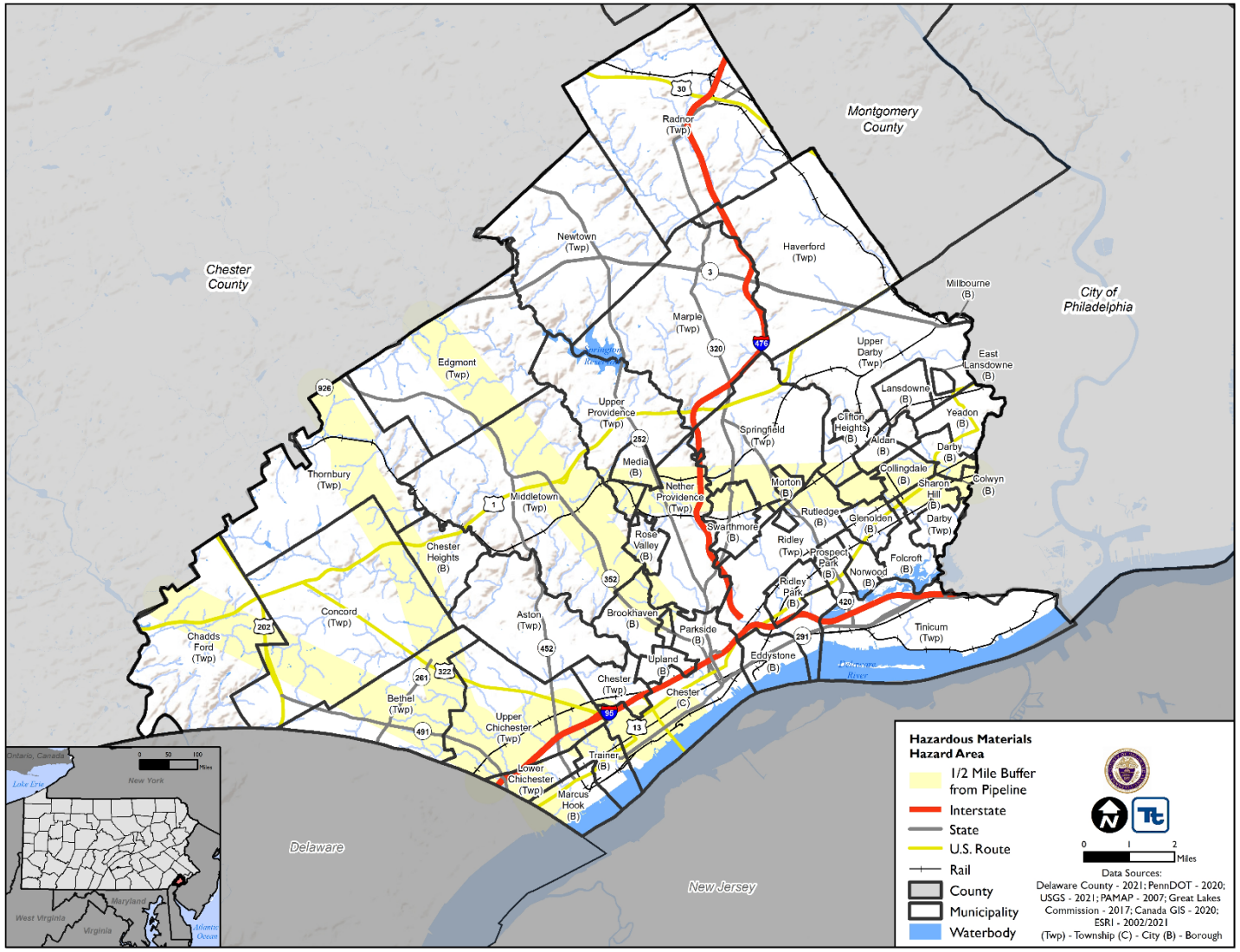
Based on past occurrences, pipeline incidents within Delaware County have been accidental and have not been considered terrorist or criminal acts. While past occurrences have not been deemed intentional, an intentional release of any of these products in large quantity would pose a threat to the local population, economy, and environment resulting in lost revenue, injuries, and deaths.

Natural gas is the most commonly transported commodity via pipeline in Delaware County. The county is home to nearly 400 linear miles of pipelines. Many of the pipelines have been in place for decades; more recently, the construction of new lines and upgrades to existing lines have increased. According to the 2016 HMP, the county's large agricultural areas increase its vulnerability to pipeline accidents. There are 11 pipeline companies that have operations in 35 municipalities in the county. The municipalities through which pipelines directly pass are most vulnerable to pipeline incidents that would involve the release of hazardous materials. In addition, there are oil refineries or terminals in Bethel Township, Upper Chichester Township, Marcus Hook Borough, Trainer Borough, and Darby Township, which also increase the risk to those jurisdictions of hazardous materials releases as well as urban fire and explosions (Bedford County 2016).

The 2002 Delaware County Hazardous Commodity Flow Study found that there are 11 pipeline companies that have operations in 35 municipalities. The pipelines transport 15 types of hazardous materials, including hazardous liquids such as crude oil and refined products (gasoline, kerosene, and jet fuel) or are used for gas transmission (primarily natural gas). In addition, there are three oil refineries and four oil storage terminals in the county

Active pipeline projects in the county include the Mariner East 2 project that carries natural gas, ethane, and propane; 2017 Expansion Project; Northeast Supply Enhancement Project; Greater Philadelphia Expansion Project; and Adelphia Gateway, all of which transport natural gas. Figure 4.3.6-1 shows pipelines in Delaware County.

Figure 4.3.6-1. Delaware County Pipelines



Pipelines within the Commonwealth of Pennsylvania are regulated by several different agencies. Although Delaware County has no regulatory authority over pipeline operators, the county can be engaged in the environmental review of proposals and coordinating emergency services response. Some of the county-level departments involved include the Planning Commission, Water Resources Authority, Conservation District, Facility and Parks, and Department of Emergency Services. Federal and state agencies involved in pipeline safety and regulations include the following:

- Federal Emergency Regulatory Commission (FERC) is an independent agency of the United States government that regulates the interstate transmission of electricity, natural gas, and oil and reviews proposals to build Liquefied Natural Gas (LNG) terminals and interstate natural gas pipelines.
- U.S. Department of Transportation (USDOT) oversees the safety of pipelines and transportation infrastructure.
- Pipeline and Hazardous Materials Safety Administration (PHMSA) develops and enforces regulations for a safe, reliable, and environmentally sound pipeline transportation system.
- Public Utility Commission (PUC) enforces safety standards for pipeline facilities.
- Pennsylvania Department of Environmental Protection (PADEP) has regulatory authority over any crossing of a wetland or waterway by a pipeline. Pipeline projects located within Delaware River Basin may be subject to regulatory review by the Delaware River Basin Commission (DRBC).

4.3.6.2 Range of Magnitude

The PHMSA classifies pipeline incidents into the following categories: Gas Distribution, Gas Gathering, Gas Transmission, and LNG. Pipeline incidents within Delaware County could range from minor leaks to a large explosion that could lead to loss of life and damage to property, environment, and economy. Severity of an incident varies depending on the type of material released and distance and related response time for emergency response teams. Areas closest to the release sites are generally at the greatest risk; however, depending on the material, a release can travel great distances or persist over a long period of time, resulting in far-reaching effects on people and the environment.

The worst-case scenario would be a large, uncontrolled release of a toxic gas or liquid from a pipeline or pump station within a major urban area. Physical property damage to private wells and public water systems is likely from this type of event, the potential for injury and death to people up to 0.25 mile from the scene is significant. This type of event would likely overwhelm the medical care capacity within the county and possibly the region. Businesses nearby could close, and households could potentially be displaced.

4.3.6.3 Past Occurrence

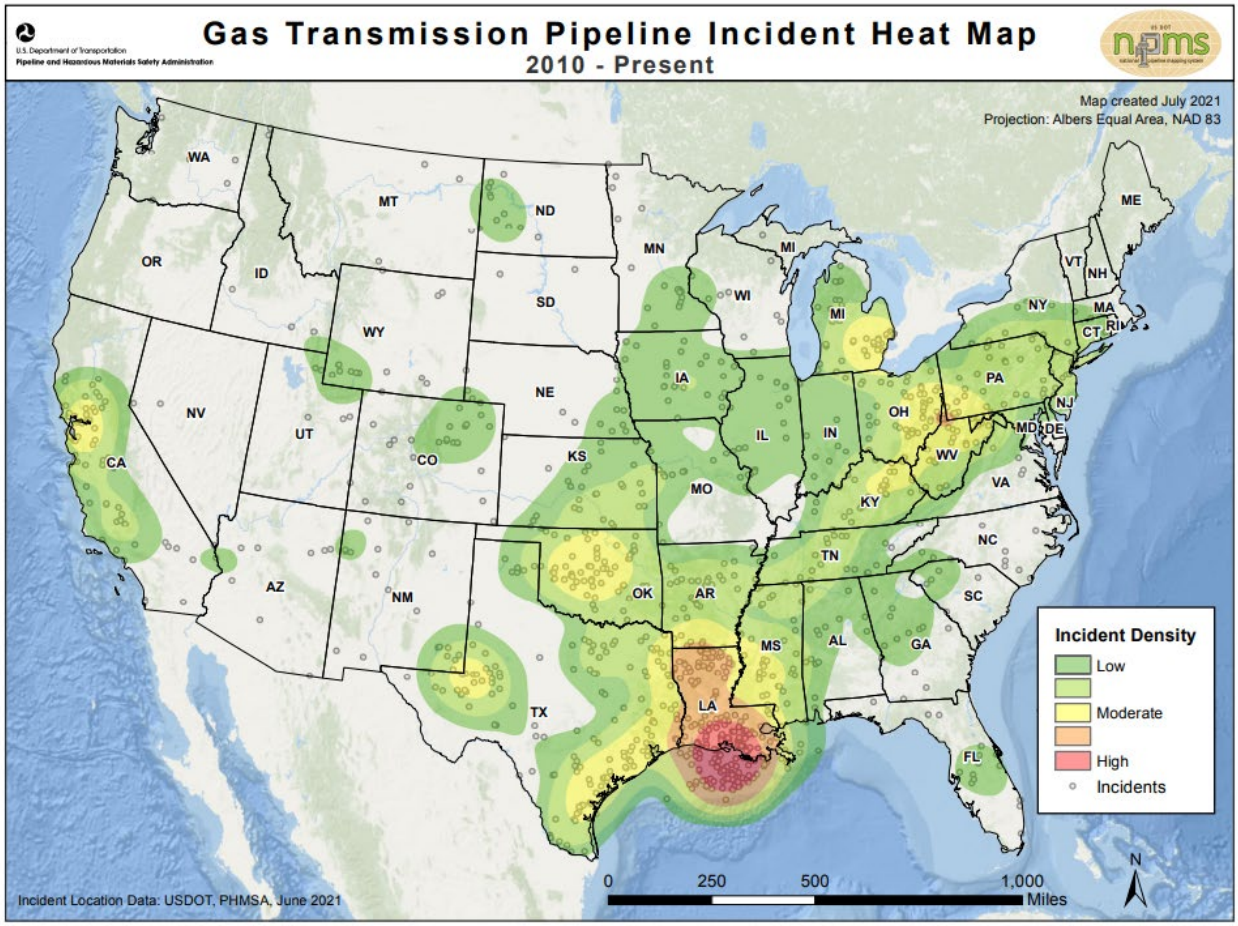
The county has experienced pipeline accidents. For most incidents, municipal police departments and county emergency dispatchers are contacted for emergency response. The county's Hazardous Materials Response Team is contacted for technical advice about addressing the hazardous material. Between 2000 and 2019, a total of 311 pipeline incidents have occurred, resulting in 20 fatalities, 58 injuries, and $210,050,876 in damages in the state of Pennsylvania (PHMSA 2020).

The 2016 HMP identified numerous pipeline-related incidents that have occurred in Delaware County. The Delaware County Hazardous Commodities Flow Study reports that there were 14 reported pipeline incidents in Delaware County between 1984 and 2001. These resulted in 150 two injuries and $4.7 million in property damages. Between 2002 and 2009, there have been two known pipeline incidents that involved a pipeline leak or break (PEIRS, 2002–2009). One occurred due to operator error in Upper Chichester Township and the other involved rupture of a natural gas pipeline by a contractor digging in Radnor Township. Neither of the two events resulted in injuries.

Gas transmission pipeline incidents and hazardous liquid pipeline accidents for 2010 through 2021 have been identified by US DOT PHMSA and are displayed in Figure 4.3.6-2 and Figure 4.3.6-3. According to

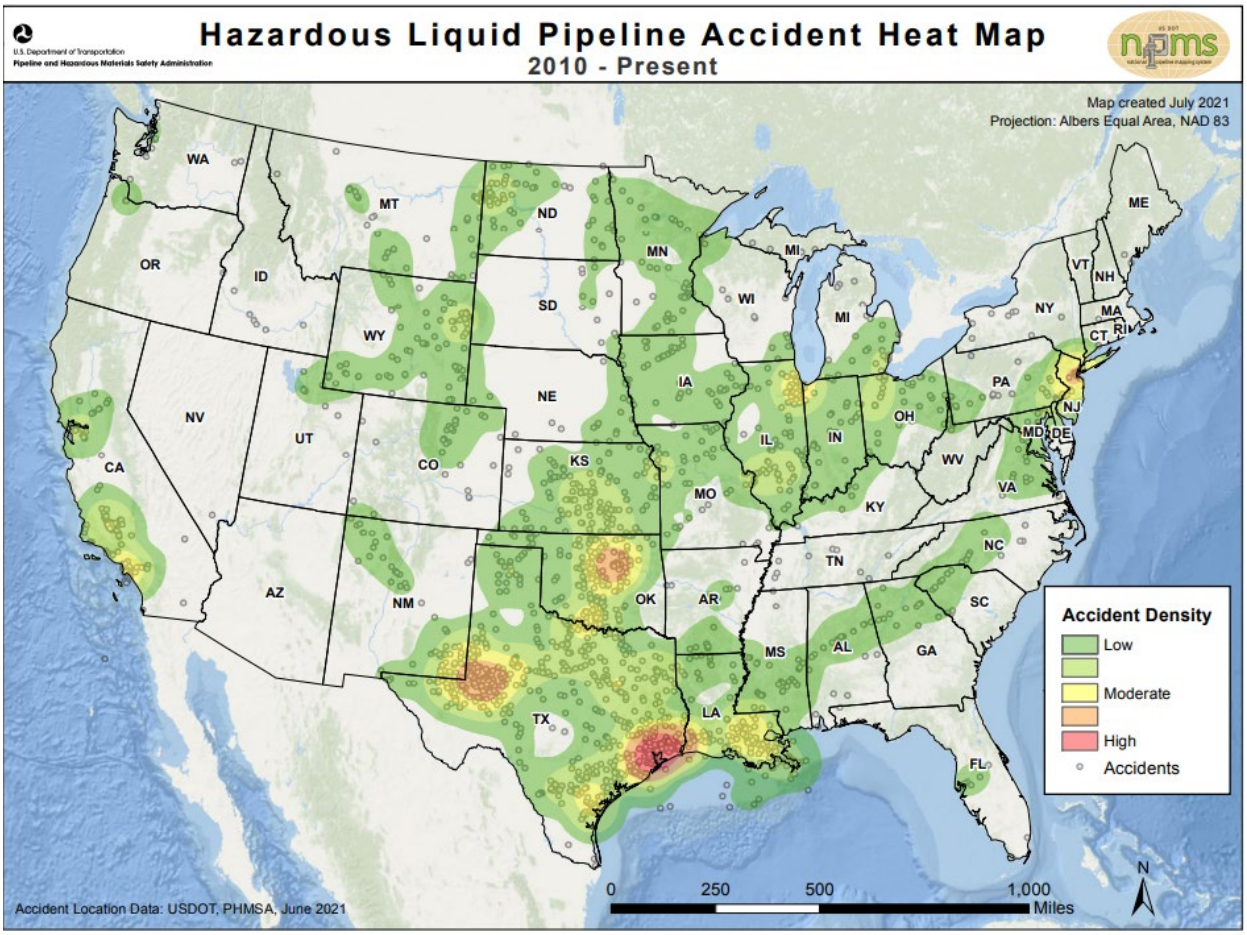
this data, Delaware County has experienced a low-moderate density of gas transmission pipeline incidents and a moderate density of hazardous liquid pipeline accidents in this time period (US DOT PHMSA 2021).

Figure 4.3.6-2. Gas Transmission Pipeline Incident Heat Map, 2010–2021



Source: US DOT PHMSA 2021

Figure 4.3.6-3. Hazardous Liquid Pipeline Accident Heat Map, 2010–2021



Source: US DOT PHMSA 2021

In addition, drilling fluid accidents that took place in Delaware County from 2016–2021 were identified in Table 4.3.6-1.

Table 4.3.6-1. Drilling Fluid Accidents in Delaware County, 2016–2021

Dates of Event	Event Type	Location	Losses/Impacts
May 18, 2017	Inadvertent Return	Brookhaven (B)	200 gallons total release of drilling fluids in 2 locations in Chester Creek.
October 24, 2017	Inadvertent Return	East Goshen (Twp)	500 gallons in total, 490 gallons to uplands, ~ < 10 gallons to storm drain street inlet
April 18, 2018	Inadvertent Return	Middletown Township	Approx. 8,000 gallons (3 tanker trucks filled) of drilling fluid discharged at same IR location of 4/18 IR event, aerial extent approx. 8' x 10', but continued drilling utilizing vacuum pumps into tankers while discharging to surface.
May 17, 2018	Inadvertent Return	Middletown Township	150 gallons of drilling fluid discharged at new IR location (~50 ft) behind the apartment building; stopped drill, set up containment area, vacuumed and squeegeed area; DEP on site to confirm clean up.
August 21, 2018	Inadvertent Return	Middletown Township	2 new IR locations in WL-I1, separate and distinct from the 8/5/18 subsidence, approx. 200 gallons of drilling fluids.

Source: Fractracker 2022

4.3.6.4 Future Occurrence

Because of the wide scope of definition of pipeline incidents, ranging from a small spill to a large release of a highly volatile or toxic hazmat, incidents can happen at any time, and will occur in the future. Transportation of hazmats via pipelines cross streams within the watersheds that are part of the county's domestic water supply.

While pipeline incidents in Delaware County have occurred in the past, future incidents are generally considered difficult to predict. Although the county does not anticipate severe releases on any regular basis, the possibility of a significant release should not be discounted. Based on Risk Factor Methodology Probability Criteria, the likelihood of future occurrences within Delaware County remains *highly likely*.

4.3.6.5 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed or vulnerable within the identified hazard area. Effects of and risk from pipelines are examined. The following sections evaluate and estimate potential impacts in Delaware County, presenting specifically:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time

Impact on Life, Health, and Safety

Pipeline hazards exert the greatest impact on the residential population in Delaware County. Table 4.3.6-2 summarizes population vulnerable to pipeline hazards. Several incidents reported in the county are related to liquid and gas leaks from pump stations and pipelines. The City of Chester has the greatest number of residents in the pipeline hazard area, with a total of 13,084 people. First responders are also greatly impacted as well. Their safety may be at risk during on-scene operations, and they may need to perform additional responsibilities such as traffic control. There is a potential for a higher than normal call volume/demand for first responders, and they may have a difficult time responding to incidents due to limited access to roads and damaged infrastructure.

Table 4.3.6-2. Estimated Delaware County Population Vulnerable to Pipeline Hazards

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Hazardous Materials Hazard Areas	
		Number of Persons Located within 1/2 Mile of Hazardous Materials Pipelines	Percent of Total
Aldan (B)	4,244	886	20.9%
Aston (Twp)	16,791	36	0.2%
Bethel (Twp)	9,574	5,139	53.7%
Brookhaven (B)	8,300	4,262	51.3%
Chadds Ford (Twp)	3,972	2,091	52.6%
Chester City (C)	32,605	13,084	40.1%
Chester (Twp)	4,080	711	17.4%
Chester Heights (B)	2,897	1,668	57.6%
Clifton Heights (B)	6,863	0	0.0%
Collingdale (B)	8,908	7,861	88.2%
Colwyn (B)	2,474	2,474	100.0%
Concord (Twp)	18,295	7,031	38.4%
Darby (B)	10,715	4,746	44.3%
Darby (Twp)	9,219	5,881	63.8%
East Lansdowne (B)	2,714	0	0.0%
Eddystone (B)	2,459	0	0.0%

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Hazardous Materials Hazard Areas	
		Number of Persons Located within 1/2 Mile of Hazardous Materials Pipelines	Percent of Total
Edgmont (Twp)	4,283	1,080	25.2%
Folcroft (B)	6,792	333	4.9%
Glenolden (B)	7,223	608	8.4%
Haverford (Twp)	50,431	0	0.0%
Lansdowne (B)	11,107	0	0.0%
Lower Chichester (Twp)	3,425	777	22.7%
Marcus Hook (B)	2,454	21	0.9%
Marple (Twp)	24,214	0	0.0%
Media (B)	5,901	3,189	54.0%
Middletown (Twp)	16,373	6,300	38.5%
Millbourne (B)	1,212	0	0.0%
Morton (B)	2,778	2,685	96.7%
Nether Providence (Twp)	14,525	5,940	40.9%
Newtown (Twp)	15,002	0	0.0%
Norwood (B)	5,943	0	0.0%
Parkside (B)	2,321	1,042	44.9%
Prospect Park (B)	6,427	0	0.0%
Radnor (Twp)	33,228	0	0.0%
Ridley (Twp)	31,053	5,486	17.7%
Ridley Park (B)	7,186	0	0.0%
Rose Valley (B)	1,017	161	15.8%
Rutledge (B)	782	17	2.2%
Sharon Hill (B)	6,014	4,931	82.0%
Springfield (Twp)	25,070	3,741	14.9%
Swarthmore (B)	6,543	1,593	24.3%
Thornbury (Twp)	6,904	2,567	37.2%
Tinicum (Twp)	3,983	0	0.0%
Trainer (B)	1,976	1,643	83.1%
Upland (B)	3,068	0	0.0%
Upper Chichester (Twp)	16,898	11,537	68.3%
Upper Darby (Twp)	85,681	2,565	3.0%
Upper Providence (Twp)	10,852	1,774	16.3%
Yeadon (B)	12,054	1	0.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**113,860**	**19.7%**

Source: Census 2010/2020
Notes: Notes: Census 2020 decennial population data was used to update the Census 2010 daysmetric block population estimates. Census 2010 dasymetric blocks were used to estimate the areas where development exists in each municipality. These boundaries may over or underestimate the density location of population within each municipality, impacting the exposure results.

% = Percent; B = Borough; C = City; Twp = Township

Impacts on General Building Stock

While buildings may be present within the hazard area, estimating direct damage to these structures and facilities would be difficult. Potential losses may include contamination and/or potential structural and content losses if an explosion occurs. To estimate the buildings exposed to a pipeline event, the half-mile buffer areas were overlaid upon the building level (Table 4.3.6-3). The City of Chester has the greatest number of buildings that

would be impacted by a pipeline event (5,077). However, if a pipeline release were to occur, the incident would not be located along all pipelines in the county but instead only a section of the total pipeline exposure area. Therefore, the total exposure does not represent a complete vulnerability, should a hazard event occur.

Table 4.3.6-3. Total Building Exposed to a Pipeline Incident

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located within 1/2 Mile of Hazardous Materials Pipelines	
		Number of Buildings	Percent of Total
Aldan (B)	1,673	366	21.9%
Aston (Twp)	6,202	13	0.2%
Bethel (Twp)	3,164	1,693	53.5%
Brookhaven (B)	3,185	1,680	52.7%
Chadds Ford (Twp)	1,402	739	52.7%
Chester City (C)	11,646	5,077	43.6%
Chester (Twp)	1,596	274	17.2%
Chester Heights (B)	1,022	511	50.0%
Clifton Heights (B)	2,324	0	0.0%
Collingdale (B)	3,130	2,773	88.6%
Colwyn (B)	839	839	100.0%
Concord (Twp)	5,400	1,954	36.2%
Darby (B)	3,569	1,529	42.8%
Darby (Twp)	3,763	2,359	62.7%
East Lansdowne (B)	906	0	0.0%
Eddystone (B)	876	0	0.0%
Edgmont (Twp)	1,579	321	20.3%
Folcroft (B)	2,500	112	4.5%
Glenolden (B)	2,453	258	10.5%
Haverford (Twp)	17,876	0	0.0%
Lansdowne (B)	3,838	0	0.0%
Lower Chichester (Twp)	1,266	282	22.3%
Marcus Hook (B)	831	7	0.9%
Marple (Twp)	8,652	0	0.0%
Media (B)	2,076	1,050	50.6%
Middletown (Twp)	5,161	2,048	39.7%
Millbourne (B)	243	0	0.0%
Morton (B)	927	903	97.4%
Nether Providence (Twp)	5,153	2,042	39.6%
Newtown (Twp)	4,691	0	0.0%
Norwood (B)	2,092	0	0.0%
Parkside (B)	851	380	44.7%
Prospect Park (B)	2,086	0	0.0%
Radnor (Twp)	8,992	0	0.0%
Ridley (Twp)	11,070	1,547	14.0%
Ridley Park (B)	2,403	0	0.0%
Rose Valley (B)	402	57	14.3%
Rutledge (B)	287	6	2.2%
Sharon Hill (B)	2,024	1,627	80.4%
Springfield (Twp)	9,233	1,420	15.4%
Swarthmore (B)	1,721	548	31.8%
Thornbury (Twp)	2,361	864	36.6%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located within 1/2 Mile of Hazardous Materials Pipelines	
		Number of Buildings	Percent of Total
Tinicum (Twp)	1,917	0	0.0%
Trainer (B)	678	562	82.8%
Upland (B)	1,297	0	0.0%
Upper Chichester (Twp)	6,005	4,103	68.3%
Upper Darby (Twp)	27,681	558	2.0%
Upper Providence (Twp)	3,636	594	16.3%
Yeadon (B)	3,741	0	0.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**196,420**	**39,097**	**19.9%**

Source: Census 2010
Notes: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 data may over or underestimate the number of buildings found in each municipality.

% = Percent; B = Borough; C = City; Twp = Township

Impacts on Critical Facilities

Potential losses of critical facilities caused by a pipeline incident are difficult to quantify. Potential losses may include inaccessibility, loss of service, contamination, and/or potential structural and content losses if an explosion occurs. Table 4.3.6-4 summarizes critical facilities and lifelines located within the pipeline buffer area. A total of 1,430 critical facilities are located in Delaware County. Overall, 281 critical facilities are exposed to a pipeline event, and 259 of those facilities are considered lifelines.

Table 4.3.6-4. Number of Critical Facilities in Pipeline Incident Exposure

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within 1/2 Mile of Hazardous Materials Pipelines			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	0	0.0%	0	0.0%
Bethel (Twp)	15	15	11	73.3%	11	73.3%
Brookhaven (B)	16	15	10	62.5%	9	60.0%
Chadds Ford (Twp)	17	16	7	41.2%	7	43.8%
Chester City (C)	88	83	35	39.8%	33	39.8%
Chester (Twp)	21	20	3	14.3%	3	15.0%
Chester Heights (B)	5	5	3	60.0%	3	60.0%
Clifton Heights (B)	14	12	0	0.0%	0	0.0%
Collingdale (B)	16	13	16	100.0%	13	100.0%
Colwyn (B)	7	6	7	100.0%	6	100.0%
Concord (Twp)	49	45	2	4.1%	2	4.4%
Darby (B)	31	27	11	35.5%	10	37.0%
Darby (Twp)	22	21	13	59.1%	13	61.9%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	0	0.0%	0	0.0%
Edgmont (Twp)	16	16	4	25.0%	4	25.0%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	0	0.0%	0	0.0%
Haverford (Twp)	87	83	0	0.0%	0	0.0%
Lansdowne (B)	26	24	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located within 1/2 Mile of Hazardous Materials Pipelines			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Lower Chichester (Twp)	13	12	6	46.2%	6	50.0%
Marcus Hook (B)	21	20	5	23.8%	5	25.0%
Marple (Twp)	64	57	0	0.0%	0	0.0%
Media (B)	26	21	13	50.0%	9	42.9%
Middletown (Twp)	62	59	36	58.1%	34	57.6%
Millbourne (B)	4	4	0	0.0%	0	0.0%
Morton (B)	6	5	6	100.0%	5	100.0%
Nether Providence (Twp)	34	33	4	11.8%	4	12.1%
Newtown (Twp)	44	39	0	0.0%	0	0.0%
Norwood (B)	15	13	0	0.0%	0	0.0%
Parkside (B)	6	6	3	50.0%	3	50.0%
Prospect Park (B)	20	19	0	0.0%	0	0.0%
Radnor (Twp)	78	74	0	0.0%	0	0.0%
Ridley (Twp)	66	62	5	7.6%	4	6.5%
Ridley Park (B)	23	22	0	0.0%	0	0.0%
Rose Valley (B)	4	4	1	25.0%	1	25.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%
Sharon Hill (B)	18	16	18	100.0%	16	100.0%
Springfield (Twp)	63	61	12	19.0%	12	19.7%
Swarthmore (B)	16	13	9	56.3%	7	53.8%
Thornbury (Twp)	22	21	5	22.7%	5	23.8%
Tinicum (Twp)	24	23	0	0.0%	0	0.0%
Trainer (B)	13	13	5	38.5%	5	38.5%
Upland (B)	14	14	0	0.0%	0	0.0%
Upper Chichester (Twp)	31	28	20	64.5%	19	67.9%
Upper Darby (Twp)	153	138	5	3.3%	4	2.9%
Upper Providence (Twp)	27	25	6	22.2%	6	24.0%
Yeadon (B)	23	22	0	0.0%	0	0.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**281**	**19.7%**	**259**	**19.5%**

Source: Delaware County 2021/2022; HIFLD 2018/2019/2022
Notes: % = Percent; B = Borough; C = City; Twp = Township

Table 4.3.6-5 identifies lifeline facilities exposed to potential pipeline incidents. 259 lifeline facilities are exposed to potential pipeline incidents.

Table 4.3.6-5. Number of Lifeline in Exposed to Pipeline Incidents

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located within 1/2 Mile of Hazardous Materials Pipelines
Communications	10	3
Energy	55	17
Food, Water, Shelter	45	10
Hazardous Materials	160	45
Health and Medical	50	10
Safety and Security	968	167
Transportation	42	7
Delaware County (Total)	**1,330**	**259**

Source: Delaware County 2021/2022; HIFLD 2018/2019/2022; PennDOT 2020

Impact on the Economy

Economic loss from pipeline incidents and explosion incidents ranges from non-recordable to losses exceeding millions of dollars. Impact on the local economy from a single incident is almost impossible to measure because of complexities of predicting losses of work, revenue, and future business. However, it is certain that a significant incident within an urban area would cause various economic losses. Pipeline incidents can lead to closures of major transportation routes. Waterway, railroad, airport, and highway closures caused by these incidents can hinder delivery of goods and services. Potential impacts may be local, regional, or statewide depending on the magnitude of the event and the extent of disruptions to services. In 2019, Pennsylvania experienced 19 pipeline incidents, causing $13.4 million in damages (PHMSA 2019).

Impact on the Environment

As discussed above, pipeline incidents and explosion incidents can profoundly affect the surrounding environment. Contamination of soil, surface water, and groundwater can result in many direct impacts on surrounding populations and ecosystems. When a large volume of product is released, much of it remains unrecovered as product disperses into the environment (Belvederesi, et al 2018). This can have an immense and lasting impact on the local flora and fauna.

Future Growth and Development

Any areas of growth could be impacted by pipeline hazards if located within identified hazard areas. Additionally, an increase in development and population can increase the likelihood of a pipeline incident. The tables and hazard maps included in the jurisdictional annexes in this HMP contain additional information regarding the specific areas of development that would increase county vulnerability to the hazmat incident hazard.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Delaware's population will continue to increase into 2040, increasing total population to approximately 648,439 persons (Center of Rural Pennsylvania 2013). Persons that move into pipeline exposure areas are at greater risk to be impacted in the event of a gas or oil release.

Effect of Climate Change on Vulnerability

As temperatures change, excessive heat on pipelines may alter the material properties. In addition, pipeline locations in the floodplain may experience an increase in flood events due to the project changes in increased precipitation events, magnitude, and frequency.

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Delaware County's vulnerability assessment.

4.3.7 Extreme Temperature

This section provides a profile and vulnerability assessment of the extreme temperature hazard in Delaware County. Extreme temperature includes both heat and cold events, which can have a significant impact to human health and commercial/agricultural businesses and primary and secondary effects on infrastructure (e.g., burst pipes and power failure). What constitutes "extreme cold" or "extreme heat" can vary across different areas of the country, based on the conditions the population is accustomed to.

Extreme cold events are when temperatures drop well below normal in an area. In regions relatively unaccustomed to winter weather, near-freezing temperatures are considered "extreme cold." Extreme cold temperatures are generally characterized in temperate zones by the ambient air temperature dropping to approximately 0ºF or below (Centers for Disease Control and Prevention [CDC] 2013). Extremely cold temperatures often accompany a winter storm, which can cause power failures and icy roads. Although staying indoors as much as possible can help reduce the risk of car crashes and falls on the ice, individuals may also face indoor hazards. Many homes will be too cold—either due to a power failure or because the heating system is not adequate for the weather. The use of space heaters and fireplaces to keep warm increases the risk of household fires and carbon monoxide poisoning (CDC 2007).

Conditions of extreme heat are defined as summertime temperatures that are substantially hotter and/or more humid than average for a location at that time of year (CDC 2009). An extended period of extreme heat of three or more consecutive days is typically called a heat wave and is often accompanied by high humidity (National Weather Service [NWS] 2005). "Heat wave" has no universal definition because the term is relative to the usual weather in a particular area. The term heat wave is applied both to routine weather variations and to extraordinary spells of heat that may occur only once per century (Meehl and Tebaldi 2004). A basic definition of a heat wave implies that it is an extended period of unusually high atmosphere-related heat stress, which causes temporary modifications in lifestyle and which may have adverse health consequences for the affected population (Robinson 2013). A heat wave is defined has three consecutive days of temperatures ≥90°F.

Extreme heat is the number one weather-related cause of death in the United States. In a 30-year average of weather fatalities across the nation from 1991 to 2020, excessive heat claimed more lives each year (143) than floods (85), lightning (39), tornadoes (69), and hurricanes (46). In 2020, extreme heat and cold claimed 64 lives nationally, with no fatalities occurring in Pennsylvania (NWS 2021).

4.3.7.1 Location

Delaware County is subject to extreme temperatures in the summer and winter seasons. Extreme heat occurs when temperatures hover 10 degrees or more above the average high temperature for a region for several weeks. Urban environments tend to retain the heat well into the night, leaving little opportunity for dwellings to cool. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility.

A heat wave combined with a drought is a very dangerous situation. Extreme cold temperatures drop well below what is considered normal for an area during the winter months and often accompany winter storm events. Combined with increases in wind speed, such temperatures in Pennsylvania can be life-threatening to those exposed for extended periods of time.

4.3.7.2 Magnitude

Delaware County is susceptible to extreme temperatures in the summer and winter seasons, and they can occur anywhere in the county. The average temperature in January is 33°F (over the last 30 years), and the average

temperature in July is 77.2°F (NOAA NCDC 2021). The average minimum temperature from January 1, 1920 to December 6, 2021 in Delaware County is 48°F, and average maximum temperature is 65°F (Midwestern Regional Climate Center [MRCC] 2021).

Extreme Heat

The severity of extreme heat is based on the ambient air temperature coupled with the relative humidity. A prolonged heat wave that occurs during drought conditions can be very dangerous as the necessary water resources needed are limited. If extreme temperatures remain for a prolonged period, power supplies may be affected as electricity demands from air conditioners overdraw the supply leading to rolling brownouts. Exposure to heat can cause health problems indirectly, such as through the increased workload on the heart. This can be especially dangerous to individuals with preexisting medical conditions, typically the elderly.

Extremely high temperatures cause heat stress which can be divided into four categories (see Table 4.3.7-1). Each category is defined by apparent temperature which is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. Note that while the temperatures in Table 4.3.7-1 serve as a guide for various danger categories, the impacts of high temperatures will vary from person to person based on individual age, health, and other factors.

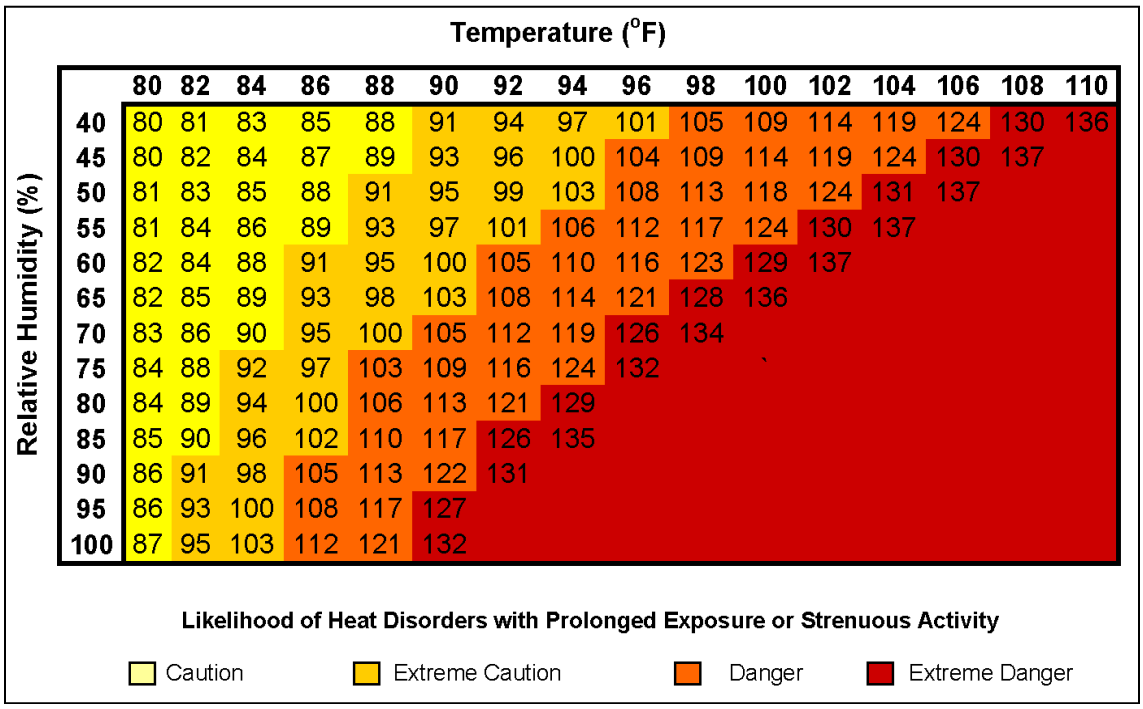
Table 4.3.7-1. Categories of Heat Stress

DANGER CATEGORY	HEAT DISORDERS	APPARENT TEMPERATURE (°F)
I (Caution)	Fatigue possible with prolonged exposure and physical activity.	80 to 90
II (Extreme Caution)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity.	90 to 105
III (Danger)	Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and physical activity.	105 to 130
IV (Extreme Danger)	Heatstroke or sunstroke imminent.	>130

Source: FEMA 1997, Delaware County 2016

NOAA's heat alert procedures are based mainly on heat index values. The heat index is given in degrees Fahrenheit. The heat index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. To find the heat index temperature, the temperature and relative humidity need to be known. Once both values are known, the heat index will be the corresponding number with both values (Figure 4.3.7-1). The heat index indicates the temperature the body feels. It is important to know that the Heat Index values are devised for shady, light wind conditions. Exposure to full sunshine can increase heat index values by up to 15°F. Strong winds, particularly with very hot dry air, can also be extremely hazardous (NWS 2013).

Figure 4.3.7-1. NWS Heat Index Chart



Source: NWS 2015
°F degrees Fahrenheit
% percent

Extreme Cold

Cold weather has a number of effects, most dramatically on the general population mortality rate. The average mortality on a winter's day is about 15 percent higher than on a summer's day. Cold weather is directly responsible for deaths through such things as hypothermia, influenza, and pneumonia. It is also an indirect factor in a number of ways such as death and injury from falls, accidents, carbon monoxide poisoning, and house fires all of which are partially attributable to cold.

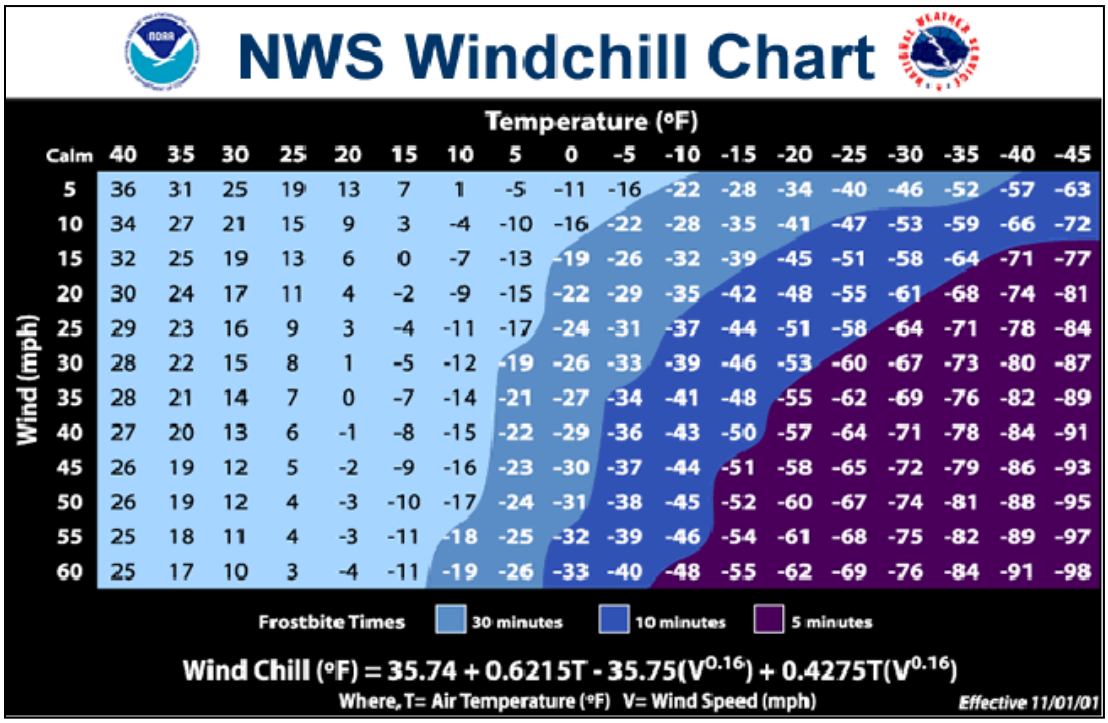
The extent (severity or magnitude) of extreme cold temperatures are generally measured through the wind chill temperature (WCT) index. Wind chill temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. As the wind increases, the body is cooled at a faster rate causing the skin's temperature to drop (NWS n.d.).

On November 1, 2001, the NWS implemented a new WCT Index. It was designed to more accurately calculate how cold air feels on human skin. The table below shows the new WCT Index. The WCT Index includes a frostbite indicator, showing points where temperature, wind speed, and exposure time will produce frostbite to humans. Figure 4.3.7-2 shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops (NWS n.d.).

In Pennsylvania, wind chill warnings are issued when wind chills drop to -25°F or lower. While this threshold applies to the entire state, the threshold for advisories vary based on regions. Wind chill advisories are issued in the southeast and western sections of Pennsylvania when wind chill values drop to -10°F. South-central to northern sections of the Commonwealth when wind chills drop to -15°F (Pennsylvania Emergency Management Agency [PEMA] 2018).

In addition, Delaware County is susceptible to periods of weather where temperatures do not go beyond the freezing mark for days or even weeks at a time. Exposure to extreme cold can lead to frostbite and if exposed for too long, even death. Pipes in homes may burst, and residential fires increase as people use space heaters and other unsafe means to heat their homes. Figure 4.3.7-2 displays wind chill and frostbite times.

Figure 4.3.7-2. NWS Wind Chill Index



Source: NWS n.d.
°F degrees Fahrenheit
mph miles per hour

4.3.7.3 Range of Magnitude

Extreme temperatures can cause a range of impacts to communities that include health impacts, transportation, agriculture, and energy. Meteorologists can accurately forecast extreme temperature event development and the severity of the associated conditions with several days of lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations.

For heat events, the NWS issues excessive heat outlooks when the potential exists for an excessive heat event in the next 3–7 days. Watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. Excessive heat warning/advisories are issued when an excessive heat event is expected in the next 36 hours (NWS 2013d). Winter temperatures may fall to extreme cold readings with no wind occurring. Currently, the only way to headline very cold temperatures is with the use of the NWS-designated wind chill advisory or warning products. When actual temperatures reach wind chill warning criteria with little to no wind, extreme cold warnings may be issued (NWS n.d.).

Cold temperatures can be extremely dangerous to humans and animals exposed to the elements. Without heat and shelter, cold temperatures can cause hypothermia, frost bite, and death. Wind chill temperatures are often used in place of raw temperature values due to the effect of wind can have in drawing heat from the body under cold temperatures. These values represent what temperatures actually feel like to humans and animals under

cold, windy conditions. Similar to high temperatures, the effect of cold temperatures will vary by individual (PEMA 2018).

Extremely high temperatures cause heat stress, which can be divided into four categories (Table 4.3.7-2). Each category is defined by apparent temperature, which is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. Although the figure below serves as a guide for various danger categories, the impacts of high temperatures will vary from person to person based on age, health, and other factors. The elderly and very young are most vulnerable to health-related impacts of extreme temperatures (PEMA 2018).

Table 4.3.7-2. Adverse Effects of Prolonged Exposure to Heat on Individuals

Category	Heat Index	Health Hazards
Extreme Danger	130 °F – Higher	Heat Stroke / Sunstroke is likely with continued exposure.
Danger	105 °F – 129 °F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Extreme Caution	90 °F – 105 °F	Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.
Caution	80 °F – 90 °F	Fatigue possible with prolonged exposure and/or physical activity.

Source: NWS 2009

4.3.7.4 Past Occurrence

Many sources provided historical information regarding previous occurrences and losses associated with extreme temperature events throughout Delaware County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

Based on data from the Midwestern Regional Climate Center, Table 4.3.7-3 presents the number of extreme cold (minimum) and hot (maximum) temperature records for the weather stations located in Pennsylvania between December 6, 1949 and December 6, 2021 (MRCC 2021).

Table 4.3.7-3. Number of Days with a Recorded Extreme Temperature (1949-2021)

NWS Station	# Days Above 90°F (Hot)	# Days Below 0°F (Cold)
Marcus Hook	1289	3
Philadelphia Intl Airport	1432	16
Upper Darby	177	2

Source: MRCC 2021

Note: There may be some potential problems with the data collected at the stations. The values of the all-time records for stations with brief histories are limited in accuracy and could vary from nearby stations with longer records. Although the data sets have been through quality control, there is still a need for more resources to quality control extremes. The record sets are for single stations in the cooperative observer network and are limited to the time of operation of each station under one coop number. The records for a place may need to be constructed from several individual station histories. Some of the data may vary from NWS records due to NWS using multiple stations and additional sources like record books (MRCC, n.d.).

Between 1954 and 2021, Pennsylvania has not been included in major disaster (DR) or emergency (EM) declarations as a result of extreme temperatures (FEMA 2021). Agriculture-related disaster declarations are quite common. One-half to two-thirds of the counties in the United States have been designated as disaster areas in

each of the past several years. The U.S. Department of Agriculture (USDA) Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Delaware County has been included in three of these declarations between 2015 and 2021.

Table 4.3.7-4 summarizes extreme temperature events that occurred in Delaware County. Between 1950 and 2021, Delaware County has experienced 26 excessive heat events, all occurring after 2000. In the same time period, the county experienced three extreme cold events, all occurring after 2007 (NOAA NCDC 2021). However, details for all events were not readily available. As stated above, many sources were researched for historical information regarding extreme temperature events; however, the table below is not inclusive of every extreme temperature event that has impacted Delaware County.

Table 4.3.7-4. Extreme Temperature Events in Delaware County, 1996 to 2021

Date(s) of Event	Event Type	Description
March 31, 2000	Excessive Heat	The highest readings (all on the 8th) included 82 degrees in Crum Creek (Delaware County).
May 2, 2001	Excessive Heat	A very strong ridge of high pressure both at the surface and aloft coupled with the strong early May sun helped produce unseasonably warm and even some record breaking temperatures for early May across eastern Pennsylvania. High temperatures reached near or around 90 degrees from the 2nd through the 4th. A cold front moved through the state during the morning of the 5th and brought considerably cooler air back to the region. Highest temperatures included 94 degrees in Springfield Township (Delaware County).
February 5-6, 2007	Extreme Cold/Wind Chill	An arctic air mass that originated near the North Pole invaded eastern Pennsylvania. The combination of the unseasonably cold air and gusty northwest winds produced wind chill factors as low as zero to 10 degrees below zero during the mornings of the 5th and 6th around Philadelphia, around 10 degrees below zero in the Lehigh Valley and Berks County and around 20 degrees below zero in the Poconos. The lowest temperatures were in the single numbers across much of eastern Pennsylvania except for some below zero readings in the Poconos. The extreme cold caused many municipalities to declare Code Blue winter weather alerts. This sets into motion efforts by churches, local charitable organizations and outreach programs to open shelters and help assist getting the homeless indoors. Many pipes froze across the region and many vehicles had dead batteries. Firefighters had a particular difficult time battling blazes in these conditions as in some instances water froze in tanker trucks and fire hydrants froze. The extreme cold helped Pennsylvania Power and Light set a new hourly wintertime usage record.
June 26-28, 2007	Excessive Heat	The 1st heat wave of the season (loosely defined as three consecutive days with high temperatures of 90 degrees or higher) occurred across most of southeastern Pennsylvania from the 26th through the 28th. The hottest day with respect to both temperature and humidity occurred on the 27th as many high temperatures reached into the mid-90s and heat indices were as high as around 100°F.
July 8, 2007	Excessive Heat	A heat wave brought unseasonably hot weather to most of Eastern Pennsylvania on July 8th through the 10th. The highest temperatures were on the 9th and 10th and were mostly in the mid to upper 90s. The combination of the heat and humidity produced afternoon heat indices of around 100F both afternoons. Cloudiness that preceded a cold front on the 11th prevented most places from reaching 90°F again.
August 7-8, 2007	Excessive Heat	One of the hottest and most humid air masses of the summer affected the southeastern Pennsylvania on the 7th and most of eastern Pennsylvania on the 8th. Highest temperatures were well into the 90s in most areas. The 8th was the hottest day. In addition, dew point temperatures, especially on the 8th were as high as the mid to upper 70s. This produced afternoon heat indices as high as around 105°F on the 8th.
June 7-10, 2008	Excessive Heat	The most oppressive heat wave of the meteorological summer affected Eastern Pennsylvania from June 7th through the 10th. The combination of high temperatures well into the 90s and dew point temperatures in the 70s produced apparent

Date(s) of Event	Event Type	Description
		temperatures or heat indices values as high as around 105 in Philadelphia and 100 to 105 elsewhere in Eastern Pennsylvania. The highest apparent temperatures occurred on both the 7th and the 10th. The excessive heat also caused many heat related injuries across the state. Many cooling centers were opened to assist senior citizens. The heat also caused a few roadways to buckle. Schools were still in session. Many that did not have air conditioning dismissed children early on the 9th and 10th. A couple of schools cancelled classes. Some after school activities were cancelled outright; others were shifted to air-conditioned locations. The excessive heat caused some scattered and mainly localized power outages. There was about a 25 percent increase in vehicle distress calls. There was also a surge in purchases of air conditioners and pools. Some air conditioners were stolen from stores. Some public pools opened earlier than scheduled.
July 16-22, 2008	Excessive Heat	The longest heat wave of the summer affected eastern Pennsylvania from July 16th through the 22nd. The heat wave ended on the 22nd as thunderstorms kept temperatures below 90 degrees on the 23rd. A coldfront overnight then brought in drier air. High temperatures were mainly in the lower to mid-90s throughout the heat wave. The hottest days occurred on the 18th, 19th, or 20th. The combination of the temperatures and dew points produced apparent temperatures or heat indices of around 100F. In Delaware County, a heat information line was also opened and the hours of air-conditioned senior centers were expanded.
August 10, 2009	Excessive Heat	As an area of high pressure was located off the East Coast on the 10th, a hot and very humid air mass (dew points between 70 and 75 degrees was across the area. This resulted in peak heat indices at above the century mark. At the Philadelphia International Airport, the heat index topped out at 103 degrees. The high temperature on the 10th was 95 degrees, which was tied with August 21st as the hottest day of the year.
June 23-24, 2010	Excessive Heat	Unseasonably hot and humid weather enveloped southeastern Pennsylvania on the 23rd and 24th. It culminated on the 24th with maximum temperatures in the mid to upper 90s and afternoon heat indices of around 100F. For many places this was already hotter than the hottest day in all of 2009. The hot and humid weather ended abruptly with the passage of severe thunderstorms during the afternoon on the 24th.
June 27, 2010	Excessive Heat	High temperatures reached in the mid-90s (95 and 96 degrees respectively) on the 27th and 28th and combined with the humid air mass to produce afternoon heat indices of around 100F.
July 5-7, 2010	Excessive Heat	The hottest weather of the summer season occurred on July 5th through the 7th throughout Eastern Pennsylvania. Except for the Poconos, many high temperatures on the 6th and 7th exceeded 100 degrees, some places even on the 5th exceeded 100 degrees. Even in the Poconos, high temperatures approached 100 degrees on the 6th. For many areas, this was the 1st time since August of 2001 that high temperatures exceeded 100 degrees and also for two consecutive days. The hot weather started on the 4th and peaked on the 6th and 7th. Delaware County reported an approximate 20 percent increase in emergency room visits during the heat wave. It was so hot that children were getting burned on hot playground surfaces.
July 16, 2010	Excessive Heat	Another heat wave brought high temperatures into the upper 90s on the 16th and five days in a row of 90 plus temperatures to southeastern Pennsylvania. July 16th was the hottest and most humid day (afternoon heat indices of around 100F. There were two heat related deaths in Delaware County (an 81-year-old man in Havertown) and a 61-year-old man in Chester).
July 23-24, 2010	Excessive Heat	The last heat wave in July culminated with some of the highest heat indices of the summer on the 24th and numerous high temperatures in the mid to upper 90s in Berks County and southeastern Pennsylvania. The combination of the heat and humidity produced heat index values of around 105 degrees on the 24th. Delaware County opened cooling centers through the weekend of the 24th and 25th.
August 10-11, 2010	Excessive Heat	An up to four day heat wave across southeastern Pennsylvania culminated with high temperatures in the mid-90s and afternoon heat indices of around 100F on the 10th.
June 8-9, 2011	Excessive Heat	Unseasonably hot weather occurred on June 8th and 9th across Eastern Pennsylvania. Except for the higher terrain in the Poconos, high temperatures reached the mid to upper 90s both days with afternoon heat indices of between

Date(s) of Event	Event Type	Description
		100F and 105F. The 9th was the hottest day for most places. There were a few occurrences of heat exhaustion throughout the area.
July 12, 2011	Excessive Heat	A heat wave saw high temperatures reach 94 degrees. Other high temperatures from around southeastern Pennsylvania included 95 degrees in Pottstown (Montgomery County), 94 degrees in Reading (Berks County) and 93 degrees in Doylestown (Bucks County).
July 21, 2011	Excessive Heat	One of the most oppressive heat waves since mid-July 1995 enveloped Eastern Pennsylvania from July 21st through the 24th. The heat was responsible for 25 deaths, 22 within Philadelphia and dozens of heat related injuries. Many locations had high temperatures that reached into the 100s. This heat wave helped make July 2011 the 6th hottest July on record for the state of Pennsylvania with a statewide average temperature of 74.4 degrees.
June 20-22, 2012	Excessive Heat	Unseasonably hot weather that started on the 20th and persisted into the 22nd across extreme southeastern Pennsylvania resulted in high temperatures in the mid to upper 90s and afternoon heat indices of around 100 degrees.
June 29-30, 2012	Excessive Heat	An unseasonably hot and humid day produced high temperatures in the mid to upper 90s in Eastern Pennsylvania (except in the Poconos). Combined with the humidity levels, maximum hourly heat indices reached around 100F in the Lehigh Valley and around 105F in Berks County and Southeast Pennsylvania. While high temperatures on the 30th reached into the lower 90s, the derecho brought in slighter drier air in its wake.
July 4-7, 2012	Excessive Heat	Both excessive heat and more humidity returned to most of Eastern Pennsylvania starting on Independence Day and lasted until the 7th. High temperatures on the 2nd and 3rd were between 90 and 95 degrees in most places, but humidity levels were relatively low. High temperatures on the 4th reached the mid-90s and combined with more humidity produced afternoon hourly heat indices of near 100F. High temperatures on the 5th and 6th were in the mid to upper 90s, with similar afternoon heat indices. The heat and humidity peaked on the 7th with high temperatures around 100F and afternoon hourly heat indices between 102F and 108F.
July 17-18, 2012	Excessive Heat	Another unseasonably hot and humid air mass affected Eastern Pennsylvania on the 17th and 18th. High temperatures on the 17th reached into the mid to upper 90s in most places with afternoon heat indices near 100F. On July 18th, the combination of scorching high temperatures (near 100 degrees) and higher dew points produced hourly afternoon heat indices that reached between 106F and 111F.
July 6-7, 2013	Excessive Heat	The 1st run of hot weather that combined high temperatures in the 90s and more oppressive humidity levels affected southeastern Pennsylvania and Berks County on July 6th and 7th and the Lehigh Valley on July 7th. High temperatures reached into the lower to mid-90s both days and combined with dew points of around 70 degrees produced afternoon heat index values of around 100 degrees. High temperatures were about the same both days, but the 7th was slightly more humid. To combat the heat, many counties, cities, and municipalities opened cooling centers. The hours of air-conditioned senior citizen centers were extended. Highest temperatures included 93 degrees in Aston (Delaware County).
July 15-20, 2013	Excessive Heat	The most oppressive hot spell of the summer season affected Eastern Pennsylvania from July 15th through the 20th. Widespread high temperatures reached into the mid to upper 90s and the most oppressive days (combination of heat and humidity) occurred on the 18th and 19th. Morning lows those days were only around 80 degrees in highly urbanized areas. Afternoon heat indices reached 105 to 109 degrees in southeastern Pennsylvania and Berks County and 100 to 105 degrees elsewhere. The highest hourly heat index in Philadelphia was 107 degrees. Four roof workers suffered heat exhaustion while working on the roof of the Chichester Middle School in Delaware County, three had to be hospitalized. To combat the heat, many counties, cities, and municipalities opened cooling centers. The hours of air-conditioned senior citizen centers were extended. Delaware County also provided fans to senior citizens by the 22nd.
January 4, 2014	Extreme Cold/Wind Chill	A high-pressure system that moved over Pennsylvania coupled with fresh snow cover from the winter storm on the 2nd and 3rd gave the area one of its coldest winter mornings in years. This was the 1st of three arctic blasts in the state during the month. While this was the coldest morning of the winter for more rural areas that are normally colder on calm wind nights, it was not the harshest. Because the

Date(s) of Event	Event Type	Description
		high-pressure system was over the region, wind chill factors and actual air temperatures were nearly the same. This was not the case a few days later and again around the 22nd of January. Low temperatures on the morning of the 4th included 4 degrees in Havertown (Delaware County).
July 19-20, 2015	Excessive Heat	Unseasonably hot and humid weather affected most of Eastern Pennsylvania on the 19th and 20th except for the Poconos. High temperatures both days reached into the lower to mid-90s. The 19th was slightly hotter overall and had some of the highest heat indices of the summer. The combination of heat and humidity brought afternoon heat index values as high as 100F to 105F on the 19th. Highest temperatures included 92 degrees in Saint Davids (Delaware County).
July 1, 2018	Excessive Heat	Temperatures in the middle to upper 90s and dew points in the upper 60s to lower 70s led to excessive heat across portions of southeastern Pennsylvania. Heat indices reached 110 degrees at the Doylestown ASOS at 2 pm on July 3rd.
June 30, 2021	Excessive Heat	A multi-day excessive heat event occurred across much of the mid-Atlantic near the end of June 2021. High temperatures in the mid to locally upper 90s combined with dew points in the upper 60s to near 70 caused heat index values to reach 105 to 110 over much of the region.
August 11-13, 2021	Excessive Heat	A multi-day excessive heat event occurred across much of the mid-Atlantic from August 11-13, 2021. Temperatures in the mid to upper 90s combined with dew point values near 70 caused widespread heat index values near to above 105F on both August 11 and 12, and locally into the 13th before a cold front brought relief.

Sources: NOAA NCEI 2022; FEMA 2022

4.3.7.5 Probability of Future Occurrence

Extreme temperature events occur each year throughout Delaware County. It is estimated that the County will continue to experience temperature extremes annually that may induce secondary hazards such as potential snow, hail, ice or windstorms, thunderstorms, drought, human health impacts, utility failures, and transportation accidents.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of extreme temperature events for Delaware County. Information from NOAA NCEI storm events database and MRCC were used to identify the number of extreme temperature events that occurred between 1950 and 2019. Using these sources ensures the most accurate probability estimates possible. Table 4.3.7-5 shows these statistics as well as the annual average number of events and the estimated percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 11.54% chance of an extreme cold/wind chill event and a 100% chance of an extreme heat event occurring in any given year in Delaware County.

Table 4.3.7-5. Probability of Future Extreme Temperature Events

Hazard Type	Number of Occurrences Between 1996 and 2021	Rate of Occurrence or Annual Number of Events (average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in any given year	Percent chance of occurrence in any given year
Extreme Cold/Wind Chill	3	0.12	8.67	0.12	11.54%
Extreme Heat	28	1.12	0.93	1.08	100%

Sources: NOAA NCEI 2022

Based on available historical data, the future occurrence of extreme temperatures can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (Section 4.4).

4.3.7.6 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For the extreme temperature events, the entire county has been identified as the hazard area. Therefore, all assets in the county (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 2), are vulnerable. To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the wildfire hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time

Impact on Life, Health, and Safety

For the purposes of this HMP, the entire population of Delaware County is considered exposed to extreme temperature events. The County Profile (Section 2) of this HMP provides population statistics regarding each participating municipality and a summary of the more vulnerable populations (over the age of 65 and individuals living below the U.S. Census poverty threshold). According to the CDC, populations most at risk to extreme cold and heat events include the following: (1) the elderly, who are less able to withstand temperature extremes due to their age, health conditions, and limited mobility to access shelters; (2) infants and children up to 4 years of age; (3) individuals with chronic medical conditions (e.g., heart disease, high blood pressure); (4) low-income persons that cannot afford proper heating and cooling; and (5) the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events (CDC 2017a).

Meteorologists can accurately forecast extreme heat event development and the severity of the associated conditions with several days of lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations, implement short-term emergency response actions and focus on surveillance and relief efforts on those at greatest risk. Adhering to extreme temperature warnings can significantly reduce the risk of temperature-related deaths.

A heat wave that lasts for an extended period of time can affect the power supply for a region as the demand for energy to run air conditioning is too high for the supply. This can lead to rolling brownouts and even blackouts, further endangering people's health.

According to the 2019 ACS 5-Year Population Estimate, around 16 percent of the population in Delaware County is 65 and over. Section 2 (County Profile) displays the densities of populations over 65 in Delaware County. People experiencing homelessness and residents with low incomes may not have access to housing or their housing may be less able to withstand extreme temperatures (e.g., homes with poor insulation and heating supply or poor cooling systems). Section 2 (County Profile) also displays the densities of low-income populations in Delaware County.

The range of these impacts, especially health effects, can be mitigated through improved forecasts, warnings, community preparedness, and appropriate community-based response. While air conditioning is the most immediate method to cool homes and buildings, new green building techniques can also be utilized to reduce the effects of high temperatures. Planting shade trees along streets and near homes and buildings has been proven to reduce the ambient air temperature, especially in urban areas with a large amount of asphalt. Additionally, the use of green roofs on large flat-roofed buildings should be encouraged. Vegetation on these roofs is aesthetically pleasing and, like shade trees, helps to counteract the effects of the urban heat sink (Delaware HMP 2016).

It is important that communities have plans in place to help vulnerable populations during an extreme heat or extreme cold events. Communities should make their local government buildings available to the public during the heat of the day or during the cold. They should also communicate with their residents regarding steps they can take to keep cool and warning signs of health-related problems due to the high or low temperatures (Delaware HMP 2016).

In urban areas where the asphalt and roofs can become heat sinks, residents should be urged to plant trees that will shade homes and help absorb heat. Additionally, where applicable, green roofs should be used. These techniques have been shown to greatly reduce ambient air temperatures in highly developed urban and suburban areas. (Delaware HMP 2016)

Impact on General Building Stock

All of the building stock in the county is exposed to the extreme temperature hazard. Refer to Section 2, which summarizes the building inventory in Delaware County. Extreme heat generally does not impact buildings. Losses may be associated with the overheating of heating, ventilation, and air conditioning (HVAC) systems. Extreme cold temperature events can damage buildings through freezing/bursting pipes and freeze/thaw cycles. Additionally, manufactured homes (mobile homes) and antiquated or poorly constructed facilities may have inadequate capabilities to withstand extreme temperatures.

Impact on Critical Facilities

All critical facilities in the county are exposed to the extreme temperature hazard. Impacts to critical facilities are the same as described for general building stock. Additionally, it is essential that critical facilities remain operational during natural hazard events. Extreme heat events can sometimes cause short periods of utility failures, commonly referred to as "brownouts," due to increased usage from air conditioners and other appliances. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can cause power interruption as well. Backup power is recommended for critical facilities and infrastructure.

Impact on the Economy

Extreme temperature events also have impacts on the economy, including loss of business function and damage/loss of inventory. Business owners may be faced with increased financial burdens due to unexpected repairs caused to the building (e.g., pipes bursting), higher than normal utility bills or business interruption due to power failure (i.e., loss of electricity, telecommunications).

The agricultural industry is most at risk in terms of economic impact and damage due to extreme temperature events. Extreme heat events can result in drought and dry conditions and directly impact livestock and crop production. Based on the 2017 Census of Agriculture, 61 farms were operating in Delaware County, with a total of 2,385 acres of farmland. The average farm size was 39 acres. Delaware County's farms had an average market value of products sold per farm of $562,808 (USDA 2017).

An extreme heat event could result in drought conditions and have a serious impact on a community. During an extreme temperature event, water and electricity will likely be in increased demand, which may lead to shortages and a higher cost for these resources.

Impact on the Environment

Temporary periods of extreme hot or cold temperatures typically do not have significant environmental impacts but have serious health impacts, especially in urban areas experiencing the heat island effect. However, prolonged periods of hot temperatures could be associated with drought conditions and can damage or destroy

vegetation, dry up rivers and streams, and reduce water quality. Prolonged exposure to extremely cold temperatures can kill wildlife and vegetation (PEMA 2018).

Extreme temperature events are also known to have an impact on utilities. In times of extreme heat, increased use of air conditioners can overload existing utility grids and spur localized or regionalized brownouts. Extreme cold events, especially when coupled with severe winter weather, can cause utility pipes to burst and interrupt the distribution of utilities. Prolonged extreme temperature events can also spur fuel shortages. The impact of extreme temperatures on utilities will depend on the overall use and duration of the event (PEMA 2018).

Future Growth and Development

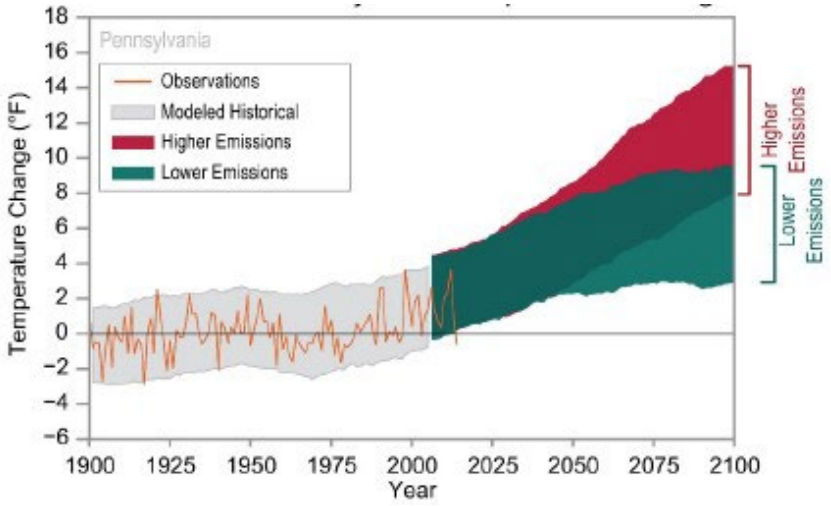
Areas targeted for potential future growth and development within the next five years have been identified across Delaware County and are discussed in Section 2.4 of this HMP. Any areas of growth could be potentially impacted by the extreme temperature hazard because the entire county is exposed and potentially vulnerable.

Effect of Climate Change on Vulnerability

Climate is defined not simply as average temperature and precipitation but also by the type, frequency, and intensity of weather events. Both globally and at the local scale, climate change has the potential to alter the prevalence and severity of extremes such as extreme temperature events. While predicting changes of extreme temperature events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society and the environment (U.S. Environmental Protection Agency [EPA] 2006).

Focusing on Pennsylvania, Figure 4.3.7-3 shows the observed (around 2°F since the beginning of the 20th century) and projected temperature change for a low and high emissions scenario. Much of the warming has been in the winter and spring, along with an increase in the number of warm nights (minimum temperature above 70°F) and decrease in number of cold nights (minimum temperature below 0°F) (Frankson et al. 2017). The annual mean temperature change across the state is projected to be 5.9 to 6.3°F (3.3 to 3.5°C) temperature by 2041–2070 relative to 1971–2000 as modeled by the CMIP5, statistically downscaled. With these changes, Philadelphia will have temperatures similar to historical Richmond, VA, while Pittsburgh will resemble Washington, DC (Shortle et al. 2015). There is not significant variation with season. It is *highly likely* that extreme temperatures will occur in the future (PA HMP 2019).

Figure 4.3.7-3. Observed and Projected Temperature Change in Pennsylvania



Source: PA HMP 2019, Frankson et al., 2017

Additional Data and Next Steps

For future plan updates, the county can track data on extreme temperature events and obtain additional information on past and future events, particularly in terms of any injuries, deaths, shelter needs, pipe freeze, agricultural losses, and other impacts. This will help to identify any concerns or trends for which mitigation measures should be developed or refined. In time, quantitative modeling of estimated extreme heat and cold events may be feasible as data are gathered and improved.

4.3.8 Flood, Flash Flood, Ice Jam

This section provides a profile and vulnerability assessment of the flood, flash flood, and ice jam hazard in Delaware County. Floods are one of the most common natural hazards in the United States and are the most prevalent type of natural disaster occurring in Pennsylvania. Over 94 percent of the Commonwealth's municipalities have been designated as flood-prone areas. Both seasonal and flash floods have been causes of millions of dollars in annual property damage, loss of lives, and disruption of economic activities (Pennsylvania Emergency Management Agency [PEMA] 2019).

The Federal Emergency Management Agency (FEMA) definition of flooding is "a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from the overflow of inland or tidal waters or the rapid accumulation of runoff of surface waters from any source" (FEMA 2015a).

Most floods fall into three categories: riverine, coastal, and shallow (FEMA 2015a). Other types of floods may include ice jam floods, flash floods, stormwater floods, alluvial fan floods, dam failure floods, and floods associated with local drainage or high groundwater (as indicated in the previous flood definition). For the purpose of this plan and as deemed appropriate by the Planning Team, riverine, flash, ice jam, and stormwater flooding are the main flood types of concern for Delaware County. These types of floods are further discussed below. Flooding caused by dam failure is addressed in Section 4.3.2 of this plan.

Riverine Floods

Riverine floods are the most common flood type and occur along a channel. Channels are defined features on the ground that carry water through and out of a watershed. They may also be called rivers, creeks, streams, or ditches. When a channel receives too much water, the excess water flows over its banks and inundates low-lying areas. These floods usually occur after heavy rains, heavy thunderstorms, or snowmelt, and can be slow or fast-rising, and generally develop over a period of hours to days (FEMA 2015a, Illinois Association for Floodplain and Stormwater Management 2006).

Flash Floods

According to the National Weather Service (NWS), flash floods are a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within 6 hours of the causative event (e.g., intense rainfall, dam failure, or ice jam) (NWS 2015).

Flash floods can occur very quickly and with very little warning. This type of flood can be deadly because it produces rapid rises in water levels and has devastating flow velocities. Urban areas are more susceptible to flash floods because a high percentage of the surface area is impervious (Pennsylvania Emergency Management Agency [PEMA] 2018). The elapsed time before flash flooding occurs may vary in different parts of the country. Ongoing flooding can intensify to flash flooding, where intense rainfall results in a rapid surge of rising flood waters (NWS 2015). A flash flood can have a dangerous wall of roaring water that carries rocks, mud, and other debris and can sweep away most things in its path. Flash floods usually result from intense storms dropping large amounts of rain within a brief period with little or no warning and can reach their peak within only a few minutes. They normally occur in the summer during the thunderstorm season. The most severe flooding conditions usually occur when direct rainfall is augmented by snowmelt. If the soil is saturated or frozen, stream flow may increase because of inability of the soil to absorb additional precipitation (FEMA 2008).

Ice Jam Floods

An ice jam is an accumulation of ice that acts as a natural dam and restricts flow of a body of water. Ice jams occur when warm temperatures and heavy rains cause rapid snow melt. The melting snow, combined with the heavy rain, causes frozen rivers to swell. The rising water breaks the ice layers into large chunks, which float downstream and often pile up near narrow passages and obstructions (bridges and dams). Ice jams may build up to a thickness great enough to raise the water level and cause flooding (Northeast States Emergency Consortium [NESEC] Date Unknown, U.S. Army Corps of Engineers [USACE] 2002).

Ice jams are of two different types: freeze-up and breakup. Freeze-up jams occur in the early to mid-winter when floating ice may slow or stop due to a change in water slope as it reaches an obstruction to movement. Breakup jams occur during periods of thaw, generally in late winter and early spring. The ice cover breakup is usually associated with a rapid increase in runoff and corresponding river discharge caused by a heavy rainfall, snowmelt, or warmer temperatures (USACE 2002).

Stormwater and Shallow Flooding

Stormwater flooding described below is caused by local drainage issues and high groundwater levels. Heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable channels. According to PEMA, since 1993, 96 percent of flooding reported to the NWS in Pennsylvania occurred outside of the 100-year floodplain (PEMA 2019).

If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems. During winter and spring, frozen ground and snow accumulations may contribute to inadequate drainage and localized ponding. Flooding issues of this nature generally occur in areas with flat gradients and generally increase with urbanization, which speeds the accumulation of floodwaters because of impervious areas. Shallow street flooding can occur unless channels have been improved to account for increased flows (FEMA 1997).

High groundwater levels can be a concern and cause problems even without surface flooding. Basements are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while elsewhere high groundwater occurs only after long periods of above-average precipitation (FEMA 1997).

Urban drainage flooding is caused by increased water runoff due to urban development and drainage systems. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. They make use of a closed conveyance system that channels water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than those prior to development in that area (FEMA 2007).

4.3.8.1 Location and Extent

Flooding in Pennsylvania is typically associated with abnormally high and intense rainfall amounts. It can also be caused by sudden snowmelt, landslides, or dam failures. In Pennsylvania, flooding usually occurs in the summer; however, it has occurred during the winter months as well.

Floodplains are found in lowland areas adjacent to rivers, streams, creeks, lakes, or other bodies of water that become inundated during a flood. The size of a floodplain depends on the recurrence interval of a given flood. A 1 percent annual chance floodplain is smaller than the floodplain associated with a flood that has a 0.2 percent annual chance of occurring (PEMA 2018). Floodplain maps of each Delaware County jurisdiction are available

at the end of this profile. These maps show locations of both the 1 percent chance annual floodplain and the 0.2 percent chance annual floodplain.

Delaware County is located in the lower Delaware River Basin. The major creeks within the county include the Brandywine, Chester, Ridley, Crum, Darby, Cobbs, Naamans, and Marcus Hook Creeks. Delaware County is flood-prone because of the generally flat terrain and because most of the communities are located along streams and river valleys. In addition, community development of the floodplain has resulted in frequent flooding. For inland areas, excess water from snowmelt or rainfall accumulates and overflows onto stream banks and adjacent floodplains.

All municipalities in Delaware County contain flood-prone areas because they are located along streams, creeks, or lakes. In addition, community development of the floodplain has resulted in frequent flooding. For inland areas, excess water from snowmelt or rainfall accumulates and overflows onto stream banks and adjacent floodplains.

Table 4.3.8-1 lists total land areas within the 1 percent and 0.2 percent annual chance flood zones calculated via a spatial analysis referencing the 2017 Digital Flood Insurance Rate Map (DFIRM).

Table 4.3.8-1. Total Land Areas in the 1 Percent and 0.2 Percent Annual Chance Flood Zones (Acres)

Jurisdiction	NFIP-Participating Community	Total Area (acres)	1% Flood Event Hazard Area		0.2% Flood Event Hazard Area	
			Area (acres)	% of Total	Area (acres)	% of Total
Aldan (B)	Yes	381	7	1.8%	8	2.0%
Aston (Twp)	Yes	3,729	219	5.9%	249	6.7%
Bethel (Twp)	Yes	3,457	50	1.4%	53	1.5%
Brookhaven (B)	Yes	1,089	50	4.6%	64	5.8%
Chadds Ford (Twp)	Yes	5,554	401	7.2%	433	7.8%
Chester City (C)	Yes	3,109	448	14.4%	644	20.7%
Chester (Twp)	Yes	910	76	8.3%	97	10.6%
Chester Heights (B)	Yes	1,420	78	5.5%	90	6.4%
Clifton Heights (B)	Yes	402	27	6.6%	31	7.8%
Collingdale (B)	Yes	555	23	4.2%	24	4.3%
Colwyn (B)	Yes	166	66	39.4%	73	43.9%
Concord (Twp)	Yes	8,675	238	2.7%	283	3.3%
Darby (B)	Yes	537	69	12.9%	84	15.7%
Darby (Twp)	Yes	892	113	12.6%	141	15.8%
East Lansdowne (B)	Yes	132	0	0.0%	0	0.0%
Eddystone (B)	Yes	673	185	27.5%	338	50.3%
Edgmont (Twp)	Yes	6,196	349	5.6%	355	5.7%
Folcroft (B)	Yes	755	211	27.9%	240	31.8%
Glenolden (B)	Yes	623	52	8.3%	52	8.3%
Haverford (Twp)	Yes	6,364	295	4.6%	345	5.4%
Lansdowne (B)	Yes	754	26	3.4%	33	4.4%

Jurisdiction	NFIP-Participating Community	Total Area (acres)	1% Flood Event Hazard Area		0.2% Flood Event Hazard Area	
			Area (acres)	% of Total	Area (acres)	% of Total
Lower Chichester (Twp)	Yes	694	16	2.4%	18	2.6%
Marcus Hook (B)	Yes	725	113	15.5%	221	30.5%
Marple (Twp)	Yes	6,531	261	4.0%	275	4.2%
Media (B)	Yes	485	7	1.5%	7	1.5%
Middletown (Twp)	Yes	8,591	421	4.9%	475	5.5%
Millbourne (B)	Yes	46	9	18.4%	12	25.4%
Morton (B)	Yes	229	15	6.5%	19	8.1%
Nether Providence (Twp)	Yes	3,028	236	7.8%	252	8.3%
Newtown (Twp)	Yes	6,367	227	3.6%	238	3.7%
Norwood (B)	Yes	504	48	9.6%	57	11.4%
Parkside (B)	Yes	132	2	1.2%	2	1.8%
Prospect Park (B)	Yes	474	20	4.2%	32	6.7%
Radnor (Twp)	Yes	8,813	560	6.4%	598	6.8%
Ridley (Twp)	Yes	3,261	327	10.0%	440	13.5%
Ridley Park (B)	Yes	689	35	5.0%	41	6.0%
Rose Valley (B)	Yes	469	42	8.9%	47	10.0%
Rutledge (B)	No	91	1	1.3%	3	2.9%
Sharon Hill (B)	Yes	491	33	6.7%	44	9.0%
Springfield (Twp)	Yes	4,054	178	4.4%	198	4.9%
Swarthmore (B)	Yes	897	50	5.6%	52	5.8%
Thornbury (Twp)	Yes	5,860	279	4.8%	341	5.8%
Tinicum (Twp)	Yes	3,639	1,930	53.0%	2,786	76.6%
Trainer (B)	Yes	677	153	22.6%	193	28.5%
Upland (B)	Yes	414	62	15.0%	83	20.0%
Upper Chichester (Twp)	Yes	4,278	227	5.3%	254	5.9%
Upper Darby (Twp)	Yes	5,004	317	6.3%	380	7.6%
Upper Providence (Twp)	Yes	3,553	178	5.0%	189	5.3%
Yeadon (B)	Yes	1,024	75	7.3%	93	9.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**N/A**	**117,395**	**8,802**	**7.5%**	**10,988**	**9.4%**

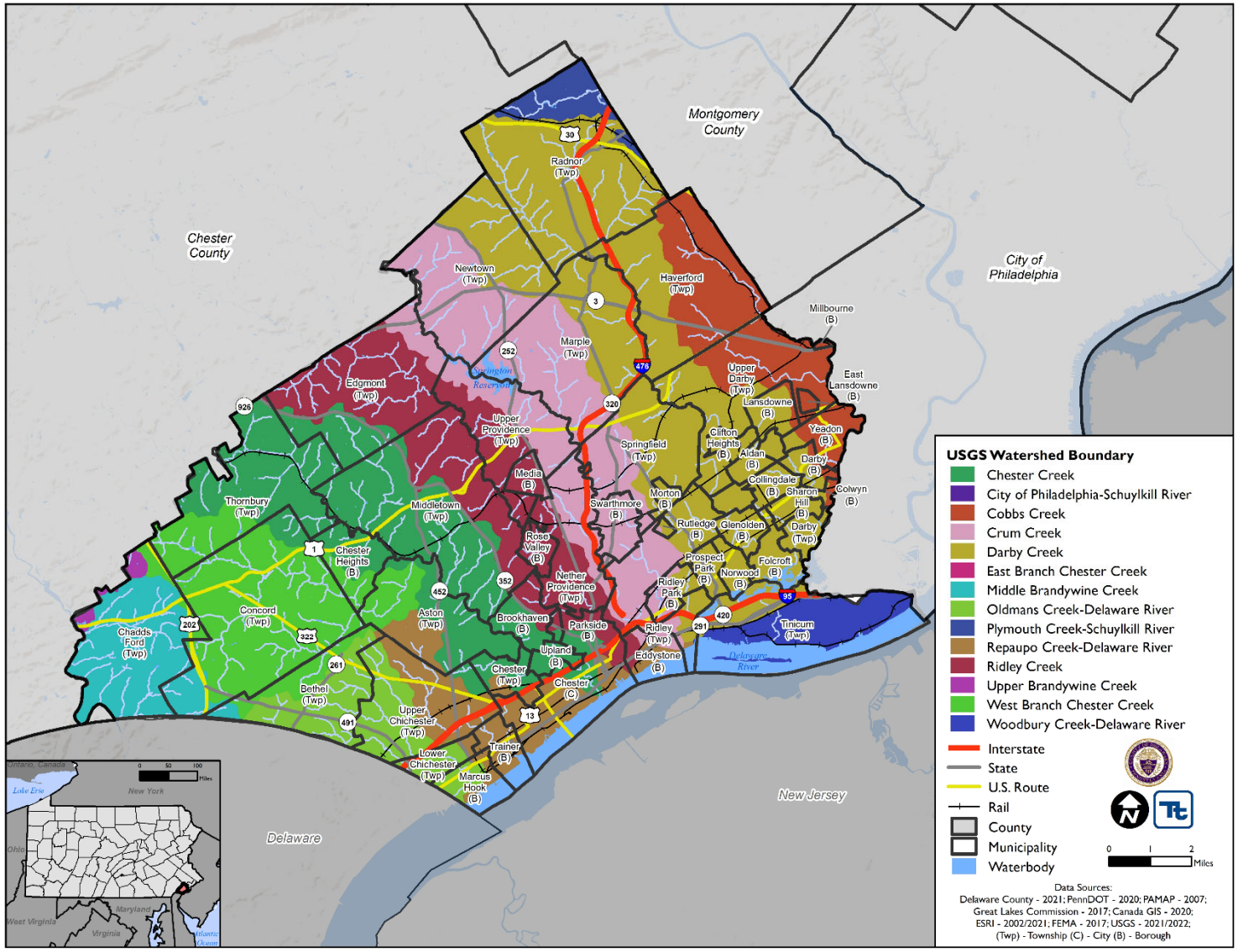
Source: Delaware County 2021/2022; FEMA 2017; PAMAP 2007; USGS 2016; ESRI 2000
Note: Areas listed also include inland waterways

In accordance with the 1978 Pennsylvania Stormwater Management Act (Act 167), counties are required to prepare stormwater management plans on a watershed-by-watershed basis; these plans provide for improved management of stormwater impacts associated with land development. In Delaware County, ordinances from plans developed in 2005 or later can also be used to satisfy NPDES II/MS4 Program requirements. The Crum Creek model ordinance is the most recent, and it has been adapted for use by most municipalities in the county.

Many Darby and Cobbs Creek municipalities continue to use the Darby-Cobbs ordinance as it still complies with the MS4 requirement.

Figure 4.3.8-1 shows PADEP-designated watersheds in Delaware County.

Figure 4.3.8-1. Watersheds in Delaware County, Pennsylvania



The 2017 FEMA Flood Insurance Study (FIS) for Delaware County also documents the major flooding problems in the county. According to the report, flooding is not a widespread problem for the county; this may be attributable to the physical features of the watersheds and stream channels. In addition, local residents have limited development in low-lying stream banks and floodplains (FEMA 2016).

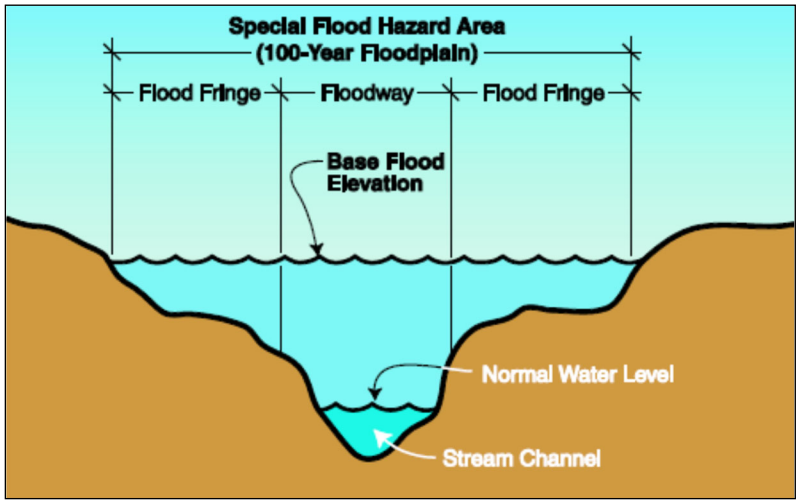
FEMA Regulatory Flood Zones

According to FEMA, flood hazard areas are defined as areas on a map shown to be inundated by a flood of a given magnitude. These areas are determined by statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. Flood hazard areas are delineated on FEMA's Flood Insurance Rate Maps (FIRM), which are official maps of a community on which the Federal Insurance and Mitigation Administration has delineated both Special Flood Hazard Areas (SFHA) and the risk premium zones applicable to the community. These maps identify SFHAs, location of a specific property in relation to the SFHA, the base flood elevation (BFE) (1 percent annual chance) at a specific site, the magnitude of a flood hazard within a specific area, undeveloped coastal barriers where flood insurance is not available, and regulatory floodways and floodplain boundaries (1 percent and 0.2 percent annual chance floodplain boundaries) (FEMA 2003, 2005, and 2008). Delaware County's FIRMs can be accessed online via the FEMA Flood Map Service Center (https://msc.fema.gov/portal).

The SFHA on a FIRM consists of the land area covered by flood waters of the base flood. It is the area where the NFIP's floodplain management regulations must be enforced, and the area where mandatory purchase of flood insurance applies. This regulatory boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities because many communities have maps showing the extent of the base flood and the depths that could occur.

The 1 percent annual chance flood is referred to as the base flood. As defined by NFIP, the BFE on a FIRM is the elevation of a base flood event, or a flood that has a 1 percent chance of occurring in any given year. The BFE describes the exact elevation of the water that will result from a given discharge level, which is one of the most important factors used in estimating potential damage within a given area. The flood fringe, is described as the remaining portion of the floodplain. A structure within a 1 percent annual chance floodplain has a 26 percent chance of undergoing flood damage during the term of a 30-year mortgage. The 1 percent annual chance flood is a regulatory standard used by federal agencies and most states to administer floodplain management programs. The 1 percent annual chance flood is used by NFIP as the basis for insurance requirements nationwide. FIRMs also depict 0.2 percent annual chance flood designations (FEMA 2016). Figure 4.3.8-2 depicts the SFHA, the BFE, the flood fringe, and the floodway areas of a floodplain for the 1 percent annual chance flood.

Figure 4.3.8-2. Floodplain Illustration

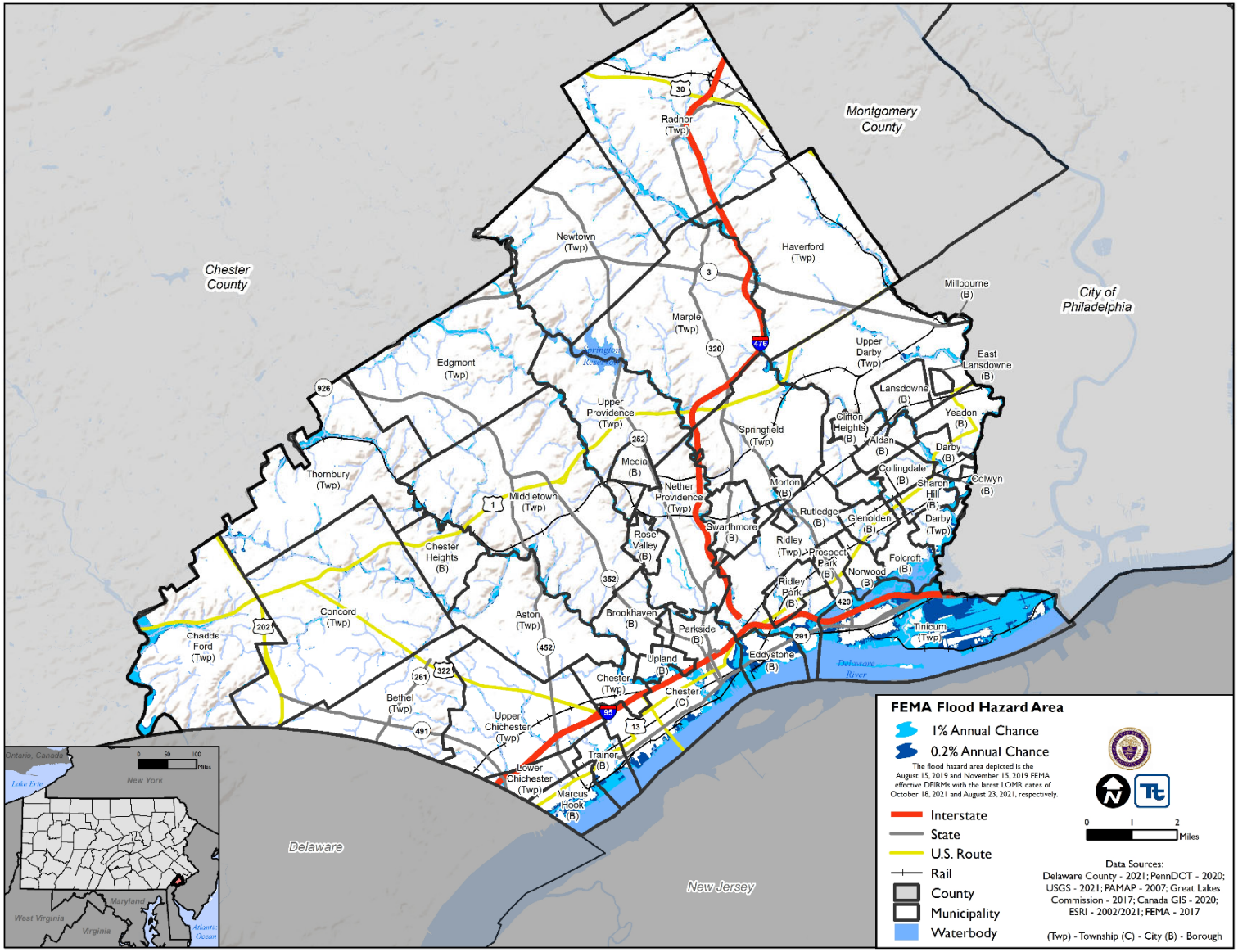


Source: PEMA 2019

The SFHA serves as the primary regulatory boundary used by FEMA and Pennsylvania. Digitized Flood Insurance Rate Maps (DFIRMs), FIRMs, and other flood hazard information can be referenced to identify the expected spatial extent of flooding from a 1 percent annual chance event and 0.2 percent annual chance event.

At the time this plan was written, the March 2017 DFIRMs were considered the best available and were used for the risk analysis. Figure 4.3.8-3 illustrates NFIP flood zones in Delaware County. Maps of each municipality's flood zones are shown at the end of this profile.

Figure 4.3.8-3. FEMA Flood Hazard Areas in Delaware County



While the FIRMs provide a creditable source to document extent and location of the flood hazard, accuracy of data reflected on these maps has limitations. Notably, FIRMs are based on existing hydrological conditions at the time of map preparation. FIRMs are not set up to account for possible changes in hydrology over time.

Flood Insurance Study

In addition to FIRMs and DFIRMs, FEMA also provides FIS of entire counties and individual jurisdictions. These studies aid in administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. They are narrative reports of countywide flood hazards, including descriptions of flood areas studied and engineered methods used, principal flood problems, flood protection measures, and graphic profiles of flood sources (FEMA 2016). The countywide FIS for Delaware County was last completed in 2017, at the same time as the DFIRM revisions.

Ice Jam Hazard Areas

Ice jams are common in northeastern United States, and the Commonwealth of Pennsylvania is not an exception. The ice jam database, maintained by the Ice Engineering Group at the USACE Cold Regions Research and Engineering Laboratory (CRREL) currently consists of over 26,000 records from across the United States. According to the USACE-CRREL, Delaware County has not been impacted by ice jam incidents between 1784 and 2021 (USACE 2022). Historical events are further mentioned in the "Previous Occurrences" section of this hazard profile.

4.3.8.2 Range of Magnitude

Both localized and widespread floods are considered hazards when people and property are affected. Injuries and deaths can occur when people are swept away by flood currents, or bacteria and disease are spread by moving or stagnant flood waters. Most property damage results from inundation by sediment-filled water. A large amount of rainfall over a short period of time can result in flash floods. Small amounts of rain can cause flooding in areas with frozen soil or saturated soils from a previous event, or if the rain is concentrated in areas with impervious surfaces (PEMA 2018).

Several factors determine severity of floods, including intensity and duration, topography, ground cover, and rate of snowmelt. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. Many areas in Pennsylvania have relatively steep slopes that promote quick surface water runoff. Most storms track from west to east; however, some originate in the Great Lakes or the Atlantic Ocean (PEMA 2018).

Rainfall in Pennsylvania is about average for the eastern United States. Amounts of precipitation can be divided into the following six categories:

- Very light rain – precipitation rate of <0.01 inch per hour
- Light rain – precipitation rate between 0.01 inch and 0.04 inch per hour
- Moderate rain – precipitation rate between 0.04 inch and 0.16 inch per hour
- Heavy rain – precipitation rate between 0.16 inch and 0.63 inch per hour
- Very heavy rain – precipitation rate between 0.63 inch and 2 inches per hour
- Extreme rain – precipitation rate greater than 2 inches per hour (PEMA 2018)

Severity of a flood depends not only on the amount of water that accumulates within a period of time but also on the land's ability to manage this water. One element is the size of rivers and streams in an area, but an equally important factor is the land's absorbency. When it rains, soil acts as a sponge. When the land is saturated or

frozen, infiltration into the ground slows, and any more water that accumulates must flow as runoff (Harris 2008).

In the case of riverine or flash flooding, once a river reaches flood stage, the flood extent or severity categories used by NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat:

- Minor Flooding – minimal or no property damage, but possibly some public threat or inconvenience.
- Moderate Flooding – some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding – extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary (NWS 2011).

In Delaware County, there are seasonal differences in how floods are caused. In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snow pack throughout contributing watersheds, although the snow pack is generally moderate during most winters. Winter floods also have resulted from runoff of intense rainfall on frozen ground, and local flooding has been exacerbated by ice jams in streams and creeks. Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream stage will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur. Flood events caused by ice jams are limited primarily to the Delaware River. According to the Delaware County Department of Emergency Services, the Delaware River near Delaware County and Philadelphia does experience ice jams; however, the Coast Guard and Army Corps of Engineers work to break the ice in the river in order to keep the Philadelphia port open. The Delaware County Department of Emergency Services reports that in the past, some smaller marinas in Delaware County municipalities and mouths of some creeks experience ice jams, but without much consequence. However, on several occasions conditions have been right to cause flooding. Specific data on ice jam incidents in the County is not available from the Delaware County Department of Emergency Services or the National Climatic Data Center (NCDC).

Summer floods have occurred from intense rainfall on dry hard-packed or previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time have also produced flash flooding. In addition, the county has been experiencing more intense rainfall from tropical storms and hurricanes in late summer and early fall. An end-of-summer flood caused a worst-case scenario flash flood on September 16, 1999, when Hurricane Floyd battered Eastern Pennsylvania, causing Delaware County to be declared a disaster area. During this flood, a 67-year-old man drowned in Darby Borough while delivering pizzas. About 1,000 people were evacuated, and 3,500 homes were flooded. Storm event totals for the County averaged eight to 12 inches of rainfall. Property damage resulting from this flood was 15 million dollars. More recently, Delaware County experienced extreme flooding due to the remnants of Hurricane Ida during the period of August 31 to September 5, 2021. A Major Disaster Declaration was declared for Delaware County which opened financial assistance for affected individuals and businesses. Following Ida's impact on Delaware County FEMA had received over 600 applications for Individual Assistance. Extreme flooding occurred in Chadds Ford where they set a new record flood level of 21 feet, four feet over Hurricane Floyd.

4.3.8.3 Past Occurrence

Delaware County has a long history of flooding events. While flooding is often localized to streets and small neighborhoods, the county has historically experienced periodic storm events that affect multiple communities over a large area. Past building practices often resulted in homes being constructed in the FEMA-designated

floodplains, exacerbating flooding problems within certain communities. Of the types of flooding that occur in the county, flash flooding is the most common.

Major creeks within the county include the Brandywine, Chester, Ridley, Crum, Darby, Cobbs, Naamans, and Marcus Hook Creeks, each of which experiences varying degrees of flood events. The lower portions of the Darby and Cobbs Creeks experience significant flooding problems during heavy rainstorms. In 1999, during Hurricane Floyd, Darby Borough experienced devastating flooding to homes and businesses along Darby Creek. Flood damage resulted in 43 homes being declared uninhabitable. These structures were later purchased by FEMA and razed, creating open space in the floodplain. More recently, Darby Creek and its tributaries, in overflowed their banks during Tropical Storm Isaias in August 4, 2020. Hundreds of properties damage from the flash flood event. During a storm in 1971, flooding was so severe that 130 businesses and 770 homes were damaged. Due to this continuing problem, Upland Borough has initiated studies that explore ways to minimize flooding along the creek. The Township of Chester, which is upstream from Upland Borough, also suffers from recurrent flooding of Chester Creek in an area known as Toby Farms. The obstruction of the Creek by the bridges spanning Chester Creek in Upland Borough contributes to the extensive flooding in the Toby Farms area.

USGS Stream Gage Data monitors conditions at Brandywine Creek at Chadds Ford, Chester Creek at Chester, Crum Creek at Newtown Square, and Ridley Creek at Media. The NWS uses flood categories as forecast points that describe the severity of flood impacts in the river/stream reach. Table 4.3.8-2 summarizes the flood categories in feet at each of these gages. Table 4.3.8-3 summarizes the top historic crests at these locations.

Table 4.3.8-2. Flood Categories at the Brandywine Creek at Chadds Ford (CDFP1), Schuylkill River at Pottstown (PTNP1), and East Brandywine Creek Below Downingtown (DWNP1) Gages

Flood Category	Flood Category Definition	Chester Creek at Chester (in feet)	Crum Creek at Newtown Square (in feet)	Ridley Creek at Media (in feet)	Brandywine Creek at Chadds Ford, PA (in feet)
Major Flood Stage	Life-threatening and extensive inundation of structures and roads; significant evacuations are expected at this stage.	14	N/A	N/A	13
Moderate Flood Stage	Inundation of buildings usually begins at this stage; roads are likely to be closed and some areas cut off (evacuations may be necessary).	10	N/A	N/A	11
Flood Stage	Gage height above which a rise in water surface level begins to create a hazard to lives, property or commerce; issuance of flood warnings is linked to flood stage.	8	N/A	N/A	9
Action Stage	Level where the NWS needs to take some type of mitigation action in preparation for possible significant hydrologic activity.	7	N/A	N/A	8

Source: NWS 2022
Note: N/A - Not available

Table 4.3.8-3. Historic Crests at Brandywine Creek at Chadds Ford, Chester Creek at Chester, Crum Creek at Newtown Square, and Ridley Creek at Media

Chester Creek at Chester		Crum Creek at Newtown Square		Ridley Creek at Media		Brandywine Creek at Chadds Ford	
Feet	Date	Feet	Date	Feet	Date	Feet	Date
24.60	09/13/1971	13.06	10/01/2010	15.10	09/16/1999	21.04	09/02/2021
19.55	09/16/1999	11.99	09/16/1999	13.31	08/28/2011	17.15	09/17/1999
17.54	10/01/2010	11.20	09/28/2004	12.80	09/29/2004	16.56	06/22/1972
17.38	08/08/2020	10.95	08/13/2018	11.72	08/04/2020	16.05	05/01/2014
17.10	08/04/2020	9.83	06/20/2019	9.93	01/28/1994	15.23	08/28/2011
16.43	09/29/2004	9.62	10/19/1996	9.74	04/30/2014	15.00	03/05/1920
16.21	11/25/1950	9.55	04/30/2014	8.60	06/20/2003	14.80	08/09/1942
15.76	08/28/2011	9.40	08/13/2013	8.55	10/29/2012	14.70	08/04/1915
15.52	10/01/2010	9.37	01/28/1994	8.50	04/02/2005	14.64	08/19/1955
14.65	06/20/2003	9.32	04/02/2005	8.24	08/07/2019	14.35	01/25/1979
13.88	08/05/1989	8.99	12/17/2000	8.19	03/22/2000	14.32	08/05/2020

Source: NWS 2020

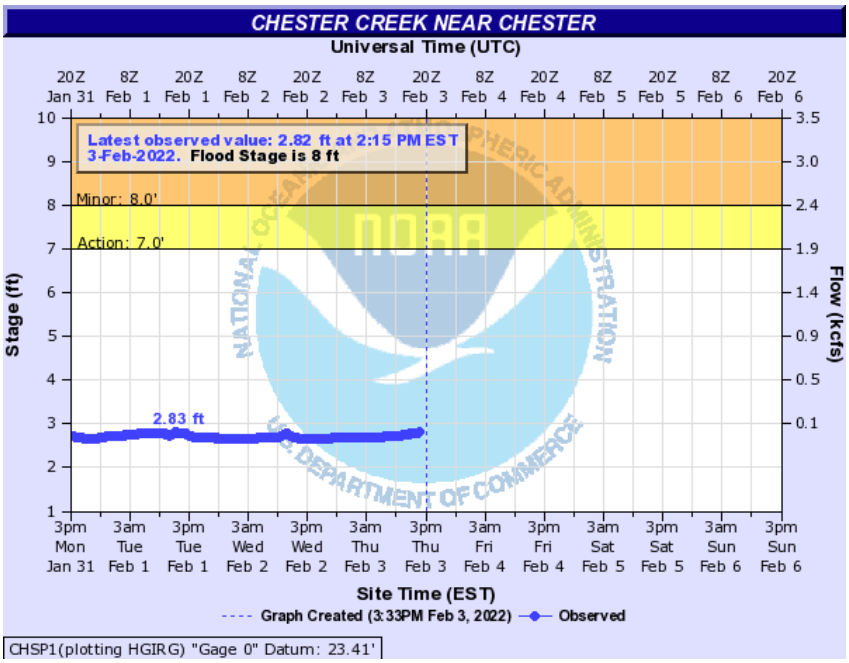
Water Level Data

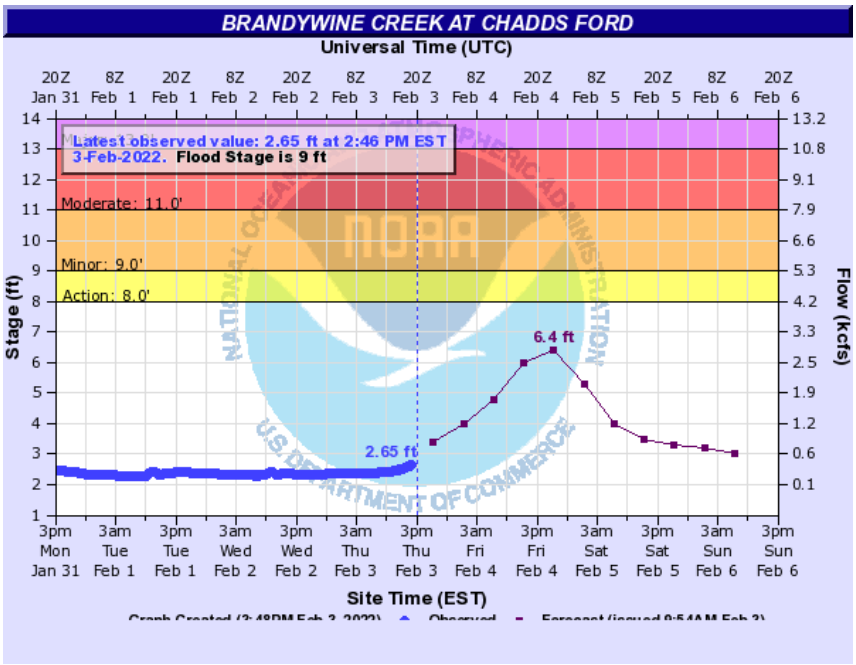
A hydrograph shows how a water level changes over time at a specific location to enable a review of historic water levels, which are useful in floodplain management planning. In Delaware County, there are four stream gages. These forecast hydrographs are useful to reference when flooding is expected or to determine the observed water level for the past few days. The hydrographs for Brandywine Creek at Chadds Ford, Chester Creek at Chester, Crum Creek at Newtown Square, and Ridley Creek at Media provide water levels for the action, minor flooding, moderate flooding, and major flooding stages. They also display the flood of record (or the highest recorded water level) for the specific gage. These stages are defined as follows:

- Action Stage - the stage which, when reached by a rising stream, lake, or reservoir, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity.
- Minor Flooding - minimal or no property damage, but possibly some public threat.
- Moderate Flooding - some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations.
- Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
- Record Flooding - flooding that equals or exceeds the highest stage or discharge at a given site during the period of record keeping.
- Stage - level of the water surface in a river measured with reference to some datum.
- Flow - volume of water passing a given point per unit of time.
- kcfs - measurement of water flow equivalent to 1000 cubic feet of water passing a given point for an entire second (NWS 2020) *(https://water.weather.gov/ahps2/pdf/hydrograph_terminology.pdf)*.

To illustrate the data available, screenshots of the gages are provided in Figure 4.3.8-4. The first hydrograph in the figure provides data collected at the *Brandywine Creek at Chadds Ford* gage, as captured on November 25, 2020. It indicates that high water level of record is 17.1 feet, Action Stage is 8 feet, Minor Stage is 9 feet, Moderate Stage is 11 feet, and Major Stage is 13 feet with the actual water height recorded as 2.18 feet at 12:30 pm on that day. This information is useful for local officials, emergency managers, and citizens to inform preparedness and response planning and activities to reduce potential impacts of flooding.

Figure 4.3.8-4. Flood Hydrographs for the Gages in Delaware County





Source: NWS 2022
Note: Ridley Creek and Crum Creek data not available

According to the National Oceanic and Atmospheric Administration's National Climatic Data Center (NOAA NCDC) storm event database, Delaware County experienced 69 flood events between January 1, 1996, and December 31, 2021 (the date range of data availability). These events resulted in over $20 million in property damage.

Between 1954 and 2021, the Commonwealth of Pennsylvania underwent 26 FEMA-declared, flood-focused disaster declarations (DR) or emergencies. Typically, these disasters covered a wide region of Pennsylvania; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations (FEMA 2022). Delaware County was included in six of the declarations, as listed in Table 4.3.8-4.

Table 4.3.8-4. Flood-Related FEMA Declarations for Delaware County, 1954 to 2021

FEMA Declaration Number	Date(s) of Event	Declaration Date	Details
DR-312	September 18, 1971	September 18, 1971	Pennsylvania Floods
DR-340	June 23, 1972	June 23, 1972	Pennsylvania Tropical Storm Agnes
DR-400	July 17, 1973	July 17, 1973	Pennsylvania Severe Storms & Flooding
DR-1093	January 19, 1996 - February 1, 1996	January 21, 1996	Pennsylvania Flooding
EM-3340	September 3, 2011 - October 15, 2011	September 8, 2011	Pennsylvania Remnants of Tropical Storm Lee
DR-4030	September 3, 2011 - October 15, 2011	September 12, 2011	Pennsylvania Tropical Storm Lee

Source: FEMA 2022

Based on all sources researched, known flooding events resulting in property damage that affected Delaware County and its municipalities since June 1971 are listed in Table 4.3.8-5. According to the USACE CRELL database, Delaware County has not experienced an ice jam event (USACE 2022). With flood documentation for the Commonwealth of Pennsylvania so extensive, not all sources have been identified or researched. Therefore, Table 4.3.8-5 may not include all events that have occurred throughout the county.

Table 4.3.8-5. Flooding Events between 1971 and 2020 in Delaware County

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
September 18, 1971	Flood	Countywide	DR-312	Yes	No records were available.
June 23, 1972	Flood	Countywide	DR-340	Yes	No records were available.
July 17, 1973	Flood	Countywide	DR-400	Yes	No records were available.
January 19, 1996	Flood	Countywide	DR-1093	Yes	Chester Creek in Chester flooded parklands and a bridge. Severe urban flooding caused many water rescues starting at 1:30 p.m. on the 19th. The Brandywine Creek at Chadds Ford crested at 14.21 feet at 1 a.m. on the 20th. Flood stage is 9 feet. The Chester Creek in Chester crested at 11.20 feet at 5 p.m. on the 19th. Flood stage is 8 feet.
January 27, 1996	Flood	Countywide	N/A	N/A	Along the main stem of the Brandywine Creek in Chadds Ford, it crested at 9.79 feet at 1 a.m. on the 28th. Flood stage is 9 feet.
April 16, 1996	Flash Flood	Western	N/A	N/A	Heavy rain...which averaged 1.5 to 2 inches caused the flooding of the Brandywine Creek along the Chester County border. Several other small streams in the western part of the county also exceeded their banks.
August 13, 1996	Flash Flood	Countywide	N/A	N/A	A low pressure system that developed along the Gulf Coast States Monday morning the 12th moved northeast and passed through the Delmarva Peninsula the morning of the 13th. It tapped the abundant moisture over the South and consequently produced heavy rain across all of Delaware County. No serious injuries or property damage was reported. Storm totals in Delaware County included 2.6 inches at both Chadds Ford and Newtown Square.
October 19, 1996	Flash Flood	Countywide	N/A	N/A	Rain, heavy at times, during the first half of the day on the 19th caused flash flooding within Delaware County. The heaviest rain fell around daybreak. A state of emergency was declared in Darby during the morning of the 19th because of the severe flooding. Darby Creek flooded and blocked several roads and inundated dozens of homes.
December 2-	Flash Flood	Countywide	N/A	N/A	Stream and creek flooding in Delaware County. Chester Creek near Chester was above its 8 foot flood stage from 4 a.m. EST to 7 a.m. EST on the 2nd. It crested at 8.6 feet at 6 a.m. EST. No serious injuries or damage were reported.
December 6, 1996	Coastal Flood	Countywide	N/A	N/A	No records were available.
December 13-14, 1996	Coastal Flood	Countywide	N/A	N/A	No records available.
January 25, 1997	Flood	Countywide	N/A	N/A	Later in the day the main stem of the Brandywine Creek at Chadds Ford (Along the Delaware/Chester County border) was above its 9 foot flood stage from 1030 a.m. EST through 4 p.m.
April 02, 1998	Flood	Countywide	N/A	N/A	The Brandywine Creek at Chadds Ford exceeded its 9 foot flood stage from 6 a.m. EST to 1030 a.m. EST on the 2nd. It crested at 9.2 feet at 730 a.m. EST. Storm

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
					totals within Delaware County averaged only around half an inch. No serious injuries or property damage were reported.
May 12, 1998	Flood	Essington	N/A	N/A	Some low-lying flooding occurred in the former Navy Yard, in the Gulf Oil area and between Philadelphia International Airport and Essington in Delaware County.
August 17, 1998	Flood	Countywide	N/A	N/A	Storm totals included 1.85 inches in Crum Creek (Delaware County).
January 3, 1999	Flood	Countywide	N/A	N/A	The combination of runoff from the heavy rain and higher than normal tides caused by the strong onshore flow in Delaware Bay caused minor flooding along the Delaware River and tidal sections of its tributaries in southeast Pennsylvania.
March 21, 1999	Flash Flood	Countywide	N/A	N/A	In Delaware County, the Crum Creek at Newtown Square crested above flood stage at 5.82 feet at 1 a.m. EST on the 22nd. Its estimated flood stage is 5.5 feet. The Chester Creek near Chester crested at 7.68 feet at 2 a.m. EST on the 22nd. Its flood stage though is 8 feet.
May 24, 1999	Flood	Countywide	N/A	N/A	Storm totals included 3.04 inches were 2.40 inches in Crum Creek (Delaware County).
August 26, 1999	Flash Flood	Northeast	N/A	N/A	During the evening of the 26th thunderstorms with torrential downpours and frequent lightning caused considerable urban and poor drainage flooding as well as flooding of some of the smaller creeks and streams and numerous power outages. The combination of frequent lightning and flooding from the heavy rain caused about 65,000 PECO Energy customers to lose power during the evening of the 26th in Southeast Pennsylvania. Hardest hit were Chester and Delaware Counties.
September 16, 1999	Flood	Countywide	DR-1294	Yes	Delaware County was the second hardest hit county in the state, but no location was hit harder than Darby Borough as flooding along the Darby and Cobb Creeks cut off and decimated the borough. Seven hundred people were evacuated, one hundred were rescued by boat, 11 were plucked from flood waters. The creek devoured residents and businesses along Mill and Walnut Streets. Twenty-five businesses were in ruin; a bank and liquor store disappeared under eight feet of flood water. A delivery van floated into six 2,000 gallon tanks containing toxic solvents, four were recovered. An ice machine was recovered half a mile downstream. The Colwyn section of Lansdowne Borough was also hard hit by the Darby Creek flooding. During the evening of the 16th about 1,000 persons were evacuated in the Crum Creek Valley in Marple, Media, Nether Providence, Ridley, Swarthmore, and Upper Providence Townships. Officials feared the record rainfall would damage the Springton Reservoir Dam's spillway. Other evacuations occurred along the Chester Creek in Aston, Brookhaven, Chester City and Upland Borough. The Chester Creek in Chester had its second highest crest on record since 1971. Tidal flooding also forced the evacuation of about 500 people along the Delaware River in Marcus Hook. Flooding forced evacuations along the Marcus Hook in Upper Chichester Township and Trainer Borough. Intense flooding along Pennsylvania State Route 291 forced the evacuation of 200 people in Tinicum Township.

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
March 21, 2000	Flash Flood	Countywide	N/A	N/A	In Delaware County flooding occurred along the Brandywine, Chester, Darby and Ridley Creeks. In Darby Borough, flooding along the Darby Creek forced the evacuation of one home and the inundation of another house. Flooding along the Chester Creek caused road closures in Aston Township. Ridley Creek flooded Ridley Creek State Park in Edgemont Township. Flooding along the Brandywine Creek closed U.S. Route 1 in the Chadds Ford-Birmingham (Chester County) area. Basement flooding was reported in Chester City. Winds were not strong, but the heavy rain apparently loosened the ground enough that trees fell down in Middletown Township, Swarthmore Borough, Upper Providence Township and Yeadon Borough. A woman in Middletown Township was hospitalized with minor injuries after a tree fell on her vehicle. A house was damaged in Swarthmore Borough after a tree fell along its side. Around Noon EST on the 22nd, two men were rescued from the flooding Brandywine Creek near the Brandywine River Museum in Chadds Ford after their canoe capsized and left them clinging to trees.
July 27, 2000	Flash Flood	North Portion	N/A	N/A	Heavy rains of 1 to 2 inches overnight and storm totals of around 3 inches during the past 24 hours led to flooding along some of the streams in northern Delaware County.
December 17, 2000	Flash Flood	Countywide	N/A	N/A	The Brandywine Creek at Chadds Ford (sharing the Delaware County line) exceeded its 9 foot flood stage from 2:30 p.m. EST on the 17th through 4 a.m. EST on the 18th. It crested at 10.64 feet at 9 p.m. EST on the 17th. In Delaware County, the Chester Creek near Chester was above its 8 foot flood stage from 915 a.m. through 6 p.m. EST on the 17th. It crested at 8.97 feet at Noon EST.
June 16, 2001	Flash Flood	East Portion	N/A	N/A	Showers and thunderstorms with torrential downpours caused flash flooding of streams and poor drainage flooding in Delaware County, particularly in the eastern half of the county. Most of the flooding occurred east of a line from Radnor Township south through Media Borough and Ridley Township. In Secane (Upper Darby Township), 4.30 inches of rain fell in 90 minutes between 5:30 p.m. and 7:00 p.m. EDT. Many vehicles were trapped in flooded roadways and numerous water rescues occurred. The torrential rains and overflowing streams loosened many trees and caused weaker ones to fall. One downed tree damaged a wall and a fence in Swarthmore Borough. Swarthmore College suffered flood damage when the Little Crum Creek flooded. Water went through the doors of several buildings and flooded the basements. Doppler Radar Storm total estimates ranged between 3 and 5 inches across the eastern part of the county.
November 17, 2002	Flash Flood	Newtown Square	N/A	N/A	In Delaware County, Crum Creek at Newtown Square was above its 6 foot flood stage from 415 a.m. through 659 a.m. EST on the 17th. It crested at 6.58 feet at 6 a.m. EST on the 17th.

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
February 22, 2003	Flash Flood	Countywide	N/A	N/A	A large swath of moderate to heavy rain with embedded thunderstorms moved across Southeast Pennsylvania during the mid-day on the 22nd. Rainfall totals averaged around half of an inch per hour during the thunderstorms and storm totals across Delaware County averaged around two and a half inches. The combination of the heavy rain and melting snow produced widespread roadway flooding and ponding of water in poor drainage areas as well as some basement flooding.
March 20, 2003	Flood	Countywide	N/A	N/A	A slow moving low pressure system and a deep southerly flow from the Gulf of Mexico produced heavy rain during the second half of the day on the 20th across southeast Pennsylvania. Soil conditions remained moist due the combination of above normal precipitation and snow melt earlier in the month. The combination produced minor river flooding along the Chester Creek (Delaware County). Chester Creek in Chester was above its 8 foot flood stage from 10:18 p.m. EST through 11:05 p.m. EST on the 20th.
June 20, 2003	Flood	Countywide	N/A	N/A	A slow moving low pressure system at both the surface and aloft helped trigger very heavy rain across Delaware County from the late morning into the afternoon 20th. Storm totals averaged between 2.0 and 4.0 inches, most of which fell during the afternoon at the rate of half an inch per hour. The heavy rain led to widespread poor drainage flooding as well as flooding of most of the gaged rivers and streams in the county. The worst flooding occurred along the Chester Creek. About 60 homes were evacuated along Powell Road in Chester City and suffered basement flooding.
August 10, 2003	Flash Flood	Newtown Square	N/A	N/A	Runoff from a cluster of thunderstorms with heavy rain that moved through southeast Chester County between 5 a.m. and 630 a.m. EDT on the 10th produced flooding along parts of Crum Creek in Delaware County. Crum Creek at Newtown Square was above its 6 foot flood stage from 858 a.m. through 11:25 a.m. EDT on the 10th.
September 15, 2003	Flash Flood	Countywide	N/A	N/A	Remnant moisture from Tropical Storm Henri produced copious amounts of rain during the morning and again during the late afternoon across Chester County and far northwestern Delaware County. Runoff from the upstream heavy rain caused significant flooding along the Brandywine Creek and minor flooding along Chester and Crum Creeks.
September 23, 2003	Flood	Countywide	N/A	N/A	A slow moving cold front helped produce heavy rain as it displaced a warm and humid air mass preceding it across the Philadelphia Metropolitan Area. Widespread poor drainage flooding was reported as well flooding along the Brandywine Creek. Area creeks were already running high from the previous week's flooding. Doppler Radar storm total estimates in Delaware County were between one and two inches.
October 27, 2003	Flood	Countywide	N/A	N/A	Doppler Radar storm total estimates ranged between 1 and 3 inches with the highest amounts along the Chester County border. The main stem of the Brandywine Creek at Chadds Ford was above its 9 foot flood stage.

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
December 11, 2003	Flood	Countywide	N/A	N/A	The combination of heavy rain between 3 a.m. and 10 a.m. EST on the 11th and runoff from the melting snow produced widespread poor drainage and some stream and river flooding in Delaware County.
February 6, 2004	Flood	Countywide	N/A	N/A	The combination of heavy rain and snow melt caused poor drainage and creek flooding in Delaware County. Heavier rain fell from the late morning into the middle of the evening on the 6th. Creek flooding included the Darby Creek in Darby Borough. McDade Boulevard was closed because of the flooding creek. Elsewhere, the main stem of the Brandywine Creek at Chadds Ford was above its 9 foot flood stage.
July 12, 2004	Flash Flood	Countywide	N/A	N/A	A series of thunderstorms with very heavy rain caused widespread poor drainage and creek flooding in Delaware County.
July 27, 2004	Flash Flood	Northwest Portion	N/A	N/A	A series of thunderstorms with very heavy rain caused poor drainage flooding and flooding of some of the streams, mainly in the northwest half of Delaware County. Doppler Radar storm total estimates reached up to 5 inches along the borders of Chester, Delaware and New Castle Counties. Crum Creek at Newtown Square was above its 6 foot flood stage.
August 1, 2004	Flash Flood	East Portion	N/A	N/A	Slow moving thunderstorms with torrential downpours caused flash flooding of streams as well as widespread poor drainage flooding in eastern Delaware County. Doppler Radar storm total estimates reached between 5 and 6 inches. Hardest hit were Haverford and Upper Darby Townships as well as Darby Borough. States of emergencies were declared in Darby and Upper Darby. About 660 residents were evacuated from the three municipalities. 142 homes, 77 apartments and 69 businesses suffered major damage. In addition, about 400 other homes and 50 other businesses suffered minor damage. Furniture, appliances, household goods and food were all damaged or destroyed. At least 200 vehicles were badly damaged as many floated away and were flipped by the flood waters. Homes were flooded through their first floor. PECO Energy reported about 35,000 homes and businesses in their service area lost power including Delaware County. Gas service was also shut to numerous homes. Delaware County issued a declaration of disaster emergency in the county. On August 6th, President George W. Bush declared Philadelphia, Delaware and Montgomery Counties disaster areas. This enabled residents and businesses to apply for federal funding.
September 18, 2004	Flash Flood	Countywide	N/A	N/A	The remnants of Hurricane Ivan interacted with an approaching cold front and dropped very heavy rain across Delaware County in the morning and into the early afternoon on the 18th.
September 28, 2004	Flash Flood	Countywide	N/A	N/A	The remnants of Hurricane Jeanne interacting with two frontal boundaries in the region caused torrential downpours to occur during the late afternoon and evening of the 28th. Doppler Radar storm total estimates ranged between 3 and 8 inches with the highest amounts toward the Chester County border. Widespread poor drainage, stream and creek flooding occurred. Many roads were flooded and

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
					closed and numerous water rescues were performed. Evacuations occurred along the Darby Creek in Darby Borough, Marple Township and Upper Darby Township. Darby Creek flooding also affected Clifton Heights and Collingdale.
November 28, 2004	Flood	Countywide	N/A	N/A	A strong cold front and a prolonged flow from the Gulf of Mexico and nearby Atlantic Ocean produced heavy rain across Delaware County from around Midnight EST through 9 a.m. EST on the 28th. Storm totals of around 2 inches produced widespread poor drainage flooding and stream and creek flooding. Fallen leaves exacerbated the poor drainage flooding.
January 14, 2005	Flood	Countywide	N/A	N/A	A slow moving cold front with waves of low pressure produced heavy rain across Delaware County during the first half of the day (mainly between 5 a.m. and Noon EST) on the 14th. Storm totals averaged close to two inches. This caused urban and poor drainage flooding and led to creek and stream flooding within the county. Schools in Chadds Ford dismissed early because of the expected flooding along the Brandywine Creek.
March 28, 2005	Flood	Countywide	N/A	N/A	Heavy rain fell across Delaware County during the afternoon and evening of the 28th and caused urban and poor drainage flooding. It also caused some stream and creek flooding and left the region vulnerable to additional heavy rain.
April 2-3, 2005	Flood	Countywide	N/A	N/A	Heavy rain fell across Delaware County and caused widespread poor drainage flooding on the 2nd and stream and river flooding on the 2nd and 3rd.
October 8, 2005	Flash Flood	Countywide	N/A	N/A	The combination of a very slow moving cold front and copious moisture from the remnants of Tropical Storm Tammy produced periods of very heavy rain across Delaware County from the late evening of the 7th into the early evening of the 8th. Storm totals averaged from three to five inches. The heavy rain caused widespread poor drainage flooding as well as flooding along Cobbs Creek bordering Philadelphia. At least two dozen roads were closed in the county and many basements were flooded. The Brandywine Creek at Chadds Ford was above its 9 foot flood stage.
December 16, 2005	Flood	Chester	N/A	N/A	The combination of snow melt and the precipitation that fell from the afternoon of the15th into the early morning of the 16th caused minor flooding along a couple of creeks in Delaware County. Chester Creek in Chester was above its 8 foot flood stage.
January 4, 2006	Coastal Flood	Countywide	N/A	N/A	The combination of a high pressure system over Canada and a low pressure system that exited the Delaware coast on the 3rd and runoff from the heavy rain produced some minor tidal flooding during the daytime high tide along the Delaware River as well as along tidal sections of its tributaries.
January 31, 2006	Coastal Flood	Countywide	N/A	N/A	The combination of spring tides coming off the recent new moon and a rapidly intensifying low pressure system that passed east of Delaware on the 31st produced a strong up the bay flow and widespread minor tidal flooding during the daytime high tide along the Delaware River and tidal sections of its tributaries during the afternoon.

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
June 2, 2006	Flash Flood	South Portion	N/A	N/A	Slow moving thunderstorms with torrential rain caused flooding of numerous roadways and a couple of creeks and streams in Delaware County. The heaviest rain fell in the southern half of the county as Doppler Radar storm total estimates reached between 2 and 4 inches. Reported street flooding included Hook Road in Darby Township, parts of Baltimore Pike in Nether Providence, and in front of the Granite Run Mall in Middletown. Several stone driveways in the western part of the county were washed away from the heavy rainfall. Chester Creek in Chester was above its 8 foot flood stage.
June 26, 2006	Flood	Chadds Ford	N/A	N/A	The runoff from heavy rain that fell during the day on the 26th caused minor flooding along the main stem of the Brandywine Creek. The main stem of the Brandywine Creek at Chadds Ford had minor flooding.
June 28, 2006	Coastal Flood	Countywide	N/A	N/A	The freshwater runoff from the heavy rain combined with the higher of the two astronomical high tides of the day to cause moderate tidal flooding during the early morning on the 28th and 29th and minor tidal flooding during the early morning on the 30th. To a lesser degree flooding extended inland on tidal sections of tributaries to the Delaware River. The highest tides occurred during the early morning on the 29th. In Delaware County, boat launches in Ridley Township were flooded. The John Heinz Wildlife Refuge in Tinicum Township was closed.
August 29, 2006	Flood	Newtown Square	N/A	N/A	The combination of the remnants of Tropical Storm Ernesto and a large high pressure system over eastern Canada produced heavy rain and strong winds in Chester and Delaware Counties. This caused power outages and downed trees. Rain moved into the area around Noon EDT on the 1st and did not exit until around 6 p.m. EDT on the 2nd. The heaviest rain fell during the day on the 2nd. Storm totals averaged around two inches. The heavy rain produced poor drainage flooding. In addition to the heavy rain, persistent east to northeast winds caused tree damage as the heavy rain loosened the root support and weighed down limbs. In Delaware County, about 50 trees were knocked down and required repairs to about 350 lines. Trees blocked roadways in Haverford Township. In Upper Darby Township, the wind and rain knocked down a 350-year-old oak tree that subsequently damaged garages, a vehicle, pool deck and patio.
October 7, 2006	Coastal Flood	Countywide	N/A	N/A	The combination of runoff from the rain and a persistent onshore flow up Delaware Bay caused minor tidal flooding to occur with the afternoon high tide on the 7th along the Delaware River and tidal sections of its tributaries.
October 28, 2006	Coastal Flood	Countywide	N/A	N/A	Heavy rain that fell during the first half of the day on the 28th caused poor drainage and stream flooding in Delaware County. Storm totals averaged around one and a half inches and culminated an overall wet month for eastern Pennsylvania.
November 8, 2006	Coastal Flood	Countywide	N/A	N/A	A slow moving low pressure system that moved from the Gulf of Mexico caused heavy rain to fall during about a 12 hour period on the 8th in Eastern Pennsylvania. Storm totals averaged between 2 and 3 inches. The heavy rain

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
					caused urban and poor drainage flooding. The flooding was exacerbated by fallen leaves that clogged catch basins.
November 16, 2006	Coastal Flood	Countywide	N/A	N/A	A slow moving cold front helped cause heavy rain across Eastern Pennsylvania during the late afternoon and early evening of the 16th. Rain began during the early afternoon of the 16th, but fell at its heaviest from about 4 p.m. through 8 p.m. EST and caused poor drainage flooding.
January 1, 2007	Coastal Flood	Countywide	N/A	N/A	The combination of fresh water runoff and a wind flow that was upriver caused minor tidal flooding along the Delaware River and tidal sections of its tributaries during the mid-day high tide on the 1st.
March 2, 2007	Flood	Aldan	N/A	N/A	1 to 3 inches of rain late on the 1st into the 2nd, and when combined with melting piles of snow in some areas, mainly minor flooding of streams, creeks and some roads resulted across eastern Pennsylvania. Some of the flooding closed several roads in the region.
April 15, 2007	Flood	Chadds Ford	N/A	N/A	The heavy rain caused roadway and basement flooding in Delaware County on the 15th. Flooding approached several homes near Crum Creek in Marple Township. Flooding from Chester Creek inundated four roads within Chester. Two roads were closed because of Brandywine Creek flooding in Chadds Ford. The Darby Creek flooded parking lots off of Mill Street and Walnut Street in Darby Borough and Hook Road in Darby Township. Pennsylvania State Route 291 was closed between Eddystone and Ridley Township and the ramps to Interstate 95 were flooded in Yeadon Borough. Flooding was also reported along Cobbs Creek along the border with Philadelphia. Trolley tracks were under water on the Sharon Hill-102 line between Collingdale and Sharon Hill. The Brandywine Creek at Chadds Ford was above its 9 foot flood stage.
April 18, 2007	Coastal Flood	Countywide	N/A	N/A	The combination of the leftover onshore flow from the departing nor'easter, fresh water runoff from the heavy rain and the astronomical spring tides caused by the new moon caused tidal flooding along the Delaware River and tidal sections of its tributaries from the afternoon of the 18th into the morning of the 21st.
April 27, 2007	Flood	Aldan	N/A	N/A	A series of thunderstorms that moved across the same region (called training) around and just after Midnight EDT on the 27th caused flash flooding of streams and poor drainage flooding.
June 13, 2007	Coastal Flood	Countywide	N/A	N/A	The combination of a weak onshore flow circulating around a high pressure system over the Canadian Maritimes, the spring tides associated with the new moon and some of the highest astronomical tides of the year helped cause minor tidal flooding during the times of high tide along the Delaware River and tidal sections of its tributaries on the night of the 13th.
October 27, 2007	Flood	Edgemont	N/A	N/A	A slow moving weather pattern gave eastern Pennsylvania four days of rainy weather which culminated with periods of heavy rain from the afternoon of the 26th into the morning of the 27th.

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
February 13, 2008	Flood	Chadds Ford	N/A	NA	A protracted precipitation event that started as a wintry mix and then changed to rain caused flooding across Eastern Pennsylvania. Precipitation changed to plain rain mainly before sunrise on the 13th and fell continuously through the late afternoon on the 13th. The heaviest rain fell during the first half of the day on the 13th. The combination of the heavy rain and snow and ice melt caused flooding of many creeks and smaller rivers as well as poor drainage flooding in urban areas. Clogged catch basins exacerbated the problems. Storm totals averaged between two and three and a half inches.
September 6, 2008	Flood	Countywide	N/A	N/A	Tropical Storm Hanna brought heavy rain throughout eastern Pennsylvania and strong winds in southeastern Pennsylvania as well as some minor tidal flooding along the lower Delaware River on the 6th. Rain moved into the region during the second half of the morning, fell heavy at times during the afternoon and early evening and ended by the late evening. Rain began during the second half of the morning of the 6th and fell at its heaviest during the afternoon and early evening. The rain ended by late that evening. Storm totals averaged from around 2 inches to around 4 inches.
September 28, 2008	Flood	Wayne	N/A	N/A	A series of showers and thunderstorms with heavy rain between 3:30 p.m. and 5:30 p.m. EDT caused flooding in Radnor Township. Doppler Radar storm total estimates reached 2.5 inches. Ithan Creek rose over Iven Road in the Saint Davids area of the township. Other flooding occurred along South Wayne Avenue and West Wayne Avenue. A vehicle became stuck underneath the Radnor Trail Bridge.
December 12, 2008	Flood	Ridley Park	N/A	N/A	Heavy rain and flooding affected most of Eastern Pennsylvania on the 11th and 12th. Rain began during the afternoon of the 10th and continued through the 11th into the early morning on the 12th. Rain fell at its heaviest from the afternoon of the 11th until just after Midnight EST on the 12th. Event precipitation totals averaged two to four inches.
August 2, 2009	Flash Flood	Haverford	N/A	N/A	Heavy rain caused flash flooding along Cobbs Creek and other small streams particularly in the eastern half of Delaware County. Many water rescues from trapped vehicles occurred. Hardest hit was Haverford Township. Doppler Radar storm total estimates reached between 3 and 4 inches in the northeast part of the county. In Haverford Township, an emergency disaster was declared. Homes bordering Cobbs Creek and its tributaries were damaged. On Eagle Road, cars were submerged and homes were surrounded by water. Roads and bridges on Hathaway Lane were damaged. Homes and vehicles on Wynnefield Drive were flooded. Six roads in the township were flooded. In Darby Borough, flood waters from the Darby Creek washed away a portion of McDade Boulevard. Ten residents were evacuated from Springfield Road. Roadway and basement flooding also occurred in Lansdowne Borough and Chester City.

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August 29, 2009	Flash Flood	Drexel Plaza	N/A	N/A	Thunderstorms with torrential downpours caused flash flooding within Upper Darby Township. Motorists were rescued from flooded vehicles on Marshall Street and Normandy Roads. A family was trapped in a flooded basement on Ashton Street. A Skywarn Spotter measured 2.62 inches of rain in the township.
October 24, 2009	Flood	Florida Park	N/A	N/A	A slow moving cold front helped trigger showers and thunderstorms with heavy rain that fell during the late afternoon and early evening on the 24th. Event precipitation totals averaged 1.5 to 3.0 inches across southeastern Pennsylvania. This caused flash flooding during the early evening and runoff flooding through the night of the 24th.
December 9, 2009	Flood	Chadds Ford	N/A	N/A	Runoff from heavy rain caused poor drainage flooding and creek flooding in Delaware County. The main stem of the Brandywine Creek at Chadds Ford was above its 9 foot flood stage.
December 26, 2009	Flood	Chester	N/A	N/A	The combination of melting snow and heavy rain produced field, poor drainage and stream and creek flooding in southeastern Pennsylvania throughout the Philadelphia Metropolitan Area.
January 25, 2010	Flood	Brookhaven	N/A	N/A	Heavy rain that fell during the first half of the day on the 25th caused some river and poor drainage flooding in southeastern Pennsylvania.
March 13, 2010	Flood	Chadds Ford	N/A	N/A	Four days of rain, heaviest on the 13th, culminated in flooding across southeastern Pennsylvania.
March 28-29, 2010	Coastal Flood	Countywide	N/A	N/A	A series of low pressure systems that brought between two and four inches of rain from the evening of the 28th into the early morning of the 31st. Coupled with already wet antecedent conditions, this caused renewed flooding in southeastern Pennsylvania. The heaviest rain came in two shots, one that fell from the evening of the 28th into the early morning of the 29th and the second that fell during the daylight hours on the 30th.
July 14, 2010	Flash Flood	Trainer	N/A	N/A	Thunderstorms with heavy rain caused flash flooding of smaller creeks as well as considerable highway and poor drainage flooding. In Trainer Borough, the Stoney Brook Creek flooded. Cars became stuck in three feet of water at the intersection of Main and Pennsylvania Streets in the borough. Interstates 476 and 95 as well as McDade Boulevard (within Darby) were flooded. Poor drainage flooding was also reported in Norwood, Prospect Park, Ridley and Tinicum Townships. Two day Doppler Radar storm total estimates reached 5 to 6 inches in Delaware County.
October 1, 2010	Flood	Chadds Ford	N/A	N/A	Flooding along the Darby Creek in Darby Borough was described as the heaviest since Hurricane Floyd. Dozens of families were evacuated and sought shelter at the Mercy Fitzgerald Hospital. People were rescued from the second floor windows on Springfield Road. Water was six to seven feet deep at the intersection of Springfield Road and MacDade Boulevard. A few homes in the borough were severely flooded as well as one automobile parts store. Major flooding also occurred along the entire length of Chester Creek from Thornbury Township into Chester City. About 60 homes were damaged in Chester City. Upland and

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					Brookhaven also had flooding along the Creek. There were about 100 county rescues from vehicles. One of the most harrowing occurred in Bethel Township where a vehicle was washed off a roadway and the female driver escaped the submerged vehicle through the passenger side window. The Chester Creek in Chester had major flooding and its third highest crest on record. It was the highest crest since Hurricane Floyd in September of 1999. The creek was above its 8 foot flood stage from 1:20 a.m. EDT through 2:09 p.m. EDT on the 1st. It crested at 17.54 feet at 6 a.m. EDT. Crum Creek at Newtown Square had major flooding and its highest crest on record. The creek was above its 6 foot flood stage from 101 a.m. EDT through 947 a.m. EDT on the 1st. It crested at 13.06 feet at 445 a.m. EDT. The Main Stem of the Brandywine Creek at Chadds Ford had moderate flooding and was above its 9 foot flood stage from 247 a.m. EDT through 11:20 p.m. EDT on the 1st. It crested at 12.94 feet at 1:45 p.m. EDT. Event precipitation totals included 9.04 inches in Chadds Ford, 8.18 inches in Radnor and 7.00 inches in Drexel Hill.
March 10, 2011	Flood	Chadds Ford	N/A	N/A	Flooding along the Brandywine Creek closed the Chadds Ford Township schools because of flooded roadways along the creek. The Brandywine Creek at Chadds Ford had moderate flooding. The creek was above its 9 foot flood stage.
April 16, 2011	Flood	Chadds Ford	N/A	N/A	The strong southeast wind up the Delaware Bay and River combined with the already high astronomical tides associated with the full moon and fresh water runoff from heavy rain to produce severe tidal flooding along the Delaware River and tidal sections of its tributaries during the overnight high tide cycle on the 16th.
August 14, 2011	Flood	Primos	N/A	N/A	The runoff from heavy rain earlier in the day caused flooding along the Darby Creek and closed MacDade Boulevard in Darby. Flooding was also reported in Clifton Heights between Baltimore Avenue and Springfield Road. Event precipitation totals included 6.13 in Nether Providence Township and 2.86 inches in Aston.
August 27, 2011	Flash Flood	Chadds Ford	N/A	N/A	Irene produced heavy flooding rain, tropical storm force wind gusts with hundreds of thousands of outages, moderate tidal flooding along the Delaware River and one flooding related death in Eastern Pennsylvania over the weekend of August 27th and 28th. Moderate stream and river flooding occurred in the Poconos and Lehigh Valley and moderate to major river flooding occurred in southeast Pennsylvania. For many places in southeastern Pennsylvania, it was the worst creek and river flooding since Hurricane Floyd in 1999 or the remnants of Hurricane Jeanne in 2004. Flooding along non-tidal sections of the Delaware River was minor to moderate. About 500,000 PECO Energy and 420,000 Pennsylvania Power and Light customers lost power in Eastern Pennsylvania.
September 6, 2011	Flood	Chadds Ford	DR-4030-PA EM-3340-PA	Yes	The remnants of Tropical Storm Lee that interacted with a stalled frontal boundary produced several days with periods of heavy rain across Eastern Pennsylvania from the 5th into the 8th.. In the most recent available flooding assessment for

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					Eastern Pennsylvania, there were 22 homes and businesses that were destroyed, 201 that suffered major damage, 672 that had minor damage and 1217 others that were affected. The preliminary damage estimate for the state of Pennsylvania was five hundred million dollars. The highest tides occurred during the evening high tide cycle on the 8th in Philadelphia and Delaware Counties and the evening high tide cycle on the 9th in Bucks County. The first round of widespread heavier rain that started on the 6th caused creek flooding concentrated in the southwest half of Delaware County. The Brandywine Creek at Chadds Ford was above its 9 foot flood stage. The Brandywine Creek at Chadds Ford had moderate flooding and was above its 9 foot flood stage.
September 24, 2011	Flood	Florida Park	N/A	N/A	The runoff from the heavy rain on the 23rd caused minor flooding on the Crum Creek and Main Stem of the Brandywine Creek on the 24th. The main stem of the Brandywine Creek at Chadds Ford was above its 9 foot flood stage.
September 29, 2011	Coastal Flood	Countywide	N/A	N/A	The combination of fresh water runoff, unusually high spring astronomical tides and a weak southeasterly flow produced moderate tidal flooding during the afternoon high tide cycle along tidal sections of the Delaware River and its tributaries. While the worst tidal flooding for this event occurred during that afternoon, minor tidal flooding also occurred during the afternoon of the 28th, early morning of the 29th, and the late afternoons of September 30th, October 1st and October 2nd.
November 23, 2011	Flood	Chadds Ford	N/A	N/A	Periods of rain, heavy at times, produced poor drainage flooding as well as minor to moderate flooding of creeks and rivers in Eastern Pennsylvania from the Lehigh Valley south through the Philadelphia Metropolitan Area.
December 7, 2011	Flood	Chadds Ford	N/A	N/A	A protracted rain event from the early morning on the 6th through the early morning on the 8th culminated with heavy rain during the afternoon and evening of the 7th and caused poor drainage flooding in Eastern Pennsylvania.
May 16, 2012	Flash Flood	Wyola	N/A	N/A	A weakening cold front helped trigger scattered showers and thunderstorms with heavy rain during the evening of the 15th into the early morning of the 16th. Event precipitation totals during multiple thunderstorms reached between 2.0 and 3.5 inches and caused flash flooding and flooding of smaller streams and creeks in southeastern Pennsylvania. Hardest hit was the tri-county area of Delaware, Montgomery and Chester Counties where Doppler Radar storm total estimates and surface reports reached around 3.5 inches.
September 3, 2012	Flash Flood	Thornton & Village Green	N/A	N/A	A series of thunderstorms with torrential downpours affected parts of southeastern Pennsylvania mainly during the first half of the day on the 3rd. Adjusted Doppler Radar storm total estimates exceeded 4 inches in western sections of Delaware County. The heavy rain was caused by the combination of a nearby stationary front and the approaching remnants associated with Hurricane Isaac.
October 29, 2012	Flood	Marcus Hook	N/A	N/A	Many gaged streams in Delaware County had moderate flooding. In addition, there was poor drainage flooding as well tidal flooding along and near the Delaware

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					River. The Darby Creek flooded Darby Borough. Flooding was also reported in Malvern. Pennsylvania State Route 1 in Chadds Ford was closed due to Brandywine Creek flooding. The main stem of the Brandywine Creek at Chadds Ford had moderate flooding and was above its 9 foot flood stage from 6 p.m. EDT on the 29th through 631 a.m. EDT on the 30th It crested at 12.20 feet at 4:21 a.m. EDT on the 30th. The Chester Creek near Chester had moderate flooding and was above its 8 foot flood stage from 355 p.m. EDT on the 29th through 426 a.m. EDT on the 30th. It crested at 10.54 feet at 830 p.m. EDT on the 29th. The Crum Creek at Newtown Square was above its 6 foot flood stage from 306 p.m. EDT through 11:25 p.m. EDT on the 29th It crested at 7.87 feet at 615 p.m. EDT. Event precipitation totals included 5.02 inches in Media, 4.20 inches in Garnet Valley, 3.06 inches at the Philadelphia International Airport and 2.43 inches in Aston Township.
December 21, 2012	Flood	Marcus Hook	N/A	N/A	The heavy rain and flooding forced the termination of the SEPTA Sharon Hill Trolley Service at McDade Boulevard. in Darby. The Crum Creek at Newtown Square was above its 6 foot flood stage from 4:31 a.m. EST through 9:42 a.m. EST on the 21st. It crested at 7.41 feet at 715 a.m. The Chester Creek near Chester was above its 8 foot flood stage from 6:08 a.m. EST through 8:15 a.m. EST on the 21st. It crested at 8.4 feet at 7 a.m. EST. The Brandywine Creek at Chadds Ford was above its 9 foot flood stage from 1157 a.m. EST through 330 p.m. EST on the 21st. It crested at 9.12 feet at 240 p.m. EST. Event precipitation totals included 2.31 inches in Media.
January 31, 2013	Flood	Florida Park	N/A	N/A	The Brandywine Creek at Chadds Ford was above its 9 foot flood stage from 12:31 p.m. EST through 515 p.m. EST on the 31st. It crested at 9.20 feet at 219 p.m. EST. The Crum Creek at Newtown Square was above its 6 foot flood stage from 6:16 a.m. EST through 7:45 a.m. EST on the 31st. It crested at 6.28 feet at 7:00 a.m. EST. Event precipitation totals included 1.37 inches in Aston.
June 7, 2013	Flood	Village Green	N/A	N/A	The flooding caused about 50 families in Chester to evacuate along the Chester Creek. Flooding occurred along a couple gaged streams in Delaware County. The Crum Creek at Newtown Square was above its 6 foot flood stage from 440 p.m. EDT through 933 p.m. EDT on the 7th, and it crested at 6.68 feet at 545 p.m. EDT. Heavy rain also led to flooding along the Chester Creek at Chester, and 50 families in the area were evacuated. The Chester Creek at Chester was above its 8 foot flood stage from 423 p.m. EDT through 11:10 p.m. EDT on the 7th, and it crested at 9.80 feet at 615 p.m. EDT. Event precipitation totals included 4.13 inches in Lansdowne, 4.01 inches in Drexel Hill, 3.71 inches in Aston Township, 3.22 inches in Chester Township, and 3.16 inches in Wayne.
June 10, 2013	Flash Flood	Brookhaven	N/A	N/A	Heavy rain that fell during the 10th led to flash flooding along roadways and gaged creeks and streams in Delaware County. The Chester Creek at Chester had moderate flooding and was above its 8 foot flood stage from 636 p.m. EDT

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					through 10:49 p.m. EDT on the 10th, and it crested at 10.93 feet at 8:45 p.m. EDT. The Crum Creek at Newtown Square was above its 6 foot flood stage from 5:18 p.m. EDT through 10:22 p.m. EDT on the 10th, and it crested at 9.34 feet at 7:00 p.m. EDT. Several roads were closed due to high water in Delaware County; including Westtown Road, Westtown-Thornton Road, and Creek Road. Event precipitation totals included 3.22 inches in Wayne and 1.37 inches in Chester Heights.
June 18, 2013	Flood	Edgemont	N/A	N/A	he combination of a slowly moving cold front with a wave of low pressure along it and wet antecedent conditions helped develop a large area of light to moderate rain with embedded thunderstorms accompanied by heavy rain in extreme southeast Pennsylvania primarily during the afternoon of the 18th. This led to urban and poor drainage flooding and also flash flooding near and along some of the smaller creeks. Event precipitation totals averaged 1 to 3 inches and this was mainly confined to Chester and Delaware Counties.
June 28, 2013	Flash Flood	Elam	N/A	N/A	Bands of thunderstorms with very heavy rain caused flash flooding in southern sections of Chester and Delaware Counties and across central Carbon County during the late afternoon and early evening on the 28th. Thunderstorms with very heavy rain caused poor drainage and small stream flash flooding in southern Delaware County. The Garnet Valley area of Bethel Township. Thunderstorms dropped 2.25 inches of rain in the area within 45 minutes.
July 12, 2013	Flash Flood	Edgemont	N/A	N/A	A low pressure system that developed along a cold frontal boundary brought bands of showers and thunderstorms with heavy downpours to Delaware and Chester Counties on the 12th. This caused flooding. Event precipitation totals reached between 2.0 and 4.5 inches across central Delaware County.
July 28, 2013	Flash Flood	Hambys Corner	N/A	N/A	A slow moving cold front coupled with a deep southerly flow of very moist air caused slow moving and in some instances back building thunderstorms to occur during the afternoon and evening of the 28th. This caused an all-time record breaking rainfall in Philadelphia as well as flash flooding in Philadelphia and Delaware Counties and also in parts of the Poconos and Lehigh Valley.
August 13, 2013	Flash Flood	Thornton & Chadds Ford	N/A	N/A	The runoff from the morning heavy rain on the 13th continued flooding along the Brandywine Creek into the night of the 13th. Heavier rain fell in Chester County. The Brandywine Creek at Chadds Ford had moderate flooding and was above its 9 foot flood stage.
September 2, 2013	Flash Flood	Upper Darby	N/A	N/A	Thunderstorms with very heavy downpours caused flash flooding across central Delaware County with Springfield and Upper Darby Townships affected the hardest. In Springfield Township, flash flooding along the Stony Creek backed into storm drains in the parking lot of BJ's Wholesalers on Woodland Avenue. The water reached up to five feet high and completely submerged some vehicles. About 20 water rescues were performed as 50 vehicles were affected in the parking lot. Seven fire companies responded to the flooding. Specialized rescue

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					boat water units were used to rescue people from their vehicles. Numerous roadways were flooded in the township and neighboring Upper Darby Township. One vehicle was swept into a flooded creek. The intersections of Normandy and Marshall Roads, Copley and Marshall Roads and Lansdowne Avenue and State Road were all flooded and closed for several hours. In Middletown Township, several water rescues occurred in the Lima area. A Skywarn spotter also reported flooding along Cobbs Creek bordering Philadelphia. Event precipitation totals included 3.59 inches in Swarthmore, 2.85 inches in Havertown, 2.00 inches in Drexel Hill and 1.89 inches at the Philadelphia International Airport.
October 11, 2013	Flood	Chadds Ford	N/A	N/A	The runoff from the heavy rain that fell earlier on the 11th caused minor flooding along sections of the Main Stem of the Brandywine Creek that persisted into the night of the 11th. The heavy rain also caused poor drainage flooding. The Main Stem of the Brandywine Creek at Chadds Ford was above its 9 foot flood stage.
November 27, 2013	Flood	Brookhaven	N/A	N/A	Rain began on the morning of the 26th and started falling heavy at times during the late evening of the 26th. The rain continued to fall heavy at times overnight. Lighter rain then continued through most of the afternoon of the 27th before ending. Event precipitation totals averaged 2 to 3.5 with the highest amounts along the fall line from Delaware through Bucks Counties.
April 30, 2014	Flood	Marcus Hook	N/A	N/A	Very heavy rain caused widespread poor drainage and moderate to major creek flooding throughout Delaware County. States of Emergency were declared in Chester City, Darby Borough and Marple Township. Flooding along the main stem of the Brandywine Creek was the worst since Tropical Storm Floyd on September 16, 1999. Even moderate tidal flooding occurred along the Delaware River on the night of April 30th. Flooding along Chester Creek forced the evacuation of around 60 homes and 250 residents in the Parker Manor Section of Chester City. The American Red Cross assisted with opening shelters. Farther upstream, Brookhaven Borough recommended evacuations along Chester Creek Road. At the Kerlin Street Bridge, the creek was almost completely blocked by debris. The borough opened a welcome, warming center at the Borough Hall. Darby Borough declared an emergency as the Darby Creek flooded. Road closures included McDade, Springfield, New Walnut, Pine, 9th, Chestnut, 12th, 13th and 14th streets. A shelter was opened at the Darby Borough Recreation Center. U.S. Route 1 was closed in both directions between U.S..
May 1, 2014	Flood	Marcus Hook	N/A	N/A	The onshore flow that started on April 29th caused minor tidal flooding along tidal sections of the Delaware River with both high tide cycles on April 30th. But, the combination of the onshore flow and the freshwater runoff caused moderate tidal flooding along the tidal Delaware River with the high tide cycle early on May 1st.
May 16, 2014	Flood	Florida Park	N/A	N/A	The Crum Creek near Newtown Square was above its 6 foot flood stage from 206 p.m. EDT through 615 p.m. EDT on the 16th. It crested at 6.76 feet at 445 p.m.

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					EDT. Event precipitation totals included 2.80 inches in Wayne, 2.78 inches in Norwood, 2.65 inches in Media and 2.30 inches in Drexel Hill.
January 18, 2015	Flood	Edgemont	N/A	N/A	The Crum Creek at Newtown Square had minor flooding and was above its 6 foot flood stage from 256 p.m. EST through 427 p.m. EST on the 18th. It crested at 6.15 feet at 330 p.m. EST. Event precipitation totals included 1.84 inches at the Philadelphia International Airport and 1.40 inches at Garnet Valley.
April 20, 2015	Flood	Maplewood Park	N/A	N/A	Heavy rain caused poor drainage flooding in eastern Delaware County and resulted in a couple of water rescues in Lansdowne and Darby Township. Event precipitation totals included 2.04 inches in Saint Davids, 1.95 inches in Wallingford, 1.88 inches at the Philadelphia International Airport and 1.75 inches in Swarthmore.
September 10, 2015	Flash Flood	Eddystone	N/A	N/A	Very heavy rain during the evening of the 10th caused flash flooding and deep ponding of water on roadways and poor drainage areas in and around Eddystone Borough in southeastern Delaware County. The calendar day event precipitation total at nearby Philadelphia International Airport was 4.76 inches.
July 23-24, 2017	Flash Flood	Chadds Ford Ridley Park, Eddystone, & Crum Lynne Station	N/A	N/A	A stalled frontal boundary was the focus for several rounds of thunderstorms that produced damaging winds and flooding in spots. Over 8,000 people lost power.
August 23, 2017	Flood	Chadds Ford	N/A	N/A	Severe thunderstorms formed in a hot and humid airmass ahead of a cold front. Flooding on Smithbridge road between Brook lane and Ridge road in Chadds Ford.
September 16, 2017	Flood	Moore	N/A	N/A	Heavy rain showers lead to localized urban and poor drainage flooding during the evening of Saturday, September 16th. Route 420 in Prospect Park at the railroad bridge was impassible.
April 16, 2018	Flash Flood	Edgemont	N/A	N/A	Water rescues took place where Mount Alverno Road crosses Chester Creek between Middletown Township and Aston Township. A number of creeks left their banks, including Crum Creek and Chester Creek. The Crum Creek gage near Newtown Square reached 8.05 feet, exceeding its flood stage of 6 feet. The Chester Creek gage at Chester reached 10.78 feet, exceeding its flood stage of 8 feet.
May 15, 2018	Flood	Chadds Ford	N/A	N/A	Heavy rain lead to urban and small stream flooding across portions of southeast Pennsylvania. Heavy rainfall caused the Brandywine Creek at Chadds Ford to briefly reach flood stage of 9.0 feet.
June 10, 2018	Flood	Elam	N/A	N/A	Torrential rain occurred on the night of June 10 across parts of southeastern Pennsylvania, and central and southern New Jersey. Rainfall totals up to 3 to 6 inches were reported. Lane closures on Route 202 between Carter Way and Smithbridge Road.

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July 3, 2018	Flash Flood	Bryn Mawr	N/A	N/A	Severe thunderstorms caused wind damage across portions of southeastern Pennsylvania on the evening of July 3. Rainfall amounts of 1 to 3 inches fell in a short amount of time. A few locations received 3 to 4 inches of rain. Widespread roadway flooding occurred in Radnor Township. There was flooding on Interstate 476 near the Villanova exit. The flood waters left debris on the roadway. Also, there was a water rescue on Conestoga Road near County Line Road.
August 11, 2018	Flash Flood	Moore	N/A	N/A	Several areas of flash flooding occurred due to heavy rain. Rainfall totals of 2 to 5 inches were reported in southeastern Pennsylvania. Additionally, severe thunderstorms impacted the area. Twovehicles were trapped in flood waters on Lincoln Avenue in Prospect Park resulting in the need for water rescues.
August 13, 2018	Flash Flood	Boothwyn, Cheyney, Drexel Hill, Radnor, Wayne, & Florida Park	N/A	N/A	Rainfall totals of 2 to 4 inches were common in southeastern Pennsylvania with some locations receiving 5 to 6 inches of rain. The heavy rain resulted in flash flooding. Also, severe thunderstorms impacted the area.
August 31, 2018	Flash Flood	Cheyney	N/A	N/A	Locally heavy rain produced flash flooding in southeastern Pennsylvania. Rainfall totals up to 2 to 4 inches fell in parts of the region. Flash flooding caused many roads to become impassable in Thornbury Township, mainly in areas to the west of Cheyney Road.
September 10, 2018	Coastal Flood	Countywide	N/A	N/A	A persistent onshore flow and unusually high astronomical tides associated with the new moon resulted in widespread moderate coastal flooding along the tidal Delaware River and its tidal tributaries during the early hours of September 10. Moderate flooding occurred along the Delaware River and its tidal tributaries in Delaware County. The tide gage at Philadelphia reached 9.65 feet MLLW.
November 26, 2018	Coastal Flood	Countywide	N/A	N/A	A coastal storm resulted in tidal flooding along the tidal Delaware River. Moderate tidal flooding occurred along the tidal Delaware River and its tidal tributaries.
June 13, 2019	Flash Flood	Brookhaven	N/A	N/A	Minor flooding occurred along the Chester Creek in Middletown Township, Aston and Brookhaven.
June 20, 2019	Flash Flood	East Lansdowne and Edgemont	N/A	N/A	A water rescue took place in Lansdowne. A vehicle was trapped in flood waters.
July 4, 2019	Flash Flood	Broomall	N/A	N/A	Thunderstorms brought locally heavy rain to parts of southeastern Pennsylvania on the afternoon of July 4. Rainfall amounts of 1.0 to 1.5 inches fell in a short amount of time. Heavy rain resulted in lane closures along Interstate 476 between Broomall and Villanova.
July 11, 2019	Flash Flood	Florida Park & Arlington	N/A	N/A	Thunderstorms brought 2 to around 5.5 inches of rain to parts of southeastern Pennsylvania on the afternoon and evening of July 11. Minor flooding occurred along Crum Creek near Newtown Square.

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July 31, 2019	Flash Flood	Drexel Plaza	N/A	N/A	Thunderstorms brought locally heavy rain to parts of eastern Pennsylvania on the afternoon and early evening of July 31.
August 7, 2019	Flash Flood	Edgemont, Ardmore, Ithan, Moylan Rose Valley, Brookhaven, Oakmont, Briarcliff, Pilfrims Gardens	N/A	N/A	Thunderstorms brought locally heavy rain to far southeastern Pennsylvania on the afternoon of August 7. Rainfall totals of 2 to around 4 inches fell in parts of the area.
August 14, 2019	Flash Flood	Sandy Bank And Oakmont	N/A	N/A	Thunderstorms brought heavy rain to parts of southeastern Pennsylvania on the evening of August 14. Rainfall totals of 1 to around 2 inches fell at some locations.
July 10, 2020	Flash Flood	Ridley Park, Collingdale, East Lansdowne, Sandy Bank, Eddystone, Trainer, Darby, Chester, Elwyn, And Florida Park	N/A	N/A	Tropical Storm Fay moved northward along the coasts of Delaware and New Jersey on the afternoon and evening of July 10. The storm produced rainfall totals up to 3 to 5 inches in southeastern Pennsylvania. Pennsylvania did not experience any tropical storm force winds.
August 4, 2020	Flash Flood	Countywide	N/A	N/A	Tropical Storm Isaias brought high winds, heavy rain, several tornadoes, and coastal flooding to the mid-Atlantic region, becoming the most impactful tropical cyclone to impact most of the region since Sandy in 2012. Multiple water rescues and severe flooding.
June 8, 2021	Flash Flood	Chadds Ford	N/A	N/A	The bridge over Harvey Run on Ring Road in Chadds Ford Township was overtopped by flood waters.
June 14, 2021	Flash Flood	East Lansdowne	N/A	N/A	A water rescue took place at the intersection of South Union Avenue and Park Place in Yeadon.
July 12, 2021	Flash Flood	Maplewood Park	N/A	N/A	A water rescue took place in Darby Township along Hook Road near Industrial Drive.
August 19, 2021	Flash Flood	Wayne	N/A	N/A	Heavy rain associated with Post-Tropical Cyclone Fred caused flash flooding in eastern Pennsylvania on the night of August 18-19, 2021. There were rainfall totals as high as 3 to 5 inches. A water rescue took place at the intersection of Sugartown Road and Morris Road in Radnor Township. Also, there was widespread roadway flooding in Radnor Township with multiple vehicles trapped in the flood waters. There was a rockslide on Strafford Avenue near Lancaster Avenue.

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August 28, 2021	Flash Flood	Leedon Estates	N/A	N/A	Thunderstorms brought locally heavy rain to southeastern Pennsylvania during the morning and early afternoon of August 28. Rainfall totals were as high as 2.5 to 4.5 inches. PA Route 291 was closed in Tinicum Township due to flooding.
September 1, 2021	Flash Flood	Edgemont and Booth Corner	N/A	N/A	Post Tropical Cyclone Ida brought heavy rain to eastern Pennsylvania on September 1. Rainfall totals were as high as 5 to 10 inches. The heavy rain caused significant flash flooding, mainly in the southeastern part of the state. It resulted in widespread property damage. There were several fatalities. Widespread flash flooding occurred in Delaware County with numerous road closures. Many creeks in the county overflowed their banks, including Chester Creek, Ridley Creek, Crum Creek and Cobbs Creek.
September 23, 2021	Flash Flood	Drexel Plaza, Chester, Eddystone, Trainer, Wallingford, Morton, Ridley Park, and Drexel Hill	N/A	N/A	Thunderstorms produced locally heavy rain in southeastern Pennsylvania on the afternoon of September 23. Rainfall totals were as high as 2 to 3 inches. A water rescue from a vehicle took place near the intersection of Marshall Road and Ashton Road in Upper Darby Township. Burmont Road in Drexel Hill was closed due to flooding. A water rescue from a vehicle took place near the intersection of Industrial Highway and Stewart Avenue in the vicinity of Ridley Park. A water rescue from a vehicle took place near Rutledge between Unity Terrace and Waverly Terrace. Rogers Lane in Nether Providence Township was closed due to flooding. A water rescue from a stranded vehicle took place near the intersection of Industrial Highway and Saville Avenue in Eddystone. Another water rescue from a vehicle took place near the intersection of Eddystone Avenue and East Fourth Street in Eddystone. Main Street in Trainer was closed at West Seventh Street due to flooding. Several roads were closed in Chester due to flooding. A water rescue from a stranded vehicle took place near the intersection of East Fourth Street and Crosby Street.
September 23, 2021	Flash Flood	Briarcliff	N/A	N/A	A water rescue from a vehicle took place near the intersection of West Oak Lane and Bartram Avenue in Darby Township.
October 28-29, 2021	Coastal Flood	Countywide	N/A	N/A	Widespread moderate to major flooding occurred along the tidal Delaware River and its tidal tributaries. There were many road closures with the flood waters approaching numerous homes and businesses.

Sources: NOAA NCEI 2022; FEMA 2022; USACE 2022

DR *Federal Disaster Declaration*
EM *Emergency Management*
EMA *Emergency Management Agency*
FEMA *Federal Emergency Management Agency*
NCEI *National Centers for Environmental Information*
NOAA *National Oceanic Atmospheric Administration*
N/A *Not applicable/not available*
SBA *Small Business Administration*
US *United States*

4.3.8.4 Future Occurrence

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of flood waters) and the related probability of occurrence. The NFIP uses historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

The NFIP recognizes the 1 percent annual chance flood, also known as the *base flood*, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1 percent annual chance flood is a flood that has a 1 percent chance of occurring over a given year. The DFIRMs identify areas subject to the 1 percent and 0.2 percent annual chance flooding. Areas subject to 2 percent and 10 percent annual chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained in the Flood Insurance Study Report. Table 4.3.8-6 shows a range of flood recurrence intervals and associated probabilities of occurrence.

Table 4.3.8-6. Recurrence intervals and associated probabilities of occurrence

Flood Recurrence Interval	Chance of Occurrence in Any Given Year (%)	Flows
5 year	20	Extreme
10 year	10	Heavy to extreme
25 year	4	Moderate
50 year	2	Light to moderate
100 year	1	Light
500 year	0.2	Mild

Based on the historic and more recent flood events in Delaware County, it is clear that the county has a high probability of flooding for the future. The fact that the elements required for flooding exist and that major flooding has occurred throughout the county in the past suggests that many people and properties are at risk from the flood hazard in the future.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of flooding events for Delaware County. Information from NOAA NCEI storm events database, FEMA, Pennsylvania State Climatologist, and the CRREL ice jam database were used to identify the number of flood events that occurred between 1950 and 2021. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimated percent chance of an incident occurring in a given year.

Table 4.3.8-7. Probability of Future Flooding Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Recurrence Interval (in Years) (# Years/Number of Events)	Percent Chance of Occurrence in Any Given Year
Flash Flood	57	1.26	79.17%
Flood and Coastal Flood	79	0.91	100%
Ice Jam	0	0	0%

Sources: NOAA NCEI 2022; FEMA 2022; USACE 2022

It is estimated that Delaware County will continue to experience direct and indirect impacts of annual flooding events that may induce secondary hazards, such as infrastructure deterioration or failure, utility failures; power

outages; water quality and supply concerns; and transportation delays, accidents, and inconveniences. Therefore, the future occurrence of floods in Delaware County has been adjusted and characterized as *highly likely,* when taking into consideration flash flooding, as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.8.5 Vulnerability Assessment

The 1 and 0.2 percent annual chance flood events were examined to evaluate Delaware County's flood risk. Polygons representing the 1 and 0.2 percent annual chance events from the FEMA Risk Map products dated September 2017 were used to estimate exposure. Figure 4.3.8-3 presented earlier in this section illustrates the flood boundaries used for the vulnerability assessment. The 1 percent annual chance flood depth grid generated for the FEMA Risk Map program was imported into FEMA's Hazus model and a riverine analysis was processed to estimate potential losses. To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the flood hazard on the county, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

Impacts of flooding on life, health, and safety depend on several factors including severity of the event and whether or not adequate warning time is provided to residents. Assumedly, the population living in or near floodplain areas that could be impacted by a flood would be exposed. However, exposure should not be limited only to those who reside within a defined hazard zone, but everyone who may be affected by a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event, as well as the first responders' safety); the degree of that impact varies and is not strictly measurable.

Based on the spatial analysis, an estimated 14,824 people live in the SFHA (or 1 percent annual chance event floodplain) and an estimated 21,728 people are located in the 0.2 percent annual chance flood event floodplain (Table 4.3.8-8). In the event of a flood hazard, these residents could be displaced from their homes, requiring them to seek temporary shelter with friends, family, or emergency shelters. The Township of Upper Darby has the greatest estimated number of individuals residing in the floodplain—approximately 3,150 people in the 1 percent and 4,492 people in the 0.2 percent chance flood boundaries, respectively. The Township of Tinicum has the highest percentage of population within the 1 percent and 0.2 percent annual chance floodplains (19.6 percent and 33.7 percent, respectively, of its 3,983 total Township population). For this project, the potential population exposed is used as a guide for planning purposes.

Table 4.3.8-8 Estimated Delaware County Population Exposed to the 1 percent and 0.2 percent Flood Hazard Area

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
Aldan (B)	4,244	70	1.7%	76	1.8%
Aston (Twp)	16,791	210	1.3%	269	1.6%
Bethel (Twp)	9,574	48	0.5%	49	0.5%
Brookhaven (B)	8,300	115	1.4%	183	2.2%
Chadds Ford (Twp)	3,972	71	1.8%	92	2.3%
Chester City (C)	32,605	887	2.7%	1,551	4.8%
Chester (Twp)	4,080	225	5.5%	629	15.4%
Chester Heights (B)	2,897	12	0.4%	16	0.6%
Clifton Heights (B)	6,863	43	0.6%	58	0.8%
Collingdale (B)	8,908	107	1.2%	109	1.2%
Colwyn (B)	2,474	275	11.1%	337	13.6%
Concord (Twp)	18,295	98	0.5%	128	0.7%
Darby (B)	10,715	572	5.3%	824	7.7%
Darby (Twp)	9,219	267	2.9%	289	3.1%
East Lansdowne (B)	2,714	0	0.0%	0	0.0%
Eddystone (B)	2,459	371	15.1%	1,285	52.3%
Edgmont (Twp)	4,283	63	1.5%	64	1.5%
Folcroft (B)	6,792	249	3.7%	470	6.9%
Glenolden (B)	7,223	550	7.6%	550	7.6%
Haverford (Twp)	50,431	747	1.5%	1,032	2.0%
Lansdowne (B)	11,107	86	0.8%	134	1.2%
Lower Chichester (Twp)	3,425	1	0.0%	2	0.0%
Marcus Hook (B)	2,454	29	1.2%	179	7.3%
Marple (Twp)	24,214	378	1.6%	422	1.7%
Media (B)	5,901	68	1.2%	68	1.2%
Middletown (Twp)	16,373	366	2.2%	455	2.8%
Millbourne (B)	1,212	0	0.0%	2	0.2%
Morton (B)	2,778	202	7.3%	271	9.7%
Nether Providence (Twp)	14,525	497	3.4%	527	3.6%
Newtown (Twp)	15,002	159	1.1%	165	1.1%
Norwood (B)	5,943	56	0.9%	104	1.8%
Parkside (B)	2,321	0	0.0%	0	0.0%
Prospect Park (B)	6,427	91	1.4%	236	3.7%
Radnor (Twp)	33,228	1,139	3.4%	1,251	3.8%
Ridley (Twp)	31,053	998	3.2%	1,427	4.6%
Ridley Park (B)	7,186	115	1.6%	143	2.0%
Rose Valley (B)	1,017	31	3.0%	34	3.4%
Rutledge (B)	782	7	0.8%	20	2.6%
Sharon Hill (B)	6,014	87	1.4%	150	2.5%
Springfield (Twp)	25,070	388	1.5%	462	1.8%
Swarthmore (B)	6,543	154	2.3%	159	2.4%
Thornbury (Twp)	6,904	111	1.6%	177	2.6%

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
Tinicum (Twp)	3,983	781	19.6%	1,343	33.7%
Trainer (B)	1,976	102	5.2%	121	6.1%
Upland (B)	3,068	259	8.4%	563	18.4%
Upper Chichester (Twp)	16,898	277	1.6%	335	2.0%
Upper Darby (Twp)	85,681	3,150	3.7%	4,492	5.2%
Upper Providence (Twp)	10,852	108	1.0%	120	1.1%
Yeadon (B)	12,054	206	1.7%	354	2.9%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**14,824**	**2.6%**	**21,728**	**3.8%**

Source: Census 2010/2020; FEMA 2017
Note: Census 2020 decennial population data was used to update the Census 2010 daysmetric block population estimates. Census 2010 dasymetric blocks were used to estimate the areas where development exists in each municipality. These boundaries may over or underestimate the density location of population within each municipality, impacting the exposure results.

B – Borough; C – City; Twp. – Township

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over the age of 65. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impact on their families. The population over the age of 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available because of isolation during a flood event, and they may have more difficulty evacuating. They also may need to seek or need medical attention that may not be available due to isolation during a flood event. Within Delaware County, approximately 90,402 people are over the age of 65 and 54,356 people are below the poverty level. The Township of Upper Darby, which has the most people in the floodplain, the largest elderly population (age over 65 years) of 9,599, and the highest number of citizens living below the poverty level 11,668.

Using 2010 U.S. Census data, Hazus estimates the potential sheltering needs as a result of a 1 percent annual chance flood event. For the 1 percent flood event, Hazus estimates 14,467 people will be displaced, and 3,230 people will seek short-term sheltering. The Township of Upper Darby would have the greatest displaced population (2,821 people) and the greatest number of persons seeking short-term shelter (424 people). These statistics, by jurisdiction, are presented in Table 4.3.8-9. The estimated displaced population and number of persons seeking short-term sheltering differs from the number of persons exposed to the 1 percent annual chance flood, because the displaced population numbers take into consideration that not all residents will be significantly impacted enough to be displaced or to require short-term sheltering during a flood event.

Table 4.3.8-9 Estimated Population Displaced or Seeking Short-Term Shelter from the 1-Percent Annual Chance Flood Event

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	1-Percent Annual Chance Flood Event	
		Displaced Population	Persons Seeking Short-Term Sheltering
Aldan (B)	4,244	62	21
Aston (Twp)	16,791	207	57
Bethel (Twp)	9,574	42	40
Brookhaven (B)	8,300	120	53

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	1-Percent Annual Chance Flood Event	
		Displaced Population	Persons Seeking Short-Term Sheltering
Chadds Ford (Twp)	3,972	66	25
Chester City (C)	32,605	1,654	180
Chester (Twp)	4,080	256	34
Chester Heights (B)	2,897	15	4
Clifton Heights (B)	6,863	44	3
Collingdale (B)	8,908	100	44
Colwyn (B)	2,474	283	15
Concord (Twp)	18,295	96	62
Darby (B)	10,715	640	85
Darby (Twp)	9,219	261	66
East Lansdowne (B)	2,714	0	0
Eddystone (B)	2,459	309	30
Edgmont (Twp)	4,283	54	30
Folcroft (B)	6,792	248	60
Glenolden (B)	7,223	423	81
Haverford (Twp)	50,431	665	137
Lansdowne (B)	11,107	76	33
Lower Chichester (Twp)	3,425	1	0
Marcus Hook (B)	2,454	30	5
Marple (Twp)	24,214	323	139
Media (B)	5,901	47	15
Middletown (Twp)	16,373	294	110
Millbourne (B)	1,212	0	0
Morton (B)	2,778	153	23
Nether Providence (Twp)	14,525	413	141
Newtown (Twp)	15,002	144	81
Norwood (B)	5,943	58	31
Parkside (B)	2,321	0	0
Prospect Park (B)	6,427	83	16
Radnor (Twp)	33,228	1,001	261
Ridley (Twp)	31,053	928	228
Ridley Park (B)	7,186	109	42
Rose Valley (B)	1,017	25	12
Rutledge (B)	782	5	1
Sharon Hill (B)	6,014	81	31
Springfield (Twp)	25,070	345	121
Swarthmore (B)	6,543	127	45
Thornbury (Twp)	6,904	198	81
Tinicum (Twp)	3,983	846	71
Trainer (B)	1,976	98	13
Upland (B)	3,068	311	25
Upper Chichester (Twp)	16,898	296	160
Upper Darby (Twp)	85,681	2,821	424
Upper Providence (Twp)	10,852	108	38
Yeadon (B)	12,054	176	56
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**14,647**	**3,230**

Source: Hazus v5.1, Census 2010

Notes: B – Borough; C – City; Twp. – Township
Census 2010 boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 population data may under or overestimate displacement and sheltering needs.

Total number of injuries and casualties resulting from typical riverine flooding is generally limited because of advance weather forecasting, blockades, and warnings. Therefore, injuries and deaths generally are not anticipated if proper warning occurs and precautions are in place. Warning time for flash flooding is often limited. Flash flood events are frequently associated with other natural hazard events, such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard. Ongoing mitigation efforts should help to avoid the most likely cause of injury—persons trying to cross flooded roadways or channels. Mitigation action items addressing this issue are included in Section 6 (Mitigation Strategy) of this plan.

Cascading impacts may also include exposure to pathogens such as mold. After flood events, excess moisture and standing water contribute to growth of mold in buildings. Mold may present a health risk to building occupants, especially those with already compromised immune systems such as infants, children, the elderly, and pregnant women. The degree of impact will vary and is not strictly measurable. Mold can grow in as short a period as 24-48 hours in wet and damaged areas of buildings that have not been properly cleaned. Very small mold spores can easily be inhaled, creating potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth (Centers for Disease Control and Prevention [CDC] 2015).

Mold and mildew are not the only public health risk associated with flooding. Flood waters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include:

- Unsafe food
- Contaminated drinking and washing water and poor sanitation
- Mosquitos and animals
- Carbon monoxide poisoning
- Secondary hazards associated with re-entering/cleaning flooded structures
- Mental stress and fatigue.

Current loss estimation models, such as Hazus, are not equipped to measure public health impacts. The best mitigation measures for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to address these vulnerabilities in responding to flood events.

Impact on General Building Stock

After consideration of the population exposed and vulnerable to the flood hazard, the built environment was evaluated. Exposure to the flood hazard includes those buildings within the flood zone. Potential damage is the modeled loss that could occur to the exposed inventory, including structural and content value.

The potential damage caused by flood events is the modeled loss that could occur to the exposed building stock measured by the structural and content replacement cost value. Table 4.3.8-10 summarizes these results. In total, 5,109 structures, or 2.6 percent of the building stock, are within the 1 percent annual chance flood zone; and 7,465 structures, or 3.8 percent of the building stock, are within the 0.2 percent flood zone.

Furthermore, Hazus estimated potential damage to buildings in Delaware County for the 1 percent annual chance flood event. Table 4.3.8-11 summarizes these results. In total, Hazus estimates $739.9 million in potential building damage. Hazus estimates $372.6 million in residential building loss.

Table 4.3.8-10 Estimated General Building Stock Exposure to the 1 Percent and 0.2 Percent Annual Chance Flood Event – All Occupancies

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located in the Flood Hazard Area			
		Number of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
Aldan (B)	1,673	25	1.5%	27	1.6%
Aston (Twp)	6,202	95	1.5%	119	1.9%
Bethel (Twp)	3,164	16	0.5%	16	0.5%
Brookhaven (B)	3,185	39	1.2%	62	2.0%
Chadds Ford (Twp)	1,402	35	2.5%	43	3.0%
Chester City (C)	11,646	343	2.9%	612	5.3%
Chester (Twp)	1,596	75	4.7%	213	13.4%
Chester Heights (B)	1,022	12	1.2%	14	1.4%
Clifton Heights (B)	2,324	23	1.0%	31	1.3%
Collingdale (B)	3,130	41	1.3%	42	1.3%
Colwyn (B)	839	98	11.7%	120	14.4%
Concord (Twp)	5,400	36	0.7%	45	0.8%
Darby (B)	3,569	211	5.9%	305	8.5%
Darby (Twp)	3,763	118	3.1%	130	3.5%
East Lansdowne (B)	906	0	0.0%	0	0.0%
Eddystone (B)	876	135	15.4%	458	52.3%
Edgmont (Twp)	1,579	30	1.9%	30	1.9%
Folcroft (B)	2,500	90	3.6%	174	7.0%
Glenolden (B)	2,453	144	5.9%	144	5.9%
Haverford (Twp)	17,876	258	1.4%	370	2.1%
Lansdowne (B)	3,838	24	0.6%	35	0.9%
Lower Chichester (Twp)	1,266	1	0.1%	1	0.1%
Marcus Hook (B)	831	11	1.3%	58	7.0%
Marple (Twp)	8,652	132	1.5%	147	1.7%
Media (B)	2,076	29	1.4%	29	1.4%
Middletown (Twp)	5,161	117	2.3%	146	2.8%
Millbourne (B)	243	0	0.0%	0	0.2%
Morton (B)	927	66	7.2%	88	9.5%
Nether Providence (Twp)	5,153	170	3.3%	180	3.5%
Newtown (Twp)	4,691	58	1.2%	61	1.3%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located in the Flood Hazard Area			
		Number of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
Norwood (B)	2,092	21	1.0%	40	1.9%
Parkside (B)	851	0	0.0%	0	0.0%
Prospect Park (B)	2,086	33	1.6%	86	4.1%
Radnor (Twp)	8,992	313	3.5%	346	3.8%
Ridley (Twp)	11,070	367	3.3%	519	4.7%
Ridley Park (B)	2,403	41	1.7%	50	2.1%
Rose Valley (B)	402	13	3.3%	15	3.7%
Rutledge (B)	287	2	0.9%	8	2.7%
Sharon Hill (B)	2,024	27	1.3%	49	2.4%
Springfield (Twp)	9,233	156	1.7%	182	2.0%
Swarthmore (B)	1,721	35	2.0%	36	2.1%
Thornbury (Twp)	2,361	40	1.7%	62	2.6%
Tinicum (Twp)	1,917	433	22.6%	702	36.6%
Trainer (B)	678	35	5.2%	43	6.3%
Upland (B)	1,297	127	9.8%	252	19.4%
Upper Chichester (Twp)	6,005	112	1.9%	132	2.2%
Upper Darby (Twp)	27,681	844	3.0%	1,127	4.1%
Upper Providence (Twp)	3,636	46	1.3%	51	1.4%
Yeadon (B)	3,741	33	0.9%	64	1.7%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**196,420**	**5,109**	**2.6%**	**7,465**	**3.8%**

Source: Census 2010; FEMA 2017
Note: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 data may over or under estimate the number of buildings found in each municipality. B – Borough; C – City; Twp. – Township

Table 4.3.8-11 Estimated General Building Stock Potential Loss to the 1 Percent Annual Chance Flood Event

Jurisdiction	Estimated Loss for All Occupancies	Estimated Loss for Residential Properties	Estimated Loss for Commercial Properties	Estimated Loss for All Other Occupancies
Aldan (B)	$2,624,359	$2,250,168	$361,191	$13,000
Aston (Twp)	$29,377,837	$8,705,289	$10,915,221	$9,757,328
Bethel (Twp)	$728,682	$709,356	$14,055	$5,272
Brookhaven (B)	$6,335,864	$5,860,106	$368,210	$107,548
Chadds Ford (Twp)	$14,342,515	$1,665,585	$3,633,998	$9,042,932
Chester City (C)	$65,366,831	$30,489,077	$13,081,602	$21,796,152
Chester (Twp)	$6,732,665	$5,910,604	$363,312	$458,749
Chester Heights (B)	$3,001,208	$765,205	$609,506	$1,626,497
Clifton Heights (B)	$10,915,925	$966,137	$6,102,055	$3,847,733
Collingdale (B)	$3,155,248	$1,265,527	$1,448,631	$441,090
Colwyn (B)	$16,747,280	$9,795,028	$6,384,116	$568,135
Concord (Twp)	$4,876,396	$1,709,255	$2,372,065	$795,076
Darby (B)	$72,985,543	$35,306,178	$34,988,051	$2,691,314
Darby (Twp)	$5,717,812	$3,955,829	$1,324,442	$437,540
East Lansdowne (B)	$0	$0	$0	$0
Eddystone (B)	$10,474,136	$6,165,633	$2,457,961	$1,850,543
Edgmont (Twp)	$3,664,053	$2,031,956	$1,269,311	$362,786
Folcroft (B)	$4,686,623	$3,085,394	$988,608	$612,620
Glenolden (B)	$10,486,533	$9,182,627	$1,224,673	$79,233
Haverford (Twp)	$43,392,546	$29,253,836	$13,084,563	$1,054,147
Lansdowne (B)	$4,355,732	$3,415,543	$498,605	$441,584
Lower Chichester (Twp)	$97,391	$39,011	$57,955	$425
Marcus Hook (B)	$109,707	$46,073	$41,010	$22,623
Marple (Twp)	$17,596,545	$12,046,408	$3,926,141	$1,623,996
Media (B)	$2,258,943	$1,801,948	$408,992	$48,003
Middletown (Twp)	$24,839,939	$16,594,565	$4,065,983	$4,179,390
Millbourne (B)	$313	$0	$313	$0
Morton (B)	$2,205,684	$1,192,669	$588,006	$425,008
Nether Providence (Twp)	$17,502,127	$12,261,629	$4,303,288	$937,209
Newtown (Twp)	$5,318,683	$3,398,144	$1,579,658	$340,881
Norwood (B)	$1,017,852	$986,704	$4,150	$26,998
Parkside (B)	$873	$611	$182	$80
Prospect Park (B)	$1,605,206	$1,535,782	$69,349	$75

Jurisdiction	Estimated Loss for All Occupancies	Estimated Loss for Residential Properties	Estimated Loss for Commercial Properties	Estimated Loss for All Other Occupancies
Radnor (Twp)	$33,655,714	$22,358,629	$7,066,467	$4,230,618
Ridley (Twp)	$46,556,729	$15,321,682	$21,791,185	$9,443,862
Ridley Park (B)	$3,569,814	$2,708,914	$364,917	$495,982
Rose Valley (B)	$3,217,308	$2,084,691	$616,622	$515,994
Rutledge (B)	$96,584	$34,037	$0	$62,547
Sharon Hill (B)	$6,784,292	$2,327,136	$3,938,536	$518,620
Springfield (Twp)	$19,105,863	$9,747,570	$8,150,153	$1,208,140
Swarthmore (B)	$5,453,951	$3,363,517	$1,371,682	$718,752
Thornbury (Twp)	$7,052,306	$5,491,461	$155,078	$1,405,767
Tinicum (Twp)	$37,089,914	$9,363,000	$15,991,914	$11,735,000
Trainer (B)	$4,212,250	$1,157,273	$604,416	$2,450,561
Upland (B)	$45,594,990	$5,841,218	$13,222,888	$26,530,884
Upper Chichester (Twp)	$11,783,395	$4,844,059	$4,916,383	$2,022,953
Upper Darby (Twp)	$105,979,570	$64,010,979	$30,217,306	$11,751,286
Upper Providence (Twp)	$8,729,912	$4,437,800	$3,732,416	$559,696
Yeadon (B)	$8,538,779	$7,138,942	$669,565	$730,272
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A
Delaware County (Total)	**$739,942,418**	**$372,622,788**	**$229,344,730**	**$137,974,900**

Sources: Hazus v5.1, Census 2010
Note: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. The Hazus results may under or overestimate losses to structures in each municipality
B – Borough; C – City; Twp. – Township

NFIP Statistics

In addition to total building stock modeling, individual data on flood policies, claims, repetitive loss (RL), and severe repetitive loss (SRL) properties were analyzed.

According to August 2022 data (the most recent data available for this plan update), Delaware County has 2,288 NFIP policies, totaling $606,748,200 in coverage (FEMA 2022). Since 1978, there have been 2,486 total claims for NFIP policies in the county for a total of $40,013,226 in losses paid (PEMA 2019).

According to Section 1361A of the National Flood Insurance Act (NFIA), as amended, 42 *United States Code* (U.S.C.) 4102a, the definition of an SRL property is a residential property covered by an NFIP flood insurance policy, and for which at least one of the following sets of claim payments have occurred:

- At least four NFIP claim payments (including building and contents) over $5,000 each, with the cumulative amount payments for these claims exceeding $20,000
- At least two separate payments for claims (building payments only), with the cumulative amount of the building portion of these payments exceeding the market value of the building

Moreover, for both above, at least two of the referenced claims must have occurred within any 10-year period and must have been submitted separately on dates more than 10 days apart.

An RL property is defined by FEMA's Flood Mitigation Assistance (FMA) Program as an NFIP-insured structure that incurred flood-related damage on two occasions, and for which the cost of repair equaled or exceeded 25 percent of the market value of the structure at the time of each such flood.

According to data from October 2022, Delaware County has 345 NFIP RL and 83 NFIP SRL properties throughout the county. Table 4.3.8-12 summarizes RL properties and Table 4.3.8-13 summarizes SRL properties in Delaware County.

Table 4.3.8-12 Total and Mitigated NFIP-Defined Repetitive Loss Properties in Delaware County

Jurisdiction	Single Family		2-4 Family		Other Res.		Bus. Non-Res		Other Non-Res		TOTAL	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Aldan (B)	-	-	-	-	-	-	-	-	-	-	-	-
Aston (Twp)	1	0	2	0	-	-	-	-	2	0	5	0
Bethel (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Brookhaven (B)	8	1	-	-	-	-	1	0	-	-	9	1
Chadds Ford (Twp)	3	0	-	-	-	-	2	0	3	0	8	0
Chester (C)	26	0	-	-	-	-	-	-	3	0	29	0
Chester (Twp)	22	8	1	0	-	-	-	-	-	-	23	8
Chester Heights (B)	1	0	-	-	-	-	-	-	-	-	1	0
Clifton Heights (B)	-	-	-	-	-	-	1	0	-	-	1	0
Collingdale (B)	1	0	-	-	-	-	3	0	4	0	8	0
Colwyn (B)	6	0	-	-	-	-	2	0	7	0	15	0
Concord (Twp)	3	0	-	-	-	-	-	-	1	0	4	0
Darby (B)	32	17	6	0	1	0	7	0	6	0	52	17
Darby (Twp)	1	0	-	-	-	-	1	0	-	-	2	0
East Lansdowne (B)	-	-	-	-	-	-	-	-	-	-	-	-
Eddystone (B)	1	0	-	-	-	-	-	-	-	-	1	0
Edgmont (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Folcroft (B)	-	-	-	-	-	-	-	-	-	-	-	-

Jurisdiction	Single Family		2-4 Family		Other Res.		Bus. Non-Res		Other Non-Res		TOTAL	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Glenolden (B)	-	-	-	-	-	-	-	-	-	-	-	-
Haverford (Twp)	13	0	-	-	-	-	-	-	3	0	16	0
Lansdowne (B)	1	0	-	-	-	-	-	-	-	-	1	0
Lower Chichester (Twp)	-	-	-	-	-	-	1	0	-	-	1	0
Marcus Hook (B)	-	-	-	-	-	-	-	-	-	-	-	-
Marple (Twp)	2	0	-	-	3	0	-	-	-	-	5	0
Media (B)	1	0	-	-	-	-	-	-	-	-	1	0
Middletown (Twp)	1	0	-	-	1	0	-	-	-	-	2	0
Millbourne (B)	-	-	-	-	-	-	-	-	-	-	-	-
Morton (B)	1	0	-	-	-	-	-	-	-	-	1	0
Nether Providence (Twp)	3	0	-	-	-	-	-	-	-	-	3	0
Newtown (Twp)	2	0	-	-	-	-	-	-	-	-	2	0
Norwood (B)	-	-	-	-	-	-	-	-	-	-	-	-
Parkside (B)	-	-	-	-	-	-	-	-	-	-	-	-
Prospect Park (B)	-	-	-	-	-	-	-	-	-	-	-	-
Radnor (Twp)	18	0	1	0	-	-	1	0	-	-	20	0
Ridley (Twp)	8	0	1	0	2	0	-	-	3	0	14	0
Ridley Park (B)	-	-	-	-	-	-	-	-	-	-	-	-
Rose Valley (B)	-	-	-	-	-	-	-	-	-	-	-	-
Rutledge (B)	-	-	-	-	-	-	-	-	-	-	-	-
Sharon Hill (B)	-	-	-	-	-	-	-	-	-	-	-	-
Springfield (Twp)	18	0	-	-	-	-	-	-	1	0	19	0
Swarthmore (B)	1	0	-	-	-	-	-	-	-	-	1	0
Thornbury (Twp)	1	0	-	-	-	-	-	-	-	-	1	0
Tinicum (Twp)	4	0	1	1	-	-	-	-	-	-	5	1
Trainer (B)	-	-	2	0	-	-	-	-	-	-	2	0
Upland (B)	16	0	-	-	-	-	4	0	13	1	33	1
Upper Chichester (Twp)	1	0	-	-	-	-	1	0	-	-	2	0
Upper Darby (Twp)	46	0	1	0	-	-	4	0	6	0	57	0
Upper Providence (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Yeadon (B)	1	0	-	-	-	-	-	-	-	-	1	0
Brandywine Conservancy and Museum of Art Special District	-	-	-	-	-	-	-	-	-	-	-	-
Delaware County (Total)	243	26	15	1	7	0	28	0	52	1	345	28

Source: PEMA 2022
Note: Mit - Mitigated

Table 4.3.8-13 Total and Mitigated NFIP-Defined Severe Repetitive Loss Properties in Delaware County

Jurisdiction	Single Family		2-4 Family		Other Res.		Bus. Non-Res		Other Non-Res		TOTAL	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Aldan (B)	-	-	-	-	-	-	-	-	-	-	-	-
Aston (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Bethel (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Brookhaven (B)	2	0	-	-	-	-	-	-	-	-	2	0
Chadds Ford (Twp)	1	0	-	-	-	-	1	0	-	-	2	0
Chester (C)	9	0	-	-	-	-	-	-	1	0	10	0

Jurisdiction	Single Family		2-4 Family		Other Res.		Bus. Non-Res		Other Non-Res		TOTAL	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Chester (Twp)	7	0	1	0	-	-	-	-	-	-	8	0
Chester Heights (B)	-	-	-	-	-	-	-	-	-	-	-	-
Clifton Heights (B)	-	-	-	-	-	-	1	0	-	-	1	0
Collingdale (B)	-	-	-	-	-	-	2	0	1	0	3	0
Colwyn (B)	2	0	-	-	-	-	2	0	2	0	6	0
Concord (Twp)	1	0	-	-	-	-	-	-	-	-	1	0
Darby (B)	3	0	4	0	1	0	4	0	2	0	14	0
Darby (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
East Lansdowne (B)	-	-	-	-	-	-	-	-	-	-	-	-
Eddystone (B)	-	-	-	-	-	-	-	-	-	-	-	-
Edgmont (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Folcroft (B)	-	-	-	-	-	-	-	-	-	-	-	-
Glenolden (B)	-	-	-	-	-	-	-	-	-	-	-	-
Haverford (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Lansdowne (B)	-	-	-	-	-	-	-	-	-	-	-	-
Lower Chichester (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Marcus Hook (B)	-	-	-	-	-	-	-	-	-	-	-	-
Marple (Twp)	1	0	-	-	1	0	-	-	-	-	2	0
Media (B)	-	-	-	-	-	-	-	-	-	-	-	-
Middletown (Twp)	-	-	-	-	1	0	-	-	-	-	1	0
Millbourne (B)	-	-	-	-	-	-	-	-	-	-	-	-
Morton (B)	-	-	-	-	-	-	-	-	-	-	-	-
Nether Providence (Twp)	2	0	-	-	-	-	-	-	-	-	2	0
Newtown (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Norwood (B)	-	-	-	-	-	-	-	-	-	-	-	-
Parkside (B)	-	-	-	-	-	-	-	-	-	-	-	-
Prospect Park (B)	-	-	-	-	-	-	-	-	-	-	-	-
Radnor (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Ridley (Twp)	1	0	-	-	-	-	-	-	-	-	1	0
Ridley Park (B)	-	-	-	-	-	-	-	-	-	-	-	-
Rose Valley (B)	-	-	-	-	-	-	-	-	-	-	-	-
Rutledge (B)	-	-	-	-	-	-	-	-	-	-	-	-
Sharon Hill (B)	-	-	-	-	-	-	-	-	-	-	-	-
Springfield (Twp)	7	0	-	-	-	-	-	-	1	0	8	0
Swarthmore (B)	-	-	-	-	-	-	-	-	-	-	-	-
Thornbury (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Tinicum (Twp)	-	-	1	1	-	-	-	-	-	-	1	1
Trainer (B)	-	-	2	0	-	-	-	-	-	-	2	0
Upland (B)	3	0	-	-	-	-	3	0	6	0	12	0
Upper Chichester (Twp)	-	-	-	-	-	-	1	0	-	-	1	0
Upper Darby (Twp)	4	0	-	-	-	-	2	0	-	-	6	0
Upper Providence (Twp)	-	-	-	-	-	-	-	-	-	-	-	-
Yeadon (B)	-	-	-	-	-	-	-	-	-	-	-	-
Brandywine Conservancy and Museum of Art Special District	-	-	-	-	-	-	-	-	-	-	-	-
Delaware County (Total)	43	0	8	1	3	0	16	0	13	0	83	1

Source: PEMA 2022
Note: Mit - Mitigated

Impact on Critical Facilities

It is important to determine the critical facilities and infrastructure within the county that may be at risk to flooding (riverine, dam failure, flash/stormwater flooding), and that may be impacted should damage occur. Critical services during and after a flood event may not be available if facilities are directly damaged or transportation routes to access these critical facilities are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout the planning area to many service providers needing to get to vulnerable populations or to make repairs. Utilities, such as overhead power, cable, and phone lines, could also be vulnerable because of damage to utility poles by standing water or the surge of water from a dam failure event. Loss of these utilities could create additional isolation issues for the inundation zones.

Critical facility exposure to the 1 percent and 0.2 percent annual chance flood hazard event boundary was examined. Table 4.3.8-14 lists critical facilities and utilities within the 1 percent annual change flood boundary. Table 4.3.8-15 lists critical facilities and utilities within the 0.2 percent annual change flood boundary. Section 4.4 (Hazard Vulnerability Summary) provides more information about the critical facilities and lifelines in Delaware County. Of the 110 critical facilities located in the 1 percent annual chance flood event boundary, 100 are considered lifelines for the county and out of the 138 critical facilities located in the 0.2 percent annual chance flood event boundary, 122 are considered lifelines for the county.

Table 4.3.8-14 Critical Facilities within the 1 Percent Annual Chance Flood Boundary

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 1-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	4	10.3%	4	10.8%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	0	0.0%	0	0.0%
Chadds Ford (Twp)	17	16	3	17.6%	3	18.8%
Chester City (C)	88	83	9	10.2%	8	9.6%
Chester (Twp)	21	20	0	0.0%	0	0.0%
Chester Heights (B)	5	5	1	20.0%	1	20.0%
Clifton Heights (B)	14	12	3	21.4%	3	25.0%
Collingdale (B)	16	13	0	0.0%	0	0.0%
Colwyn (B)	7	6	0	0.0%	0	0.0%
Concord (Twp)	49	45	3	6.1%	3	6.7%
Darby (B)	31	27	5	16.1%	5	18.5%
Darby (Twp)	22	21	3	13.6%	3	14.3%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	3	16.7%	3	16.7%
Edgmont (Twp)	16	16	0	0.0%	0	0.0%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	3	14.3%	3	15.0%
Haverford (Twp)	87	83	1	1.1%	1	1.2%
Lansdowne (B)	26	24	0	0.0%	0	0.0%
Lower Chichester (Twp)	13	12	0	0.0%	0	0.0%
Marcus Hook (B)	21	20	3	14.3%	3	15.0%
Marple (Twp)	64	57	2	3.1%	2	3.5%
Media (B)	26	21	1	3.8%	1	4.8%
Middletown (Twp)	62	59	7	11.3%	7	11.9%
Millbourne (B)	4	4	0	0.0%	0	0.0%
Morton (B)	6	5	0	0.0%	0	0.0%
Nether Providence (Twp)	34	33	1	2.9%	1	3.0%
Newtown (Twp)	44	39	6	13.6%	6	15.4%
Norwood (B)	15	13	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 1-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	2	10.0%	2	10.5%
Radnor (Twp)	78	74	7	9.0%	7	9.5%
Ridley (Twp)	66	62	10	15.2%	10	16.1%
Ridley Park (B)	23	22	1	4.3%	1	4.5%
Rose Valley (B)	4	4	1	25.0%	1	25.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%
Sharon Hill (B)	18	16	0	0.0%	0	0.0%
Springfield (Twp)	63	61	6	9.5%	5	8.2%
Swarthmore (B)	16	13	0	0.0%	0	0.0%
Thornbury (Twp)	22	21	3	13.6%	3	14.3%
Tinicum (Twp)	24	23	8	33.3%	8	34.8%
Trainer (B)	13	13	1	7.7%	1	7.7%
Upland (B)	14	14	2	14.3%	2	14.3%
Upper Chichester (Twp)	31	28	1	3.2%	1	3.6%
Upper Darby (Twp)	153	138	6	3.9%	6	4.3%
Upper Providence (Twp)	27	25	3	11.1%	3	12.0%
Yeadon (B)	23	22	1	4.3%	1	4.5%
Brandywine Conservancy and Museum of Art Special District	0	0	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**110**	**7.7%**	**108**	**8.1%**

Source: Delaware County 2021/2022; HIFLD 2018/2022; FEMA 2017
Note: B – Borough; C – City; Twp. – Township

Table 4.3.8-15. Critical Facilities within the 0.2 Percent Annual Chance Flood Boundary

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 0.2-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	4	10.3%	4	10.8%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	1	6.3%	1	6.7%
Chadds Ford (Twp)	17	16	4	23.5%	4	25.0%
Chester City (C)	88	83	15	17.0%	13	15.7%
Chester (Twp)	21	20	0	0.0%	0	0.0%
Chester Heights (B)	5	5	1	20.0%	1	20.0%
Clifton Heights (B)	14	12	3	21.4%	3	25.0%
Collingdale (B)	16	13	0	0.0%	0	0.0%
Colwyn (B)	7	6	0	0.0%	0	0.0%
Concord (Twp)	49	45	3	6.1%	3	6.7%
Darby (B)	31	27	5	16.1%	5	18.5%
Darby (Twp)	22	21	3	13.6%	3	14.3%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	6	33.3%	6	33.3%
Edgmont (Twp)	16	16	0	0.0%	0	0.0%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	3	14.3%	3	15.0%
Haverford (Twp)	87	83	1	1.1%	1	1.2%
Lansdowne (B)	26	24	0	0.0%	0	0.0%
Lower Chichester (Twp)	13	12	0	0.0%	0	0.0%
Marcus Hook (B)	21	20	6	28.6%	6	30.0%
Marple (Twp)	64	57	2	3.1%	2	3.5%
Media (B)	26	21	1	3.8%	1	4.8%
Middletown (Twp)	62	59	7	11.3%	7	11.9%
Millbourne (B)	4	4	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the 0.2-Percent Annual Chance Flood Event Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Morton (B)	6	5	0	0.0%	0	0.0%
Nether Providence (Twp)	34	33	1	2.9%	1	3.0%
Newtown (Twp)	44	39	6	13.6%	6	15.4%
Norwood (B)	15	13	0	0.0%	0	0.0%
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	2	10.0%	2	10.5%
Radnor (Twp)	78	74	7	9.0%	7	9.5%
Ridley (Twp)	66	62	10	15.2%	10	16.1%
Ridley Park (B)	23	22	1	4.3%	1	4.5%
Rose Valley (B)	4	4	2	50.0%	2	50.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%
Sharon Hill (B)	18	16	0	0.0%	0	0.0%
Springfield (Twp)	63	61	6	9.5%	5	8.2%
Swarthmore (B)	16	13	0	0.0%	0	0.0%
Thornbury (Twp)	22	21	4	18.2%	4	19.0%
Tinicum (Twp)	24	23	14	58.3%	13	56.5%
Trainer (B)	13	13	4	30.8%	4	30.8%
Upland (B)	14	14	2	14.3%	2	14.3%
Upper Chichester (Twp)	31	28	1	3.2%	1	3.6%
Upper Darby (Twp)	153	138	6	3.9%	6	4.3%
Upper Providence (Twp)	27	25	4	14.8%	4	16.0%
Yeadon (B)	23	22	1	4.3%	1	4.5%
Brandywine Conservancy and Museum of Art Special District	0	0	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**136**	**9.5%**	**132**	**9.9%**

Source: Delaware County 2021/2022; HIFLD 2018/2022; FEMA 2017
Note: B – Borough; C – City; Twp. – Township; SARA – Superfund Amendments and Reauthorization Act

Impact on the Economy

For impact on the economy, estimated losses from a flood event are considered. Losses include but are not limited to general building stock damage, agricultural losses, business interruption, and impacts on tourism and tax base within Delaware County. Damage to general building stock can be quantified by use of Hazus as discussed above. Other economic components such as loss of facility use, functional downtime, and social economic factors are less susceptible to measurement with a high degree of certainty. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services.

Hazus estimates the amount of debris generated from a 1 percent annual chance flood event. The model breaks down debris into three categories because of the different types of equipment needed to handle debris: (1) finishes (dry wall, insulation, etc.), (2) structural (wood, brick, etc.), and (3) foundations (concrete slab and block, rebar, etc.). Table 4.3.8-16 summarizes the debris Hazus estimates to result from a 1 percent annual chance flood event, which is more than 43,913 tons of debris. Notably, this table lists estimated debris generated only by riverine flooding and does not include additional potential damage and debris possibly generated by force of wind.

Table 4.3.8-16. Estimated Debris Generated from the 1 Percent Annual Chance Flood Event

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Aldan (B)	281	128	84	68
Aston (Twp)	970	291	383	296
Bethel (Twp)	6	6	0	0
Brookhaven (B)	250	186	38	25
Chadds Ford (Twp)	72	51	12	8
Chester City (C)	6,968	1,832	2,791	2,345
Chester (Twp)	570	338	141	91
Chester Heights (B)	36	32	2	2
Clifton Heights (B)	911	151	429	332
Collingdale (B)	109	83	16	10
Colwyn (B)	1,782	702	636	444
Concord (Twp)	32	28	3	2
Darby (B)	4,704	2,196	1,430	1,078
Darby (Twp)	284	262	14	9
East Lansdowne (B)	0	0	0	0
Eddystone (B)	425	337	52	36
Edgmont (Twp)	21	17	2	1
Folcroft (B)	360	276	50	34
Glenolden (B)	803	577	131	95
Haverford (Twp)	2,638	1,185	831	623
Lansdowne (B)	446	225	130	91
Lower Chichester (Twp)	9	2	4	3
Marcus Hook (B)	14	13	1	1
Marple (Twp)	931	539	234	158
Media (B)	128	76	29	23
Middletown (Twp)	1,310	464	489	357
Millbourne (B)	0	0	0	0
Morton (B)	52	52	0	0
Nether Providence (Twp)	577	417	96	64

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Newtown (Twp)	144	127	10	7
Norwood (B)	120	102	11	7
Parkside (B)	0	0	0	0
Prospect Park (B)	87	87	0	0
Radnor (Twp)	902	800	59	43
Ridley (Twp)	1,311	1,024	168	118
Ridley Park (B)	206	153	30	23
Rose Valley (B)	256	71	108	78
Rutledge (B)	0	0	0	0
Sharon Hill (B)	924	202	406	315
Springfield (Twp)	780	469	182	129
Swarthmore (B)	167	133	22	12
Thornbury (Twp)	50	33	10	7
Tinicum (Twp)	893	703	112	78
Trainer (B)	156	77	45	34
Upland (B)	4,513	512	2,170	1,831
Upper Chichester (Twp)	161	113	29	19
Upper Darby (Twp)	7,384	3,940	1,982	1,462
Upper Providence (Twp)	273	141	77	55
Yeadon (B)	898	415	270	213
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A
Delaware County (Total)	**43,913**	**19,570**	**13,718**	**10,625**

Source: Hazus v5.1, Census 2010
Notes: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. The Hazus results may under or overestimate losses to structures in each municipality.

Impact on the Environment

As Delaware County and its jurisdictions evolve with changes in population and density, flood events may increase in frequency and/or severity as land use changes, more structures are built, and impervious surfaces expand. Flood extents for the 1 percent and 0.2 percent annual chance flood event will continue to evolve alongside natural occurrences such as climate change and/or severe weather events. These flood events will inevitably impact Delaware County's natural and local environment.

Furthermore, the environmental impacts of a dam failure event can include significant water quality and debris disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties. In addition, severe erosion is likely; such erosion can negatively impact local ecosystems.

Severe flooding will affect these natural areas and can ultimately be disruptive to species that reside in these natural habitats.

Future Growth and Development

Any areas of growth could be impacted by the flood hazard if within identified hazard areas. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to dam inundation areas.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Delaware County's population will continue to increase into 2040, increasing total population to approximately 648,439 persons (The Center of Rural Pennsylvania 2013). As more people move into flood zones, an increased amount of the population will be vulnerable to flood hazards.

Effect of Climate Change on Vulnerability

Climate is defined not simply as average temperature and precipitation but also by type, frequency, and intensity of weather events. Both globally and at the local scale, climate change can alter prevalence and severity of extremes such as flood events. While predicting changes of flood events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).

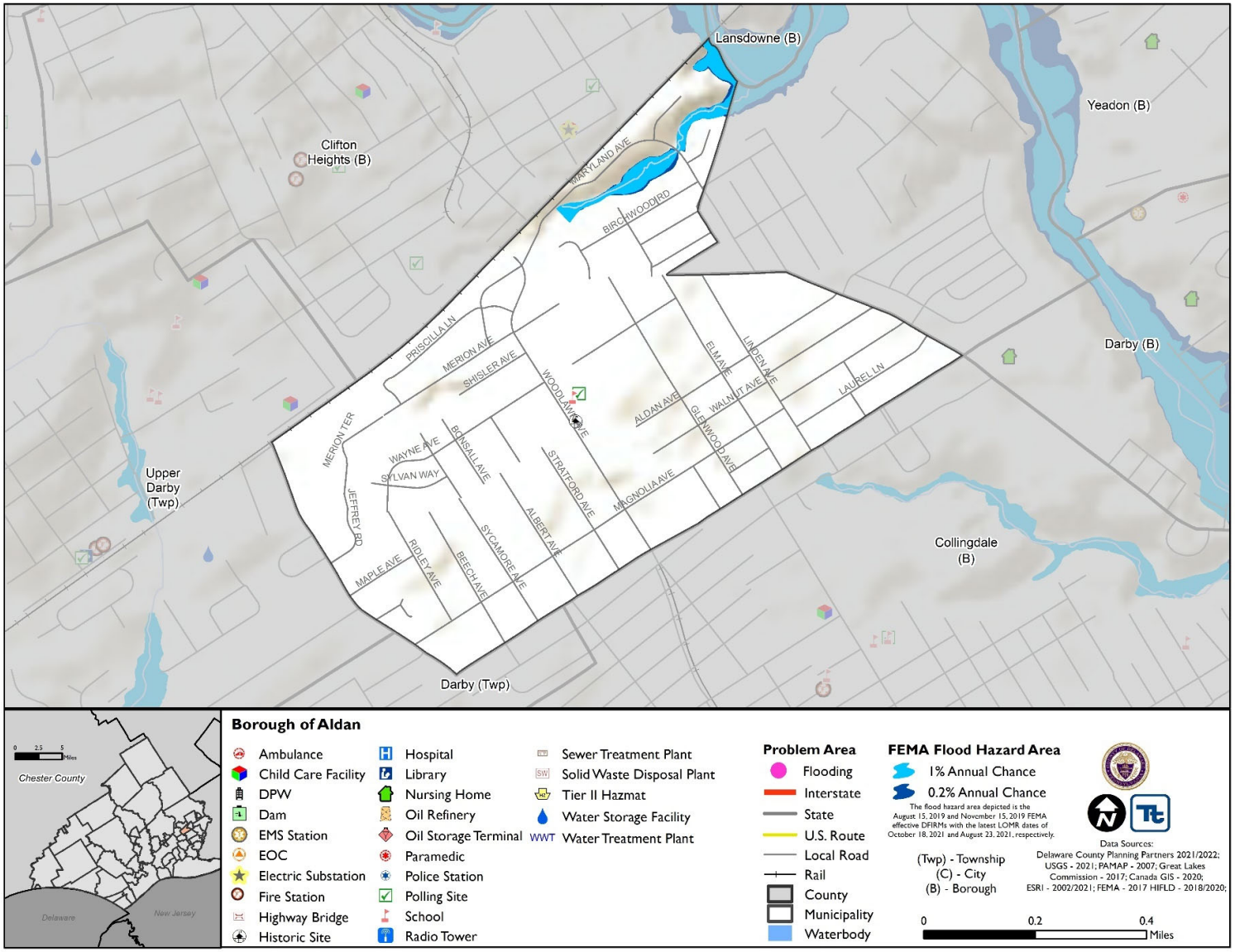
PADEP was directed by the Climate Change Act (Act 70 of 2008) to initiate a study of potential impacts of global climate change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment indicated that Pennsylvania is very likely to undergo increased temperatures in the 21st century (PADEP 2009). An increase in variability of temperature and precipitation may lead to increased frequency and/or severity of storm events. Summer floods and general stream flow variability are projected to increase because of increased variability in precipitation. Even with the anticipated increase in winter precipitation as rain rather than snow, increased winter temperatures and a reduced snowpack may decrease rain-on-snow events and thus major flooding events in Pennsylvania. This conclusion, however, remains speculative until further studies can validate it. Future improvements in modeling smaller-scale climatic processes are expected and will lead to improved understanding of how the changing climate will alter temperature, precipitation, storms, and flood events in Pennsylvania (PADEP 2009).

Additional Data and Next Steps

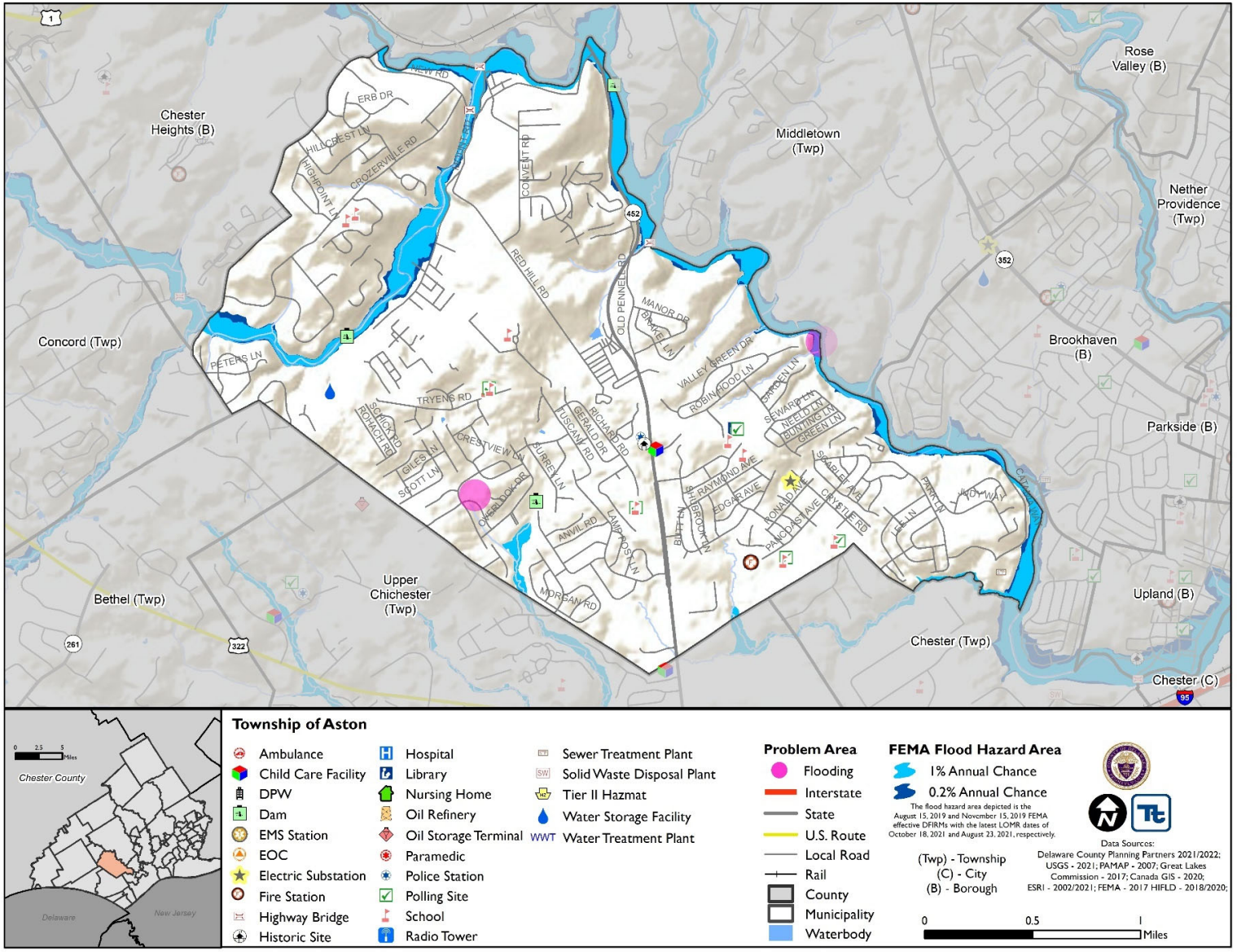
Delaware County will work to updated building and critical facility inventories to develop more precise modeling of flood impacts in future updates.

Flood Hazard Maps

Aldan Borough



Aston Township



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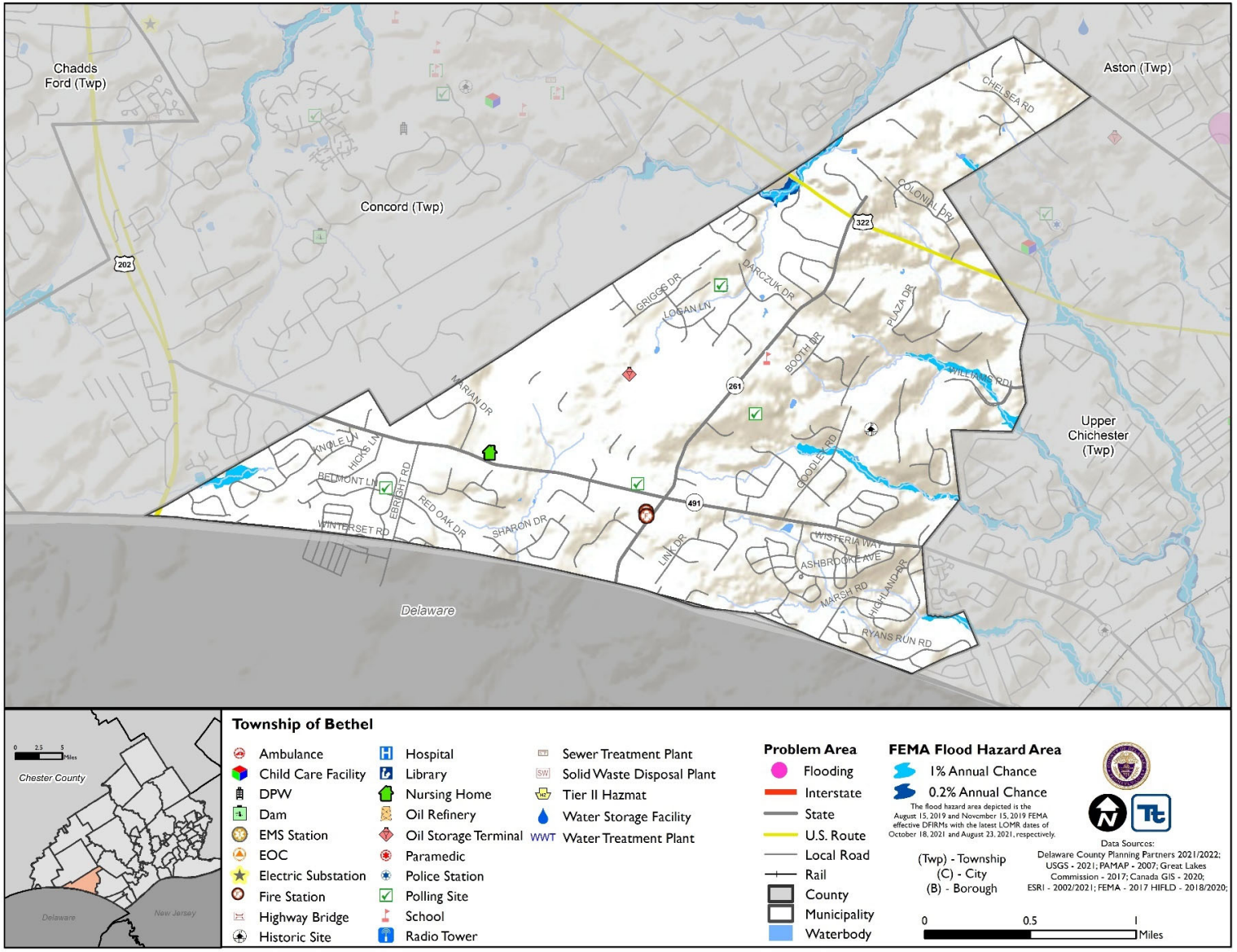
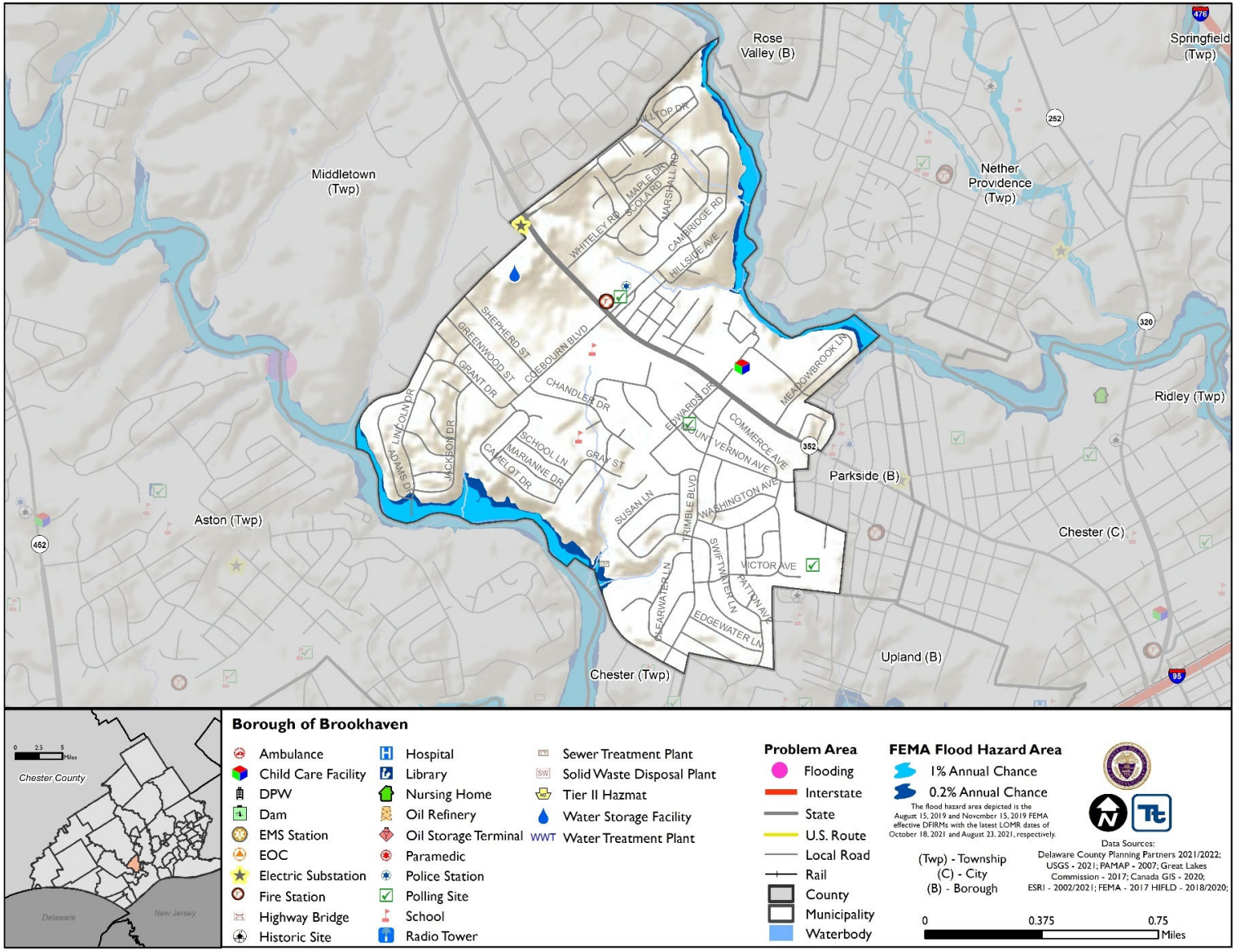
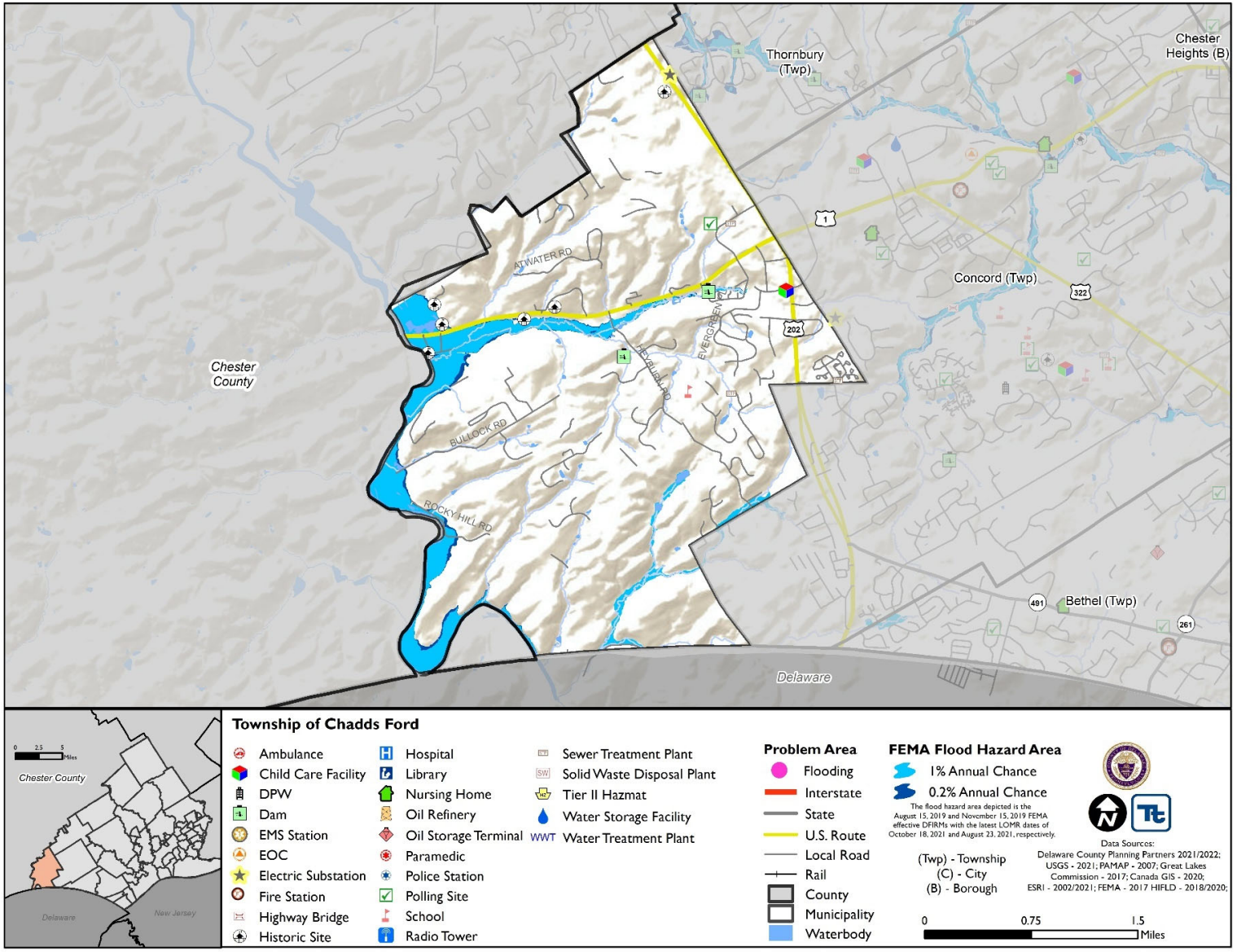


Brookhaven Borough



Chadds Ford Township



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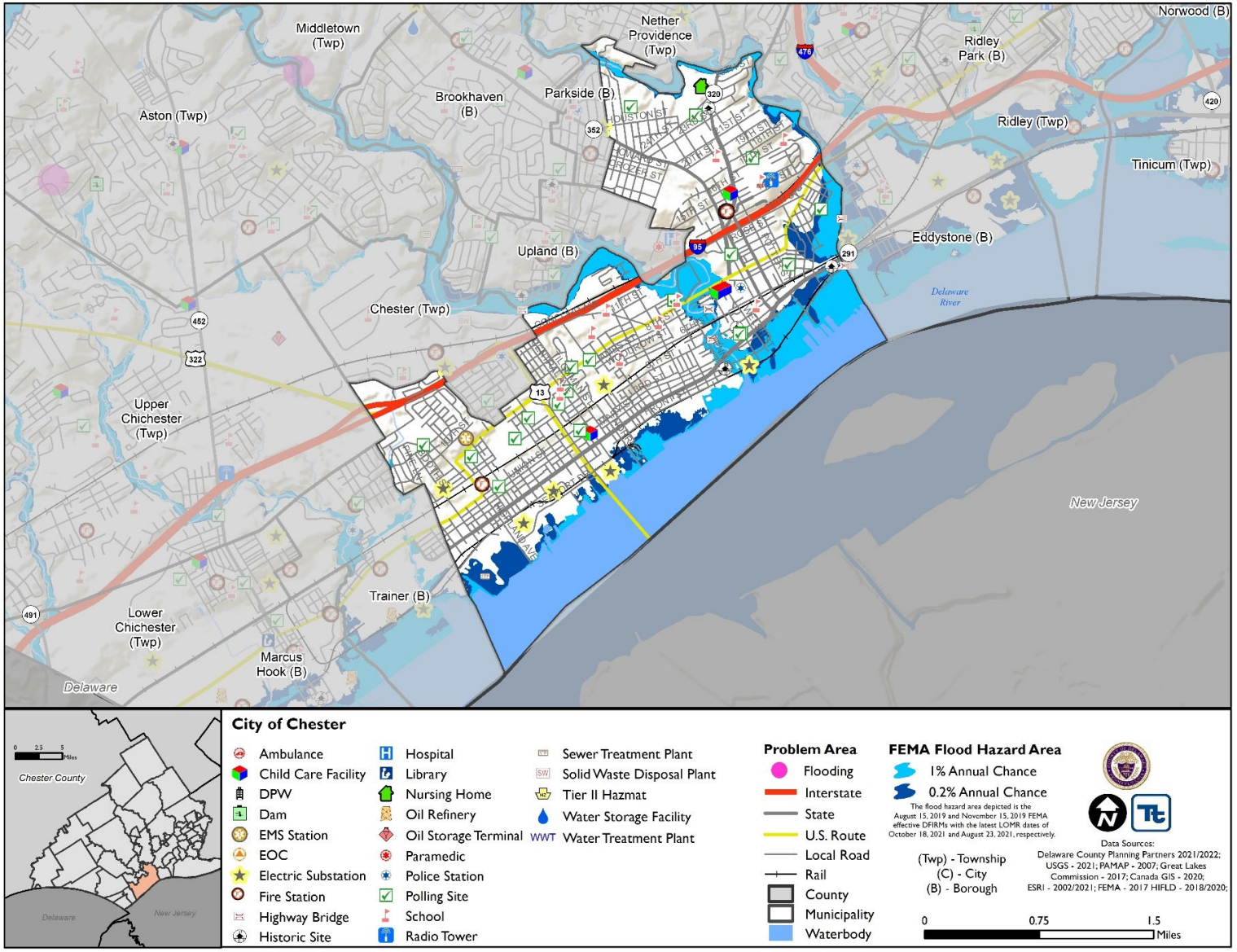

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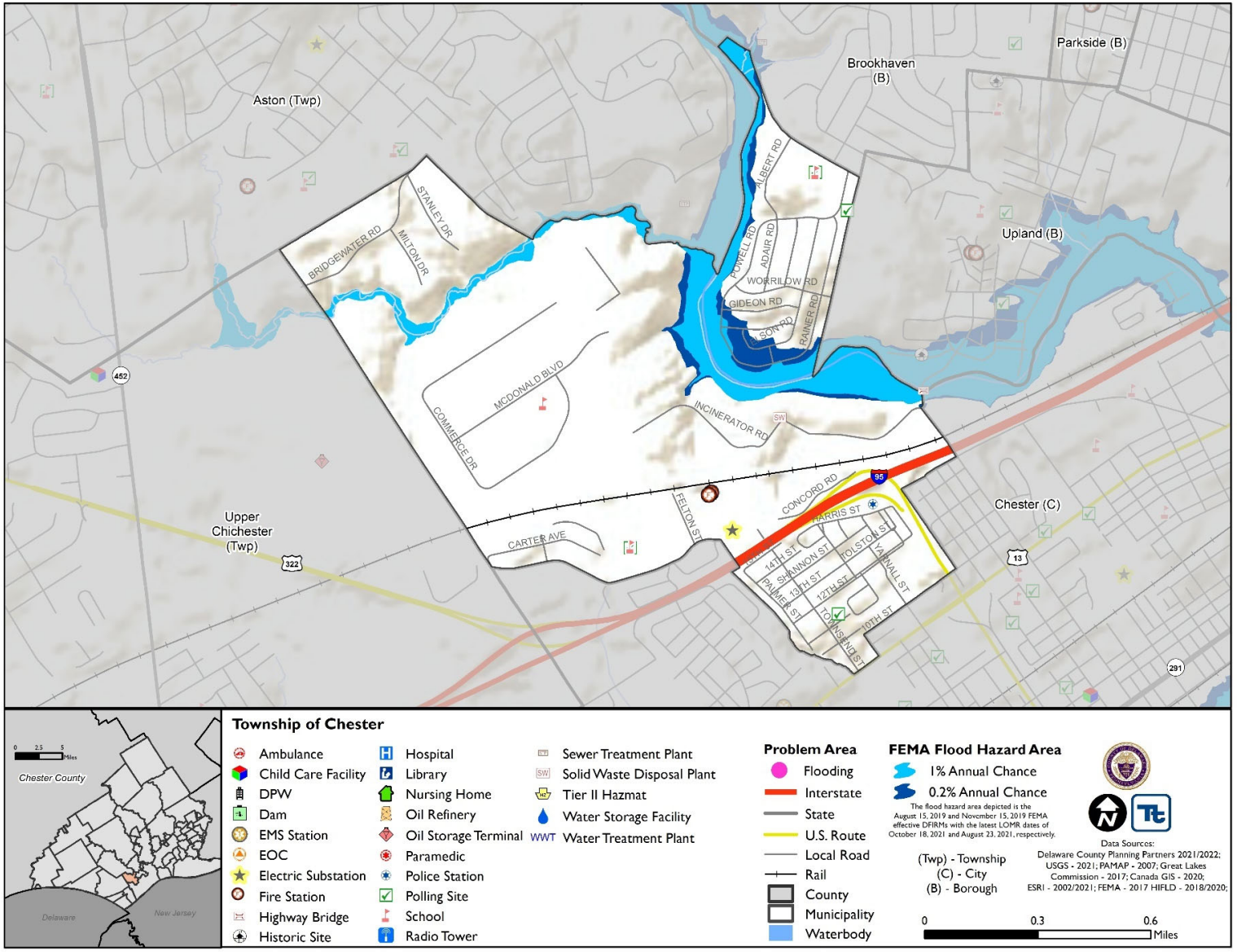

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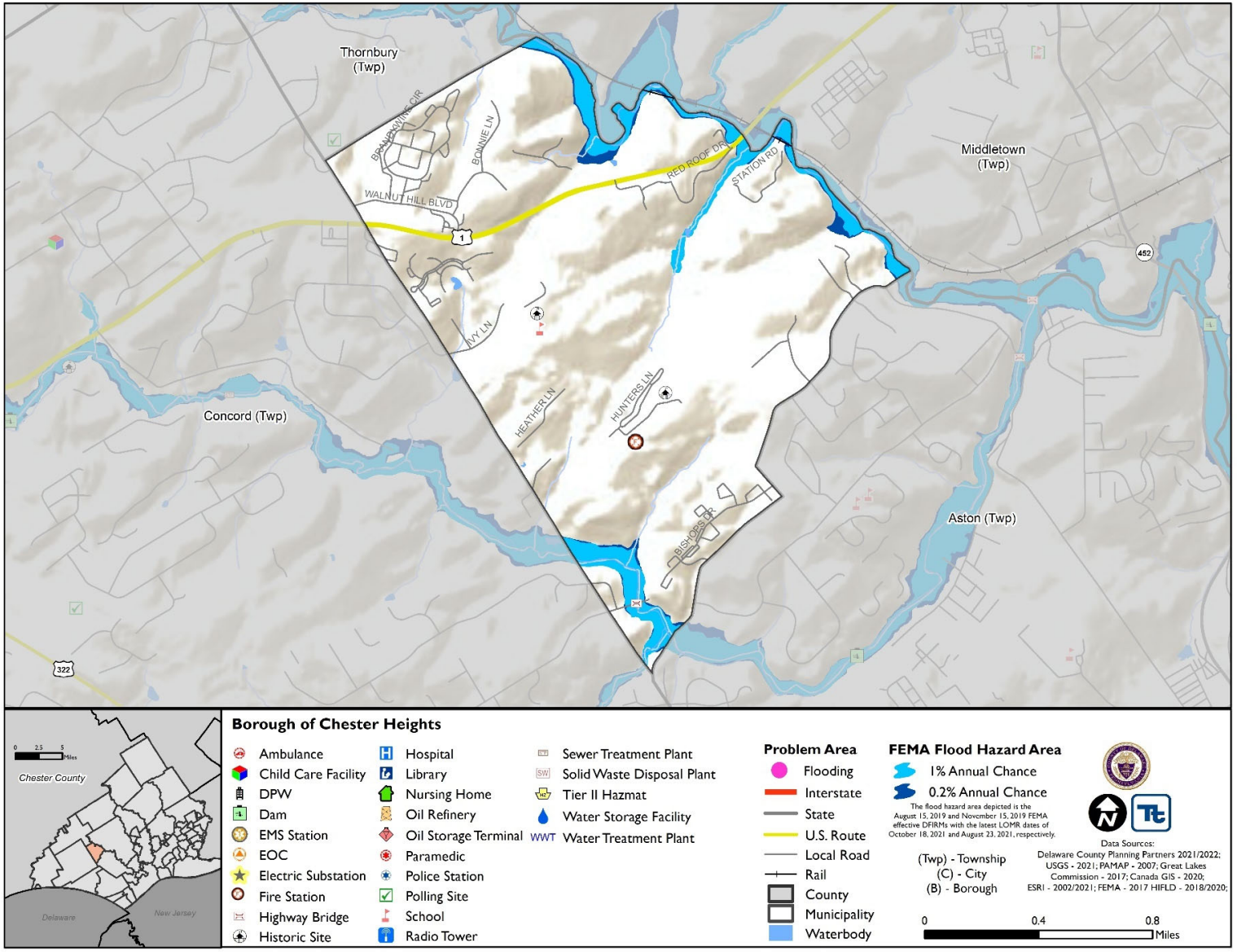
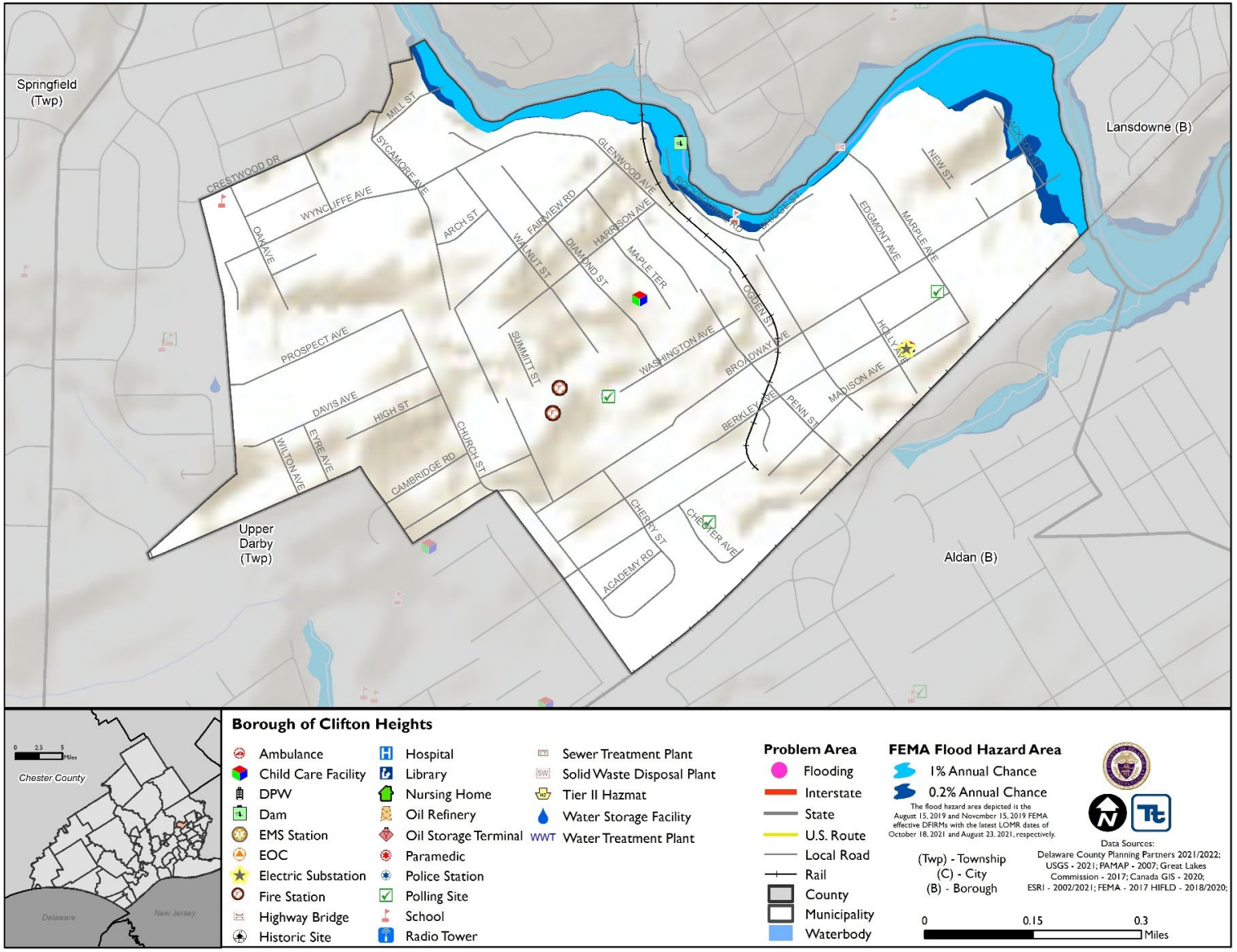
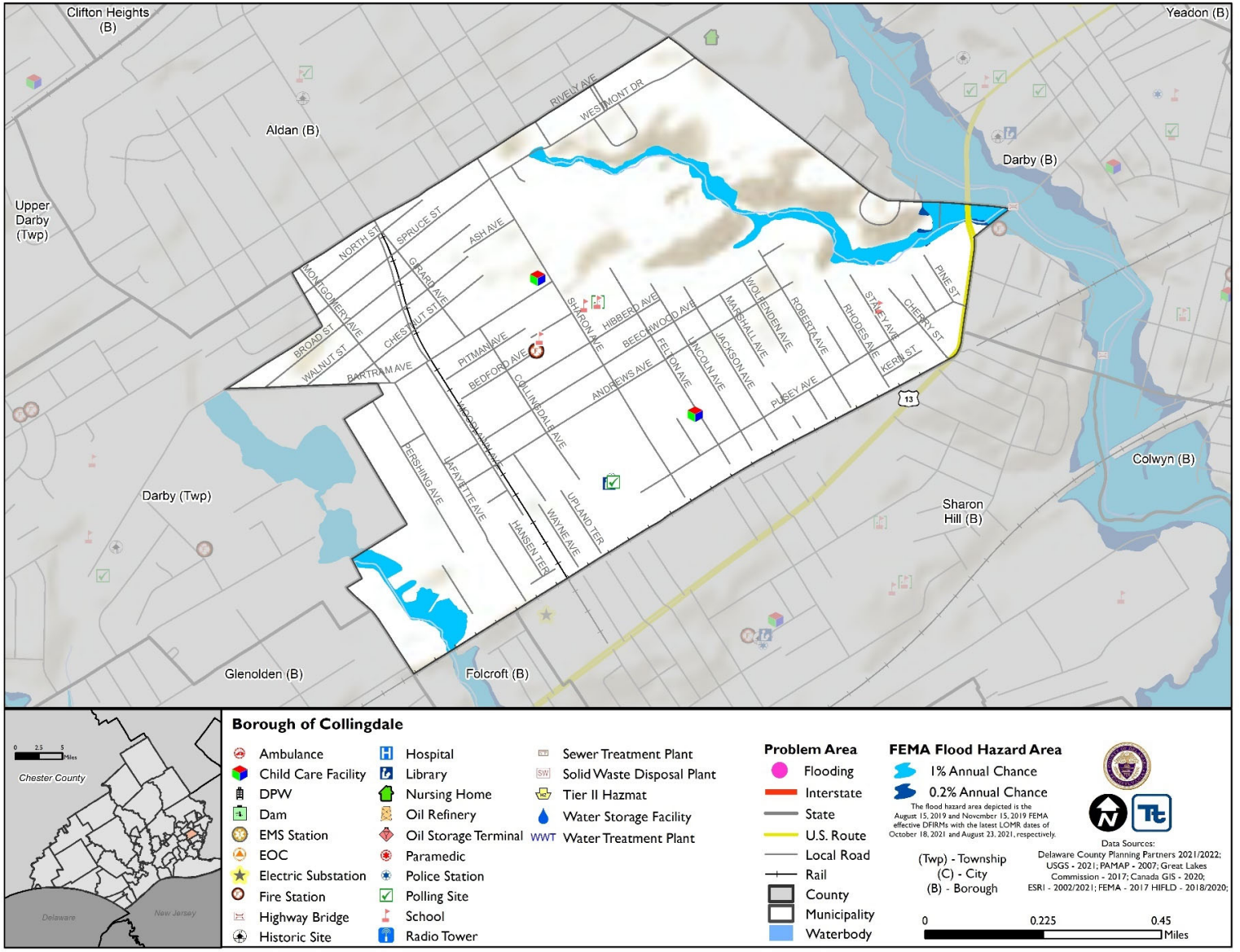


Clifton Heights Borough



Collingdale Borough



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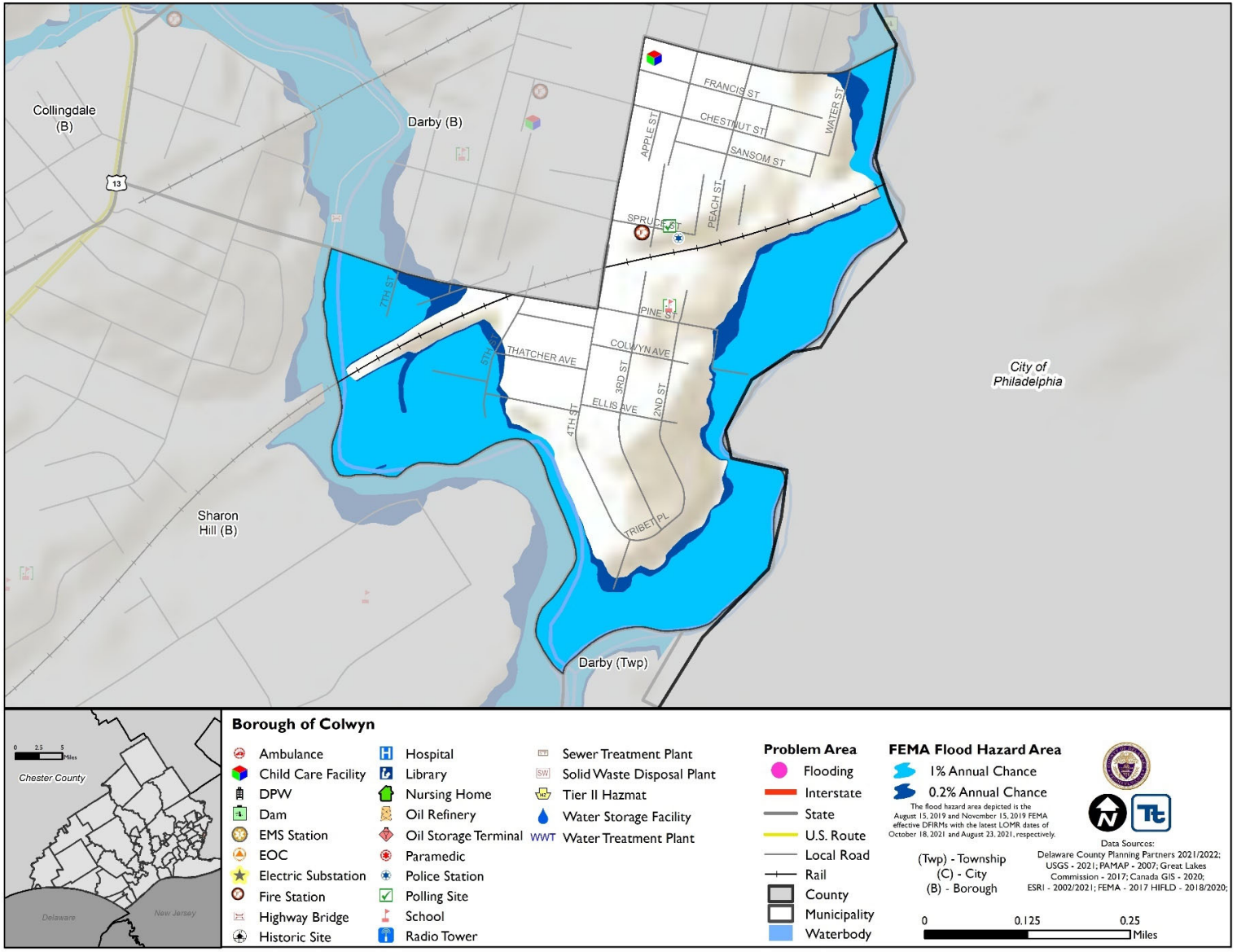
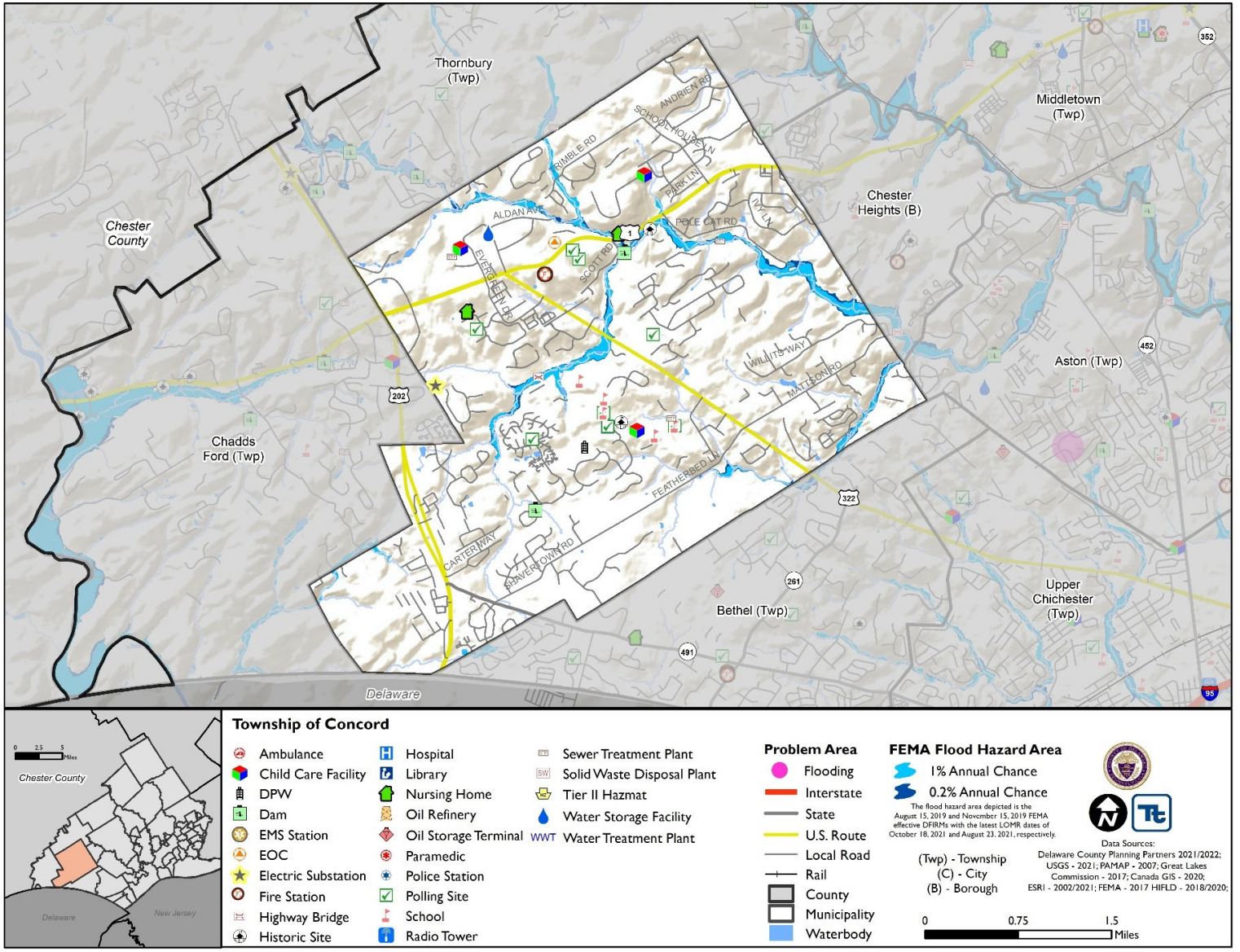
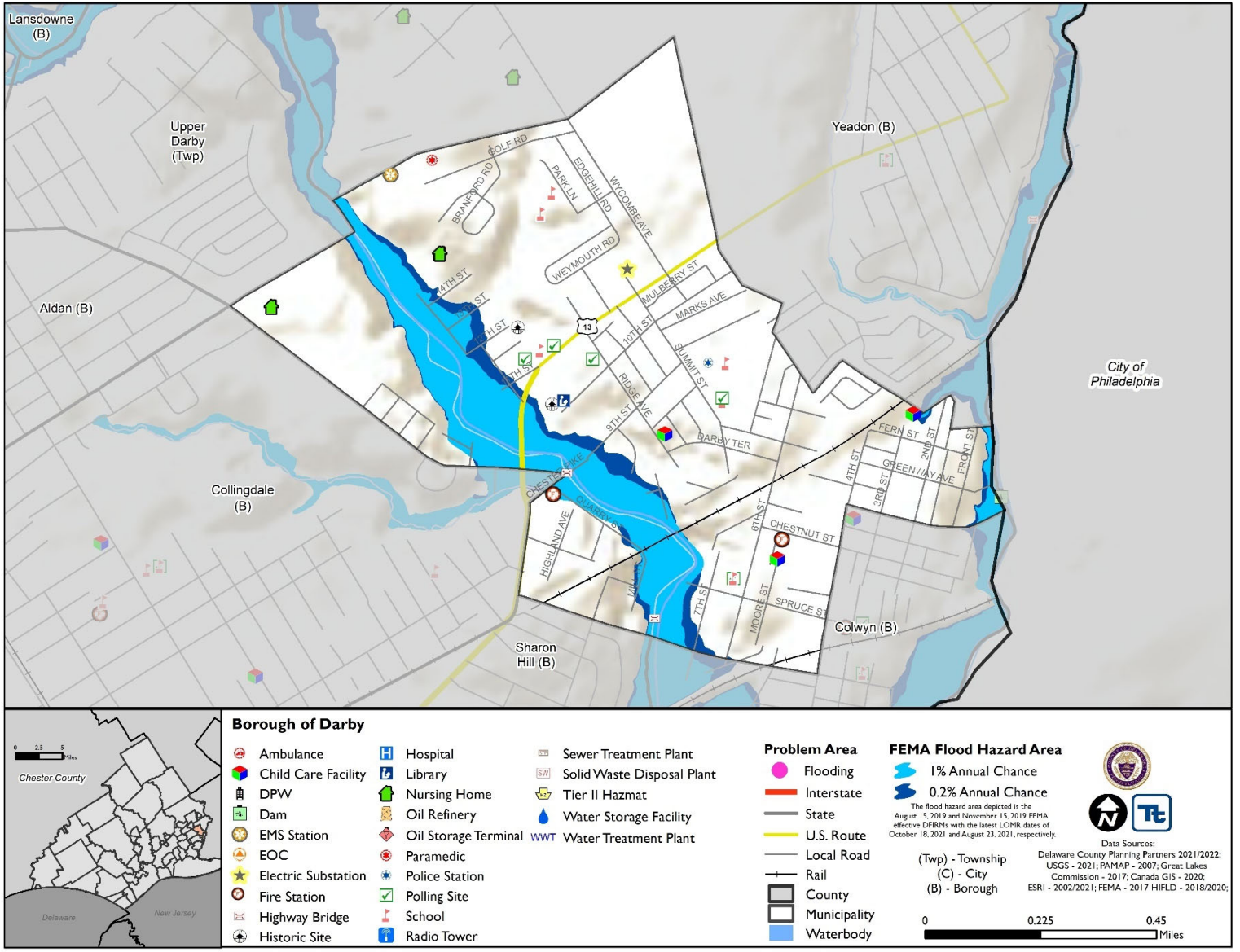


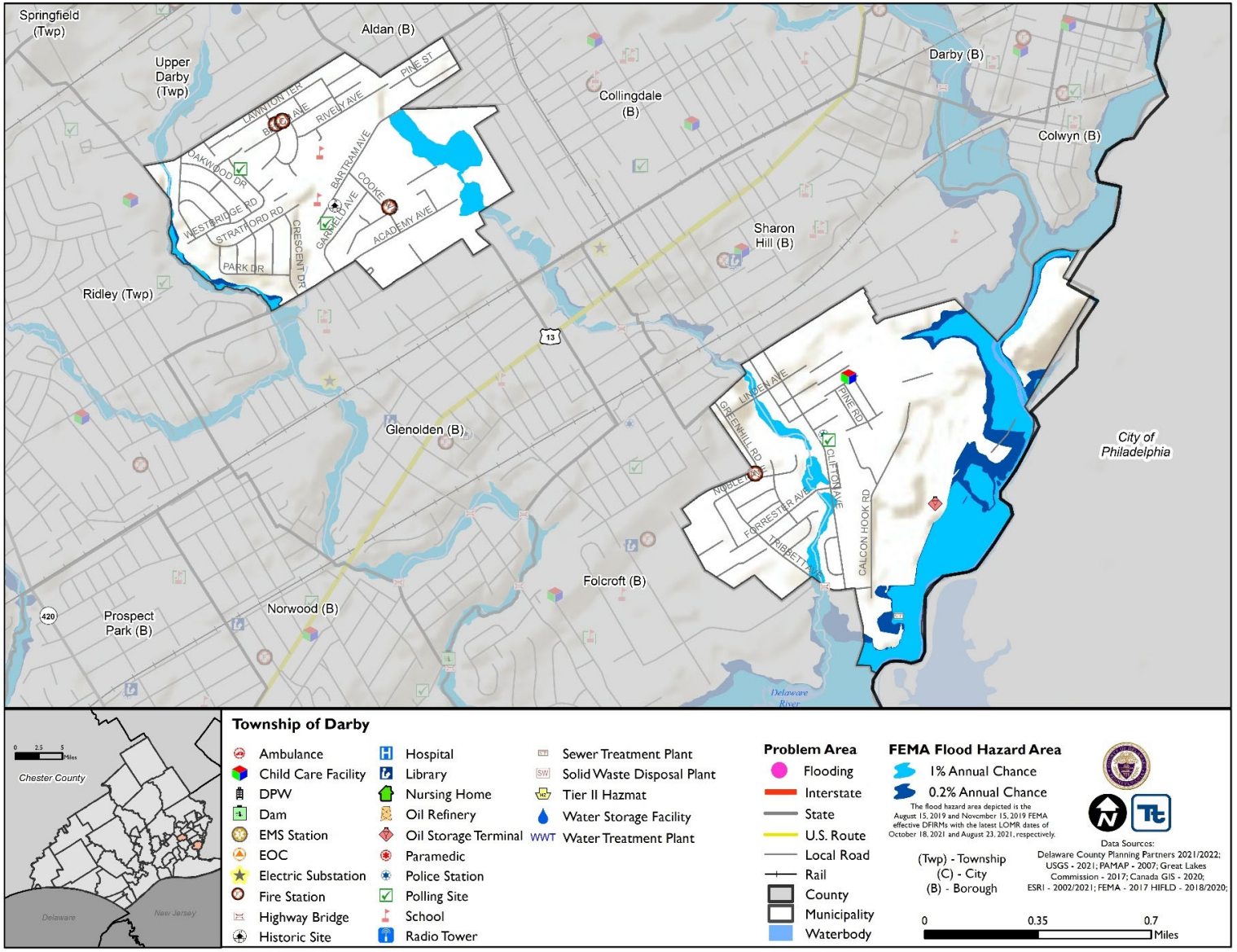
Concord Township



Darby Borough

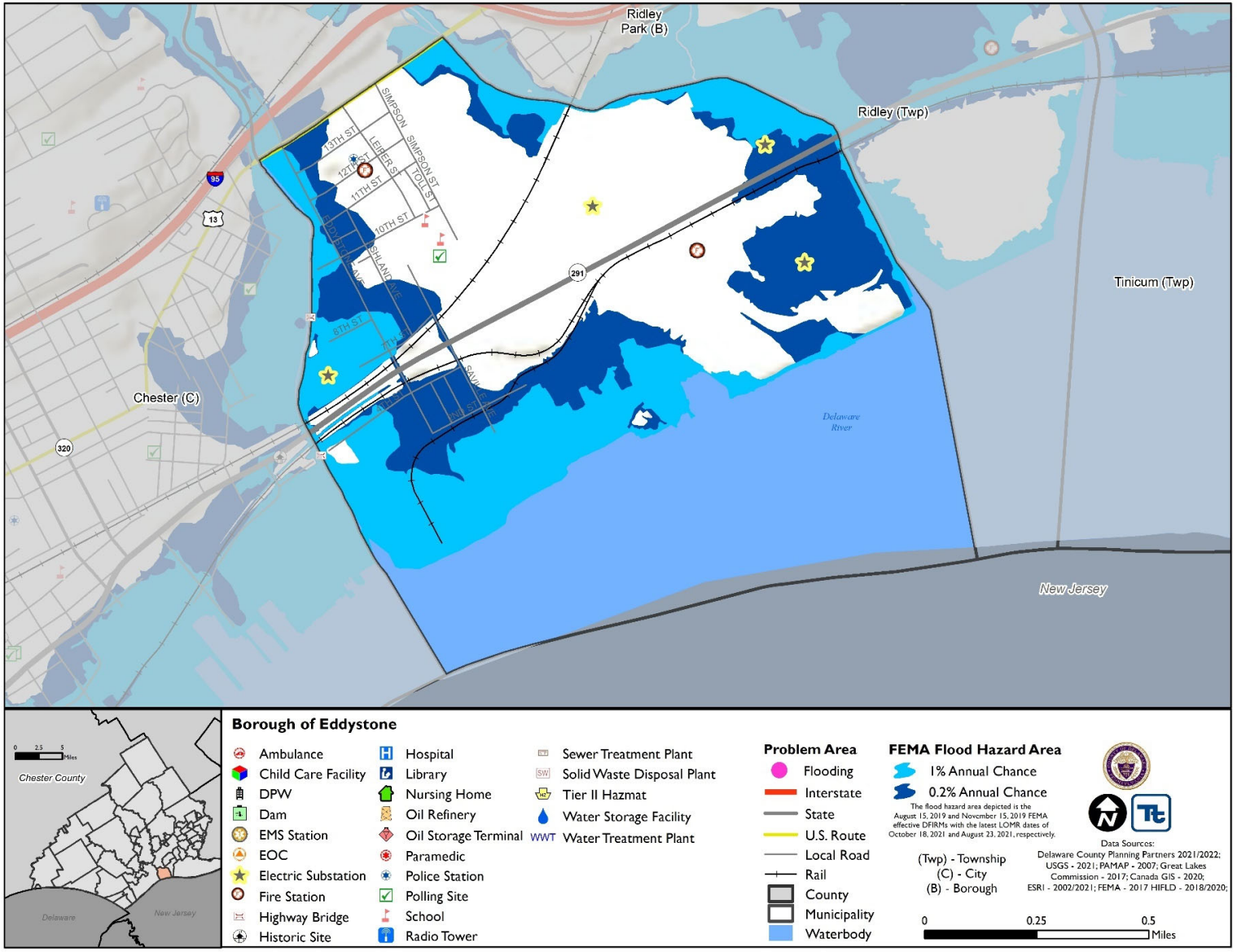


Darby Township

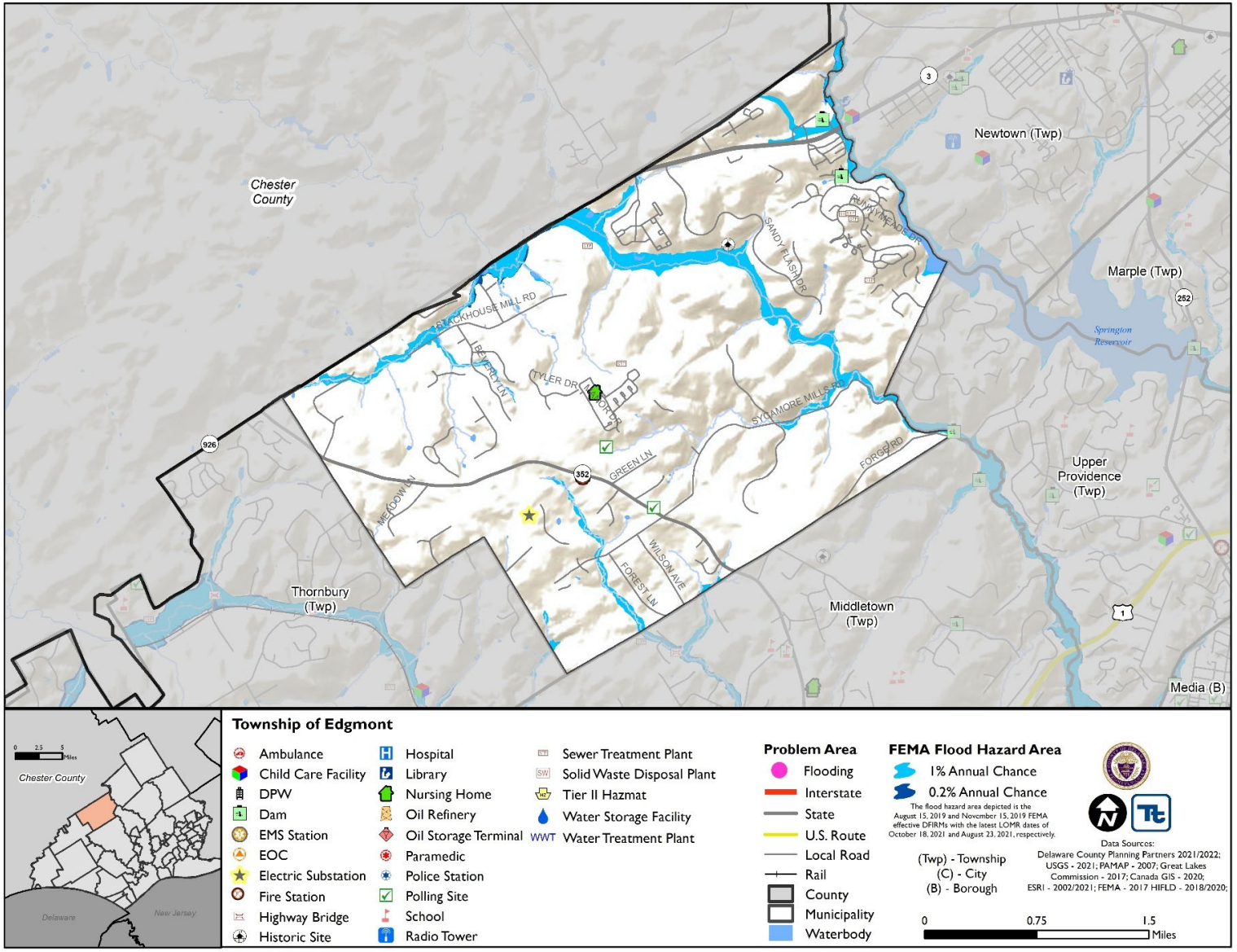


East Lansdowne Borough

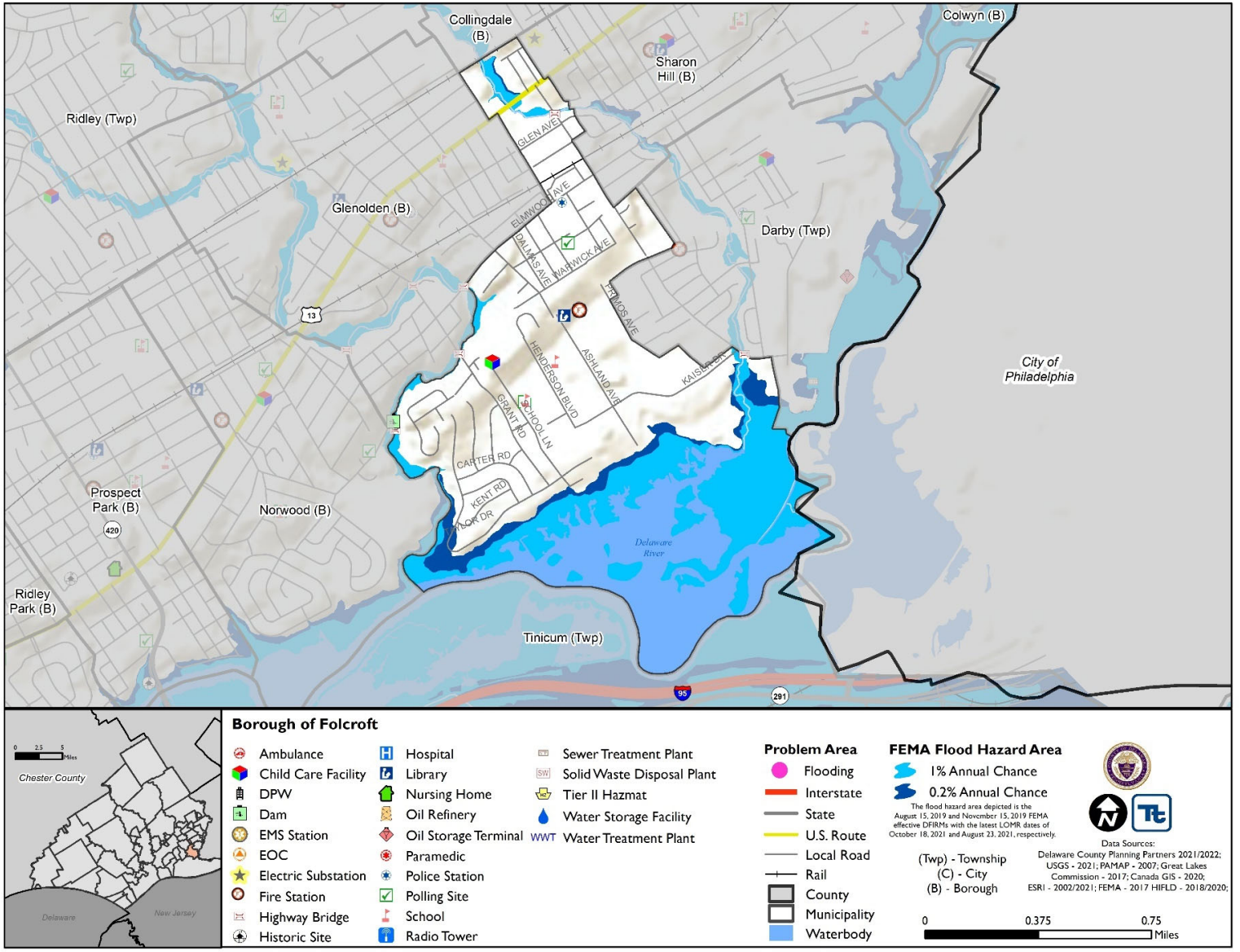
Eddystone Borough



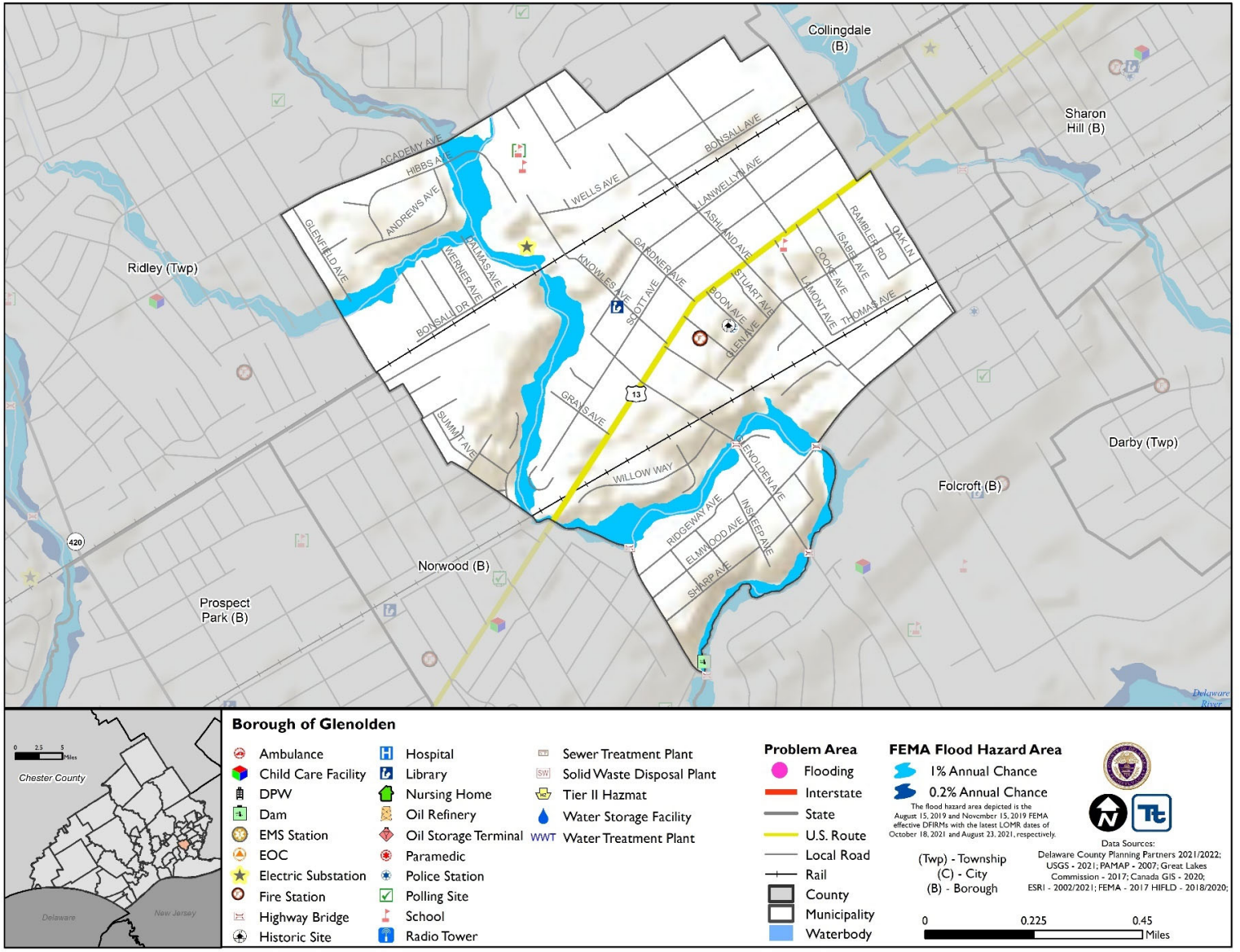
Edgmont Township



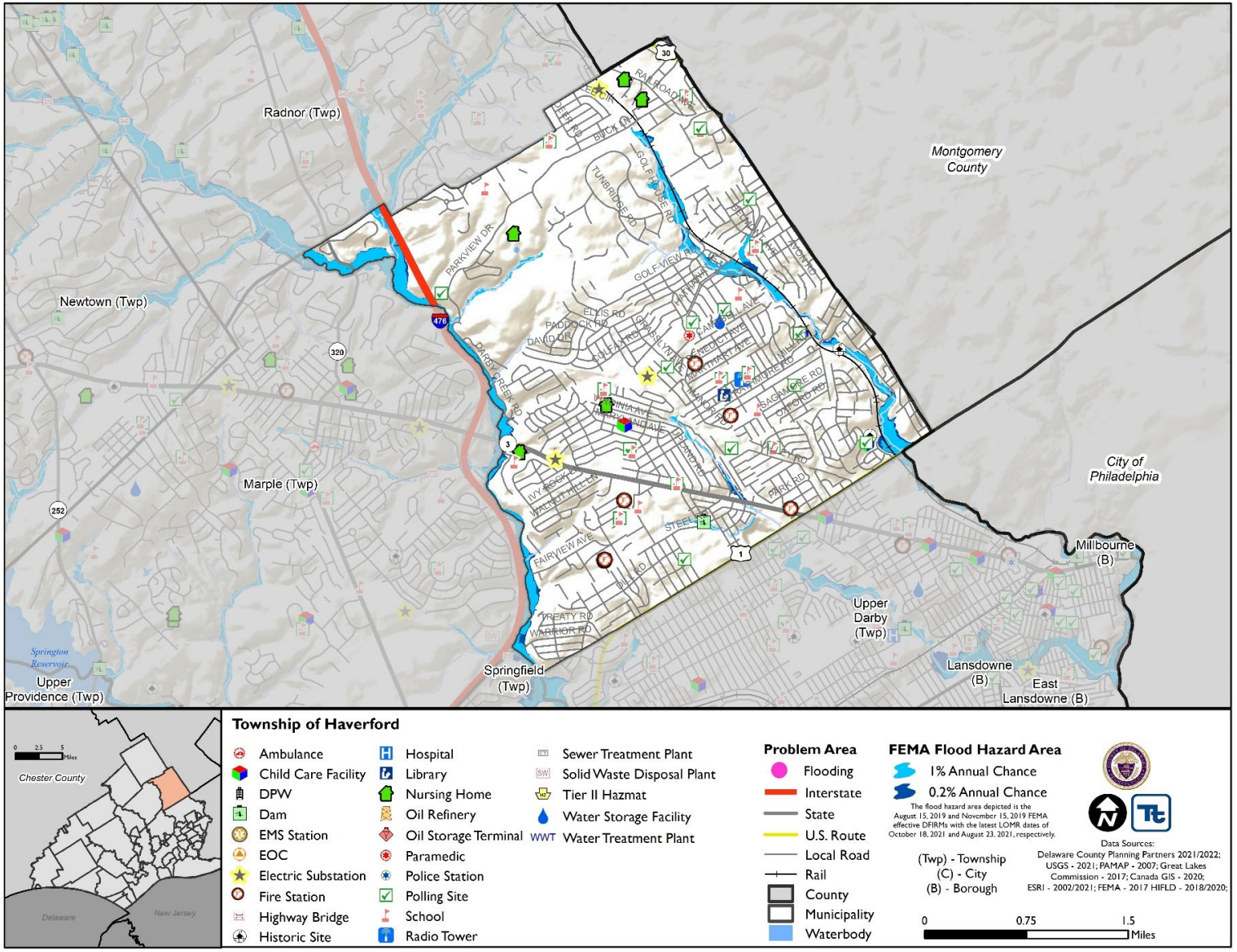
Folcroft Borough



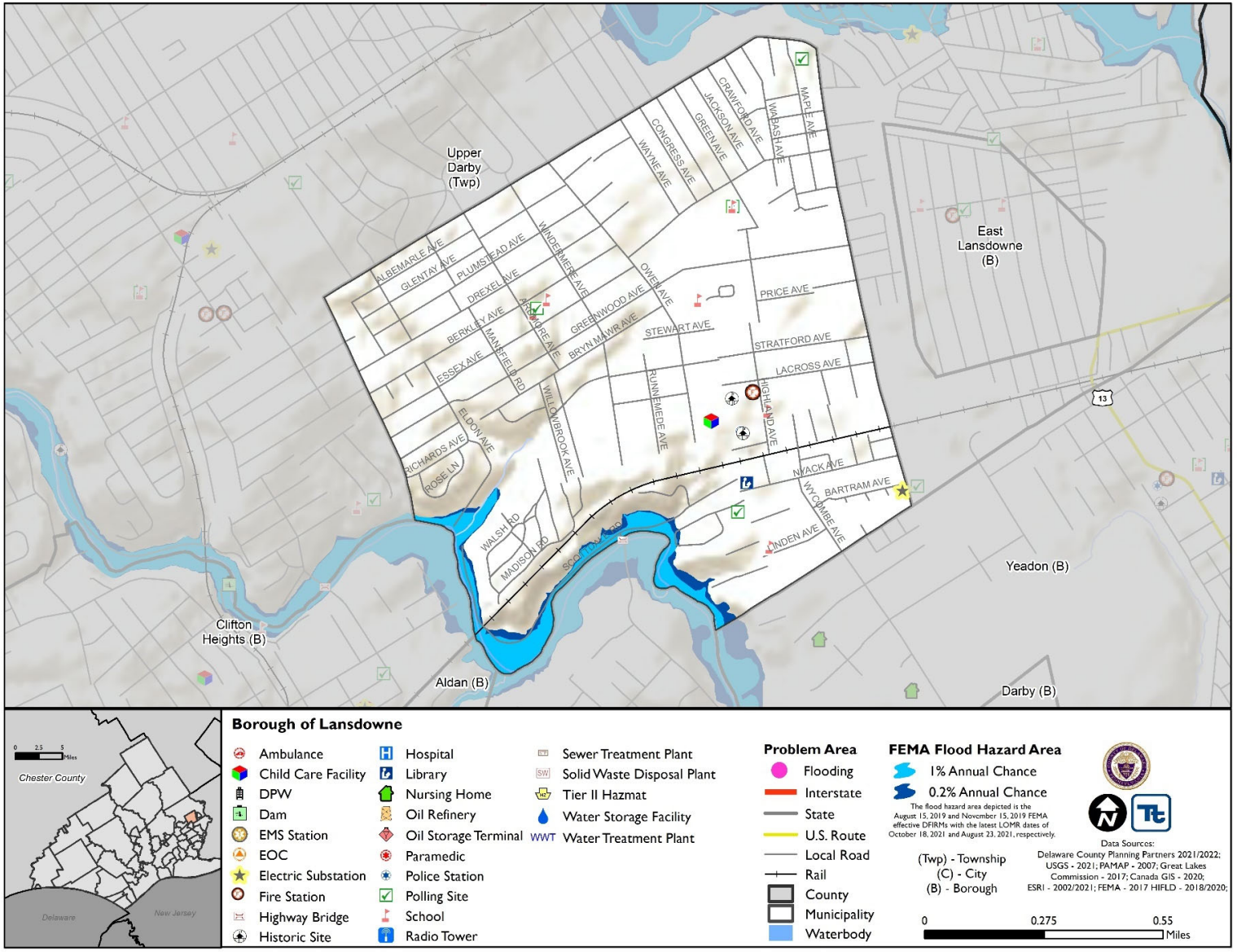
Glenolden Borough



Haverford Township



Lansdowne Borough



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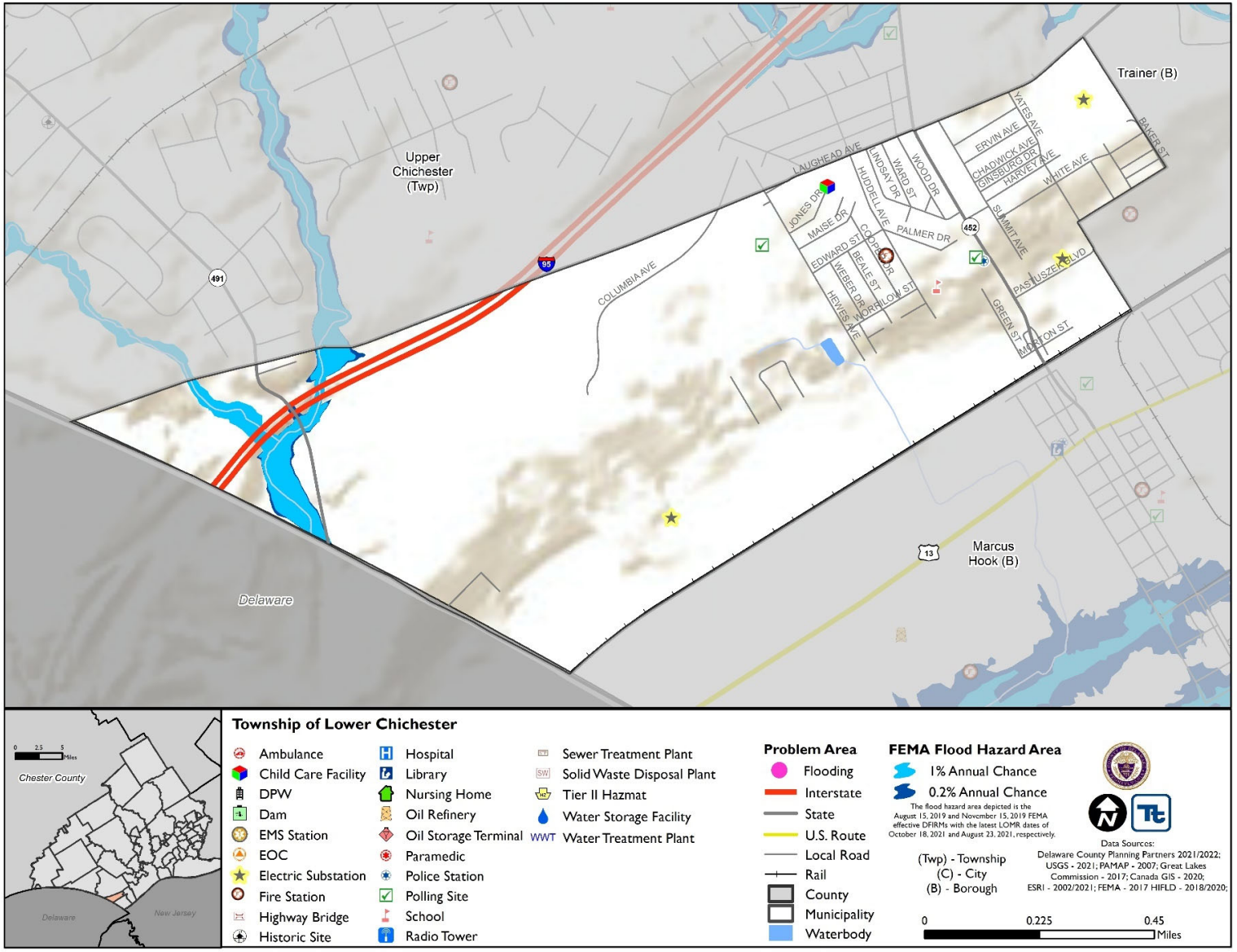

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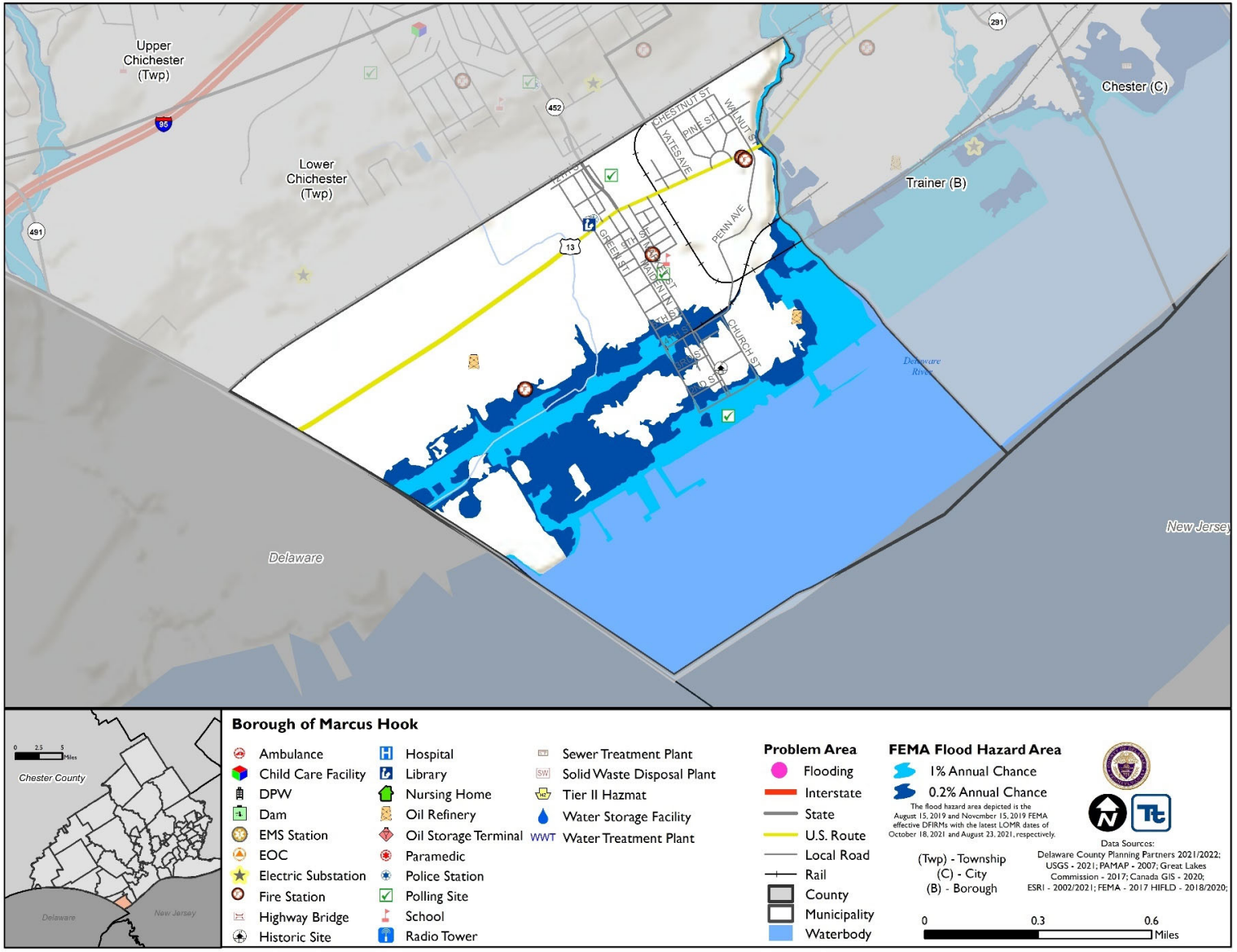

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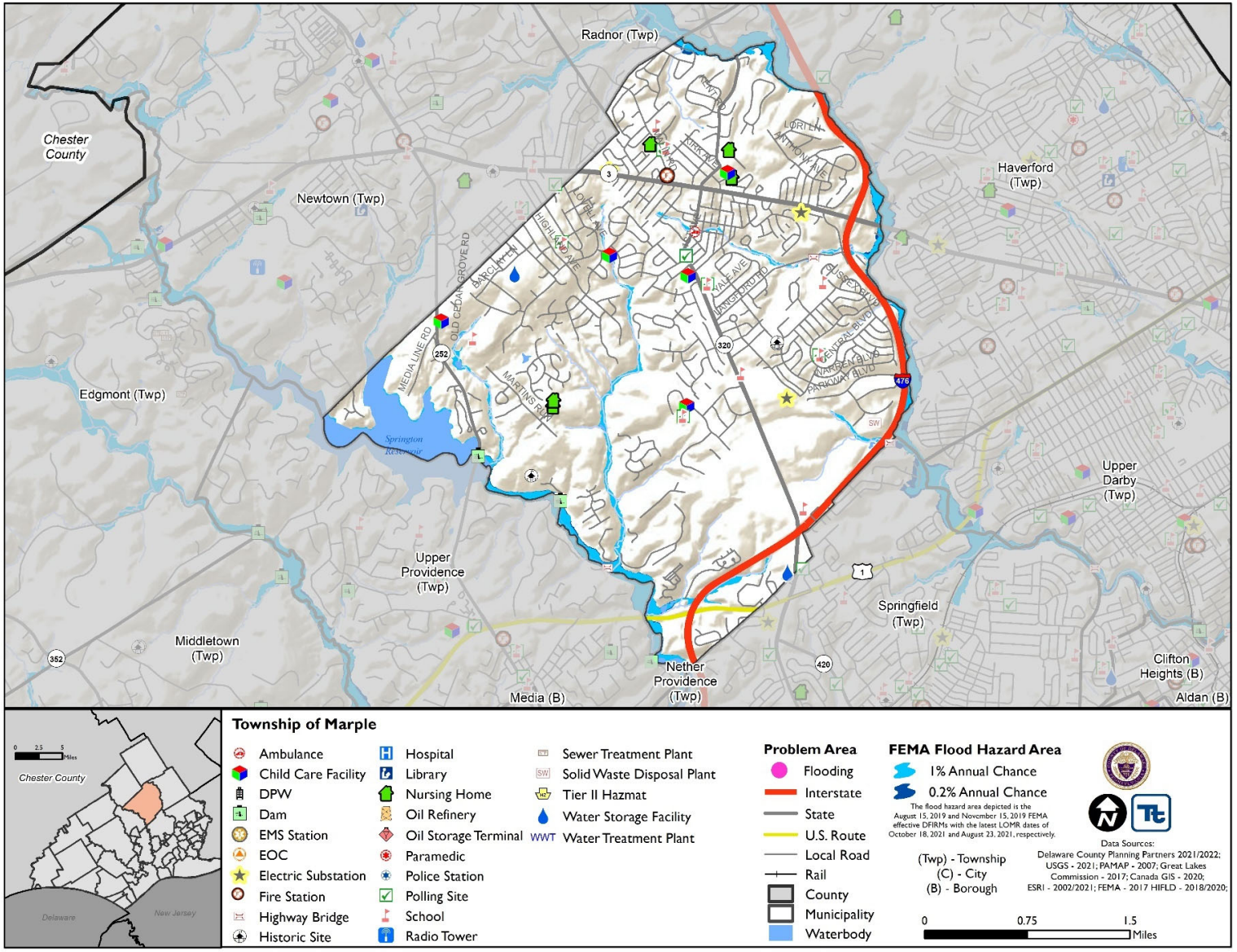
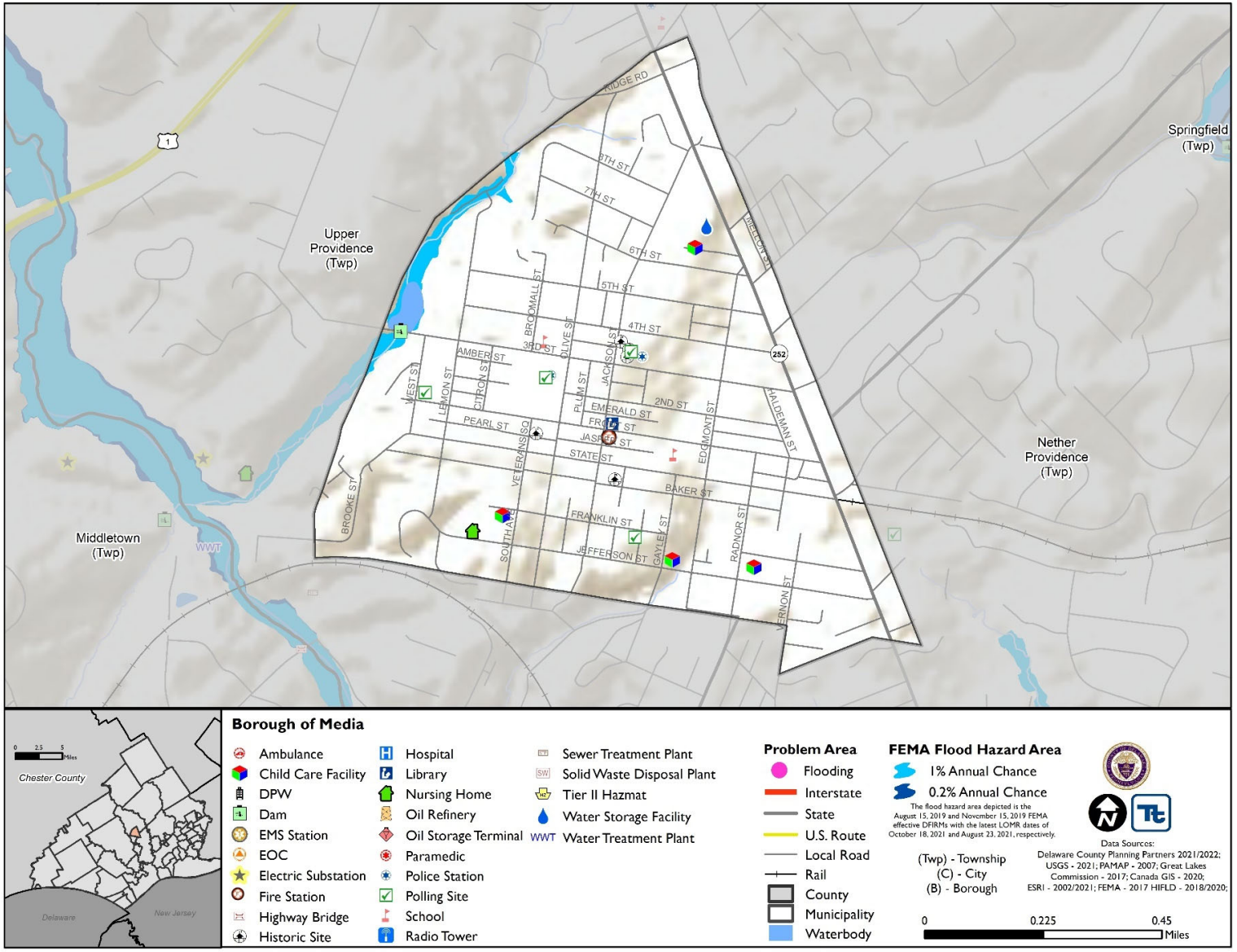


Media Borough



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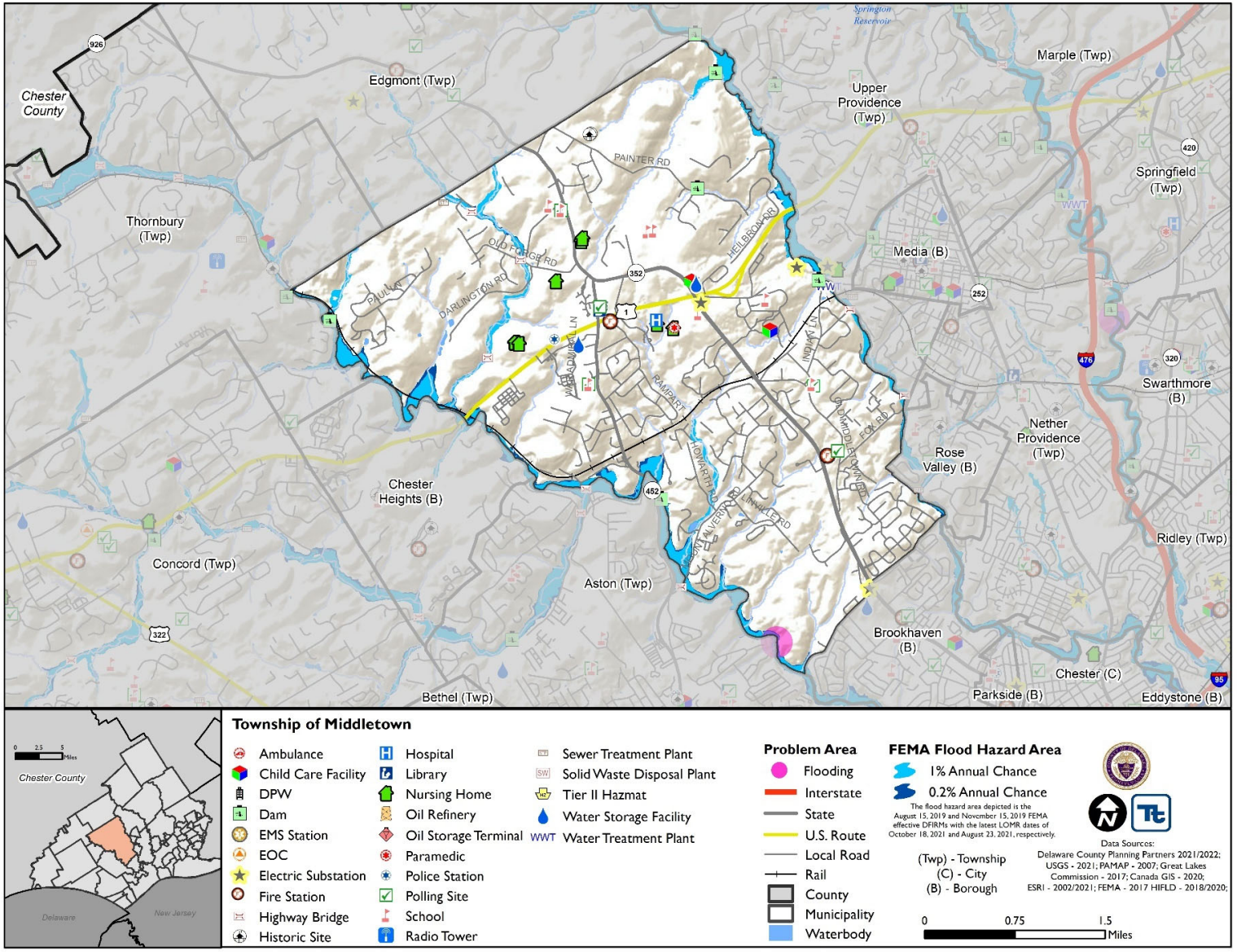

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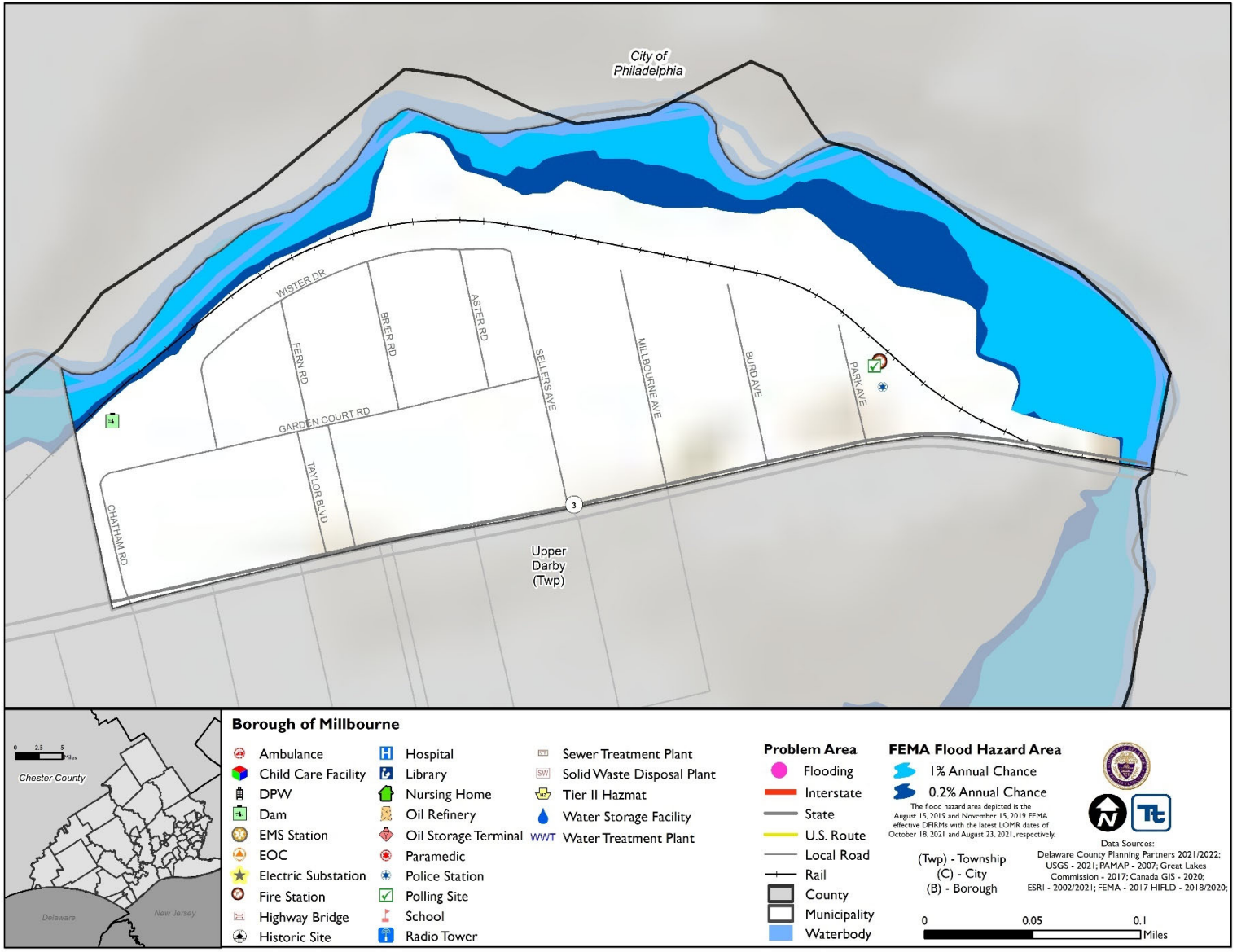

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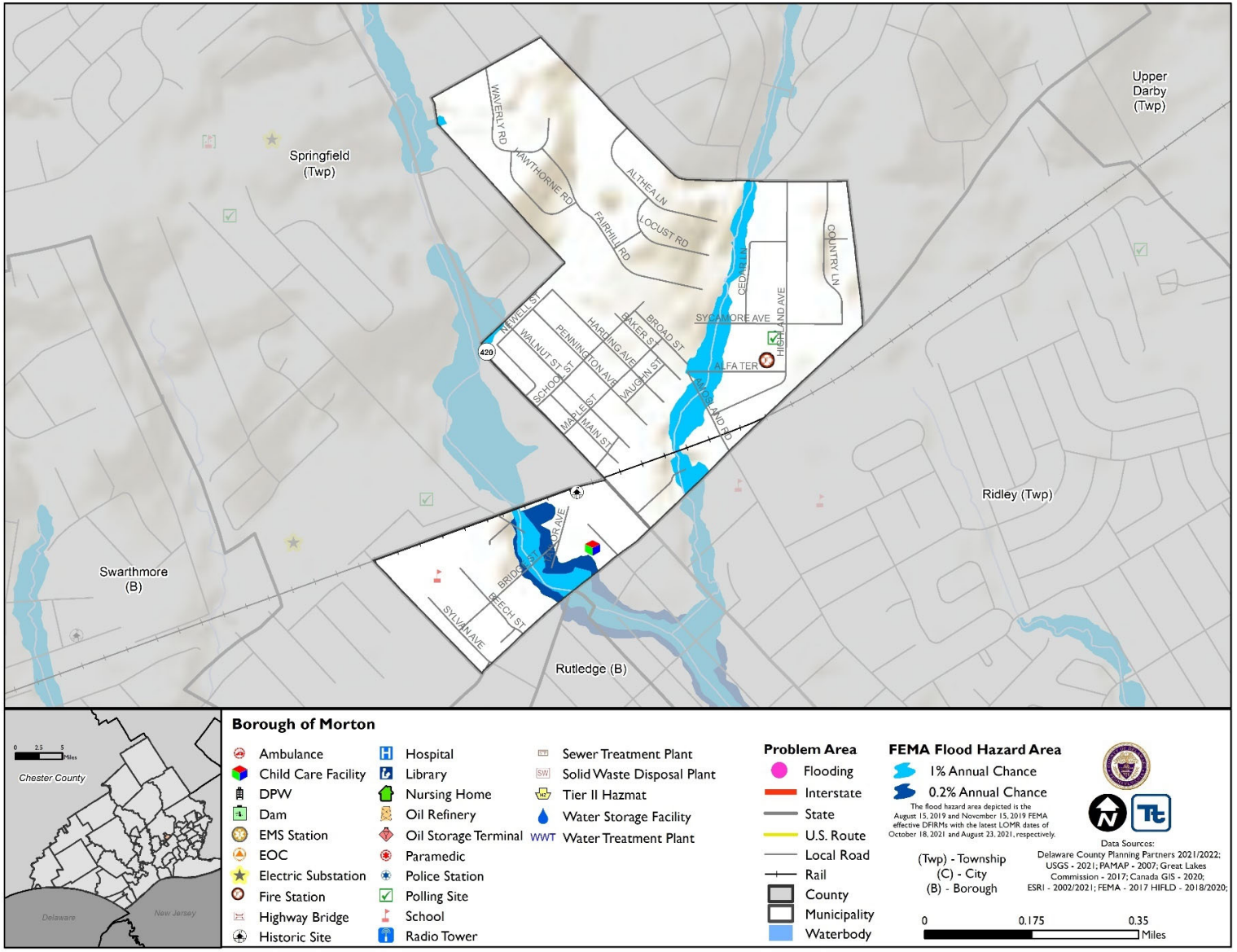
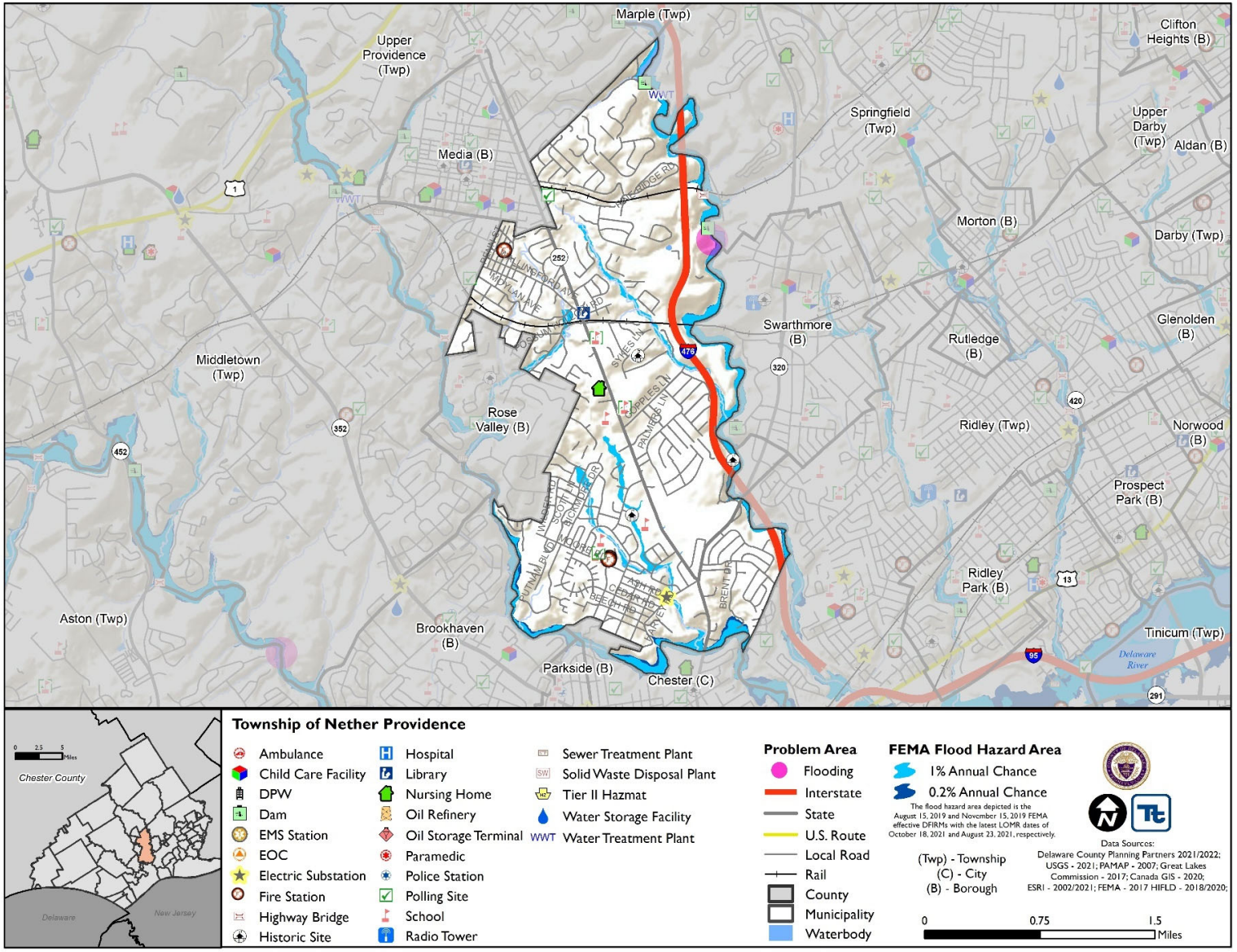


Nether Providence Township



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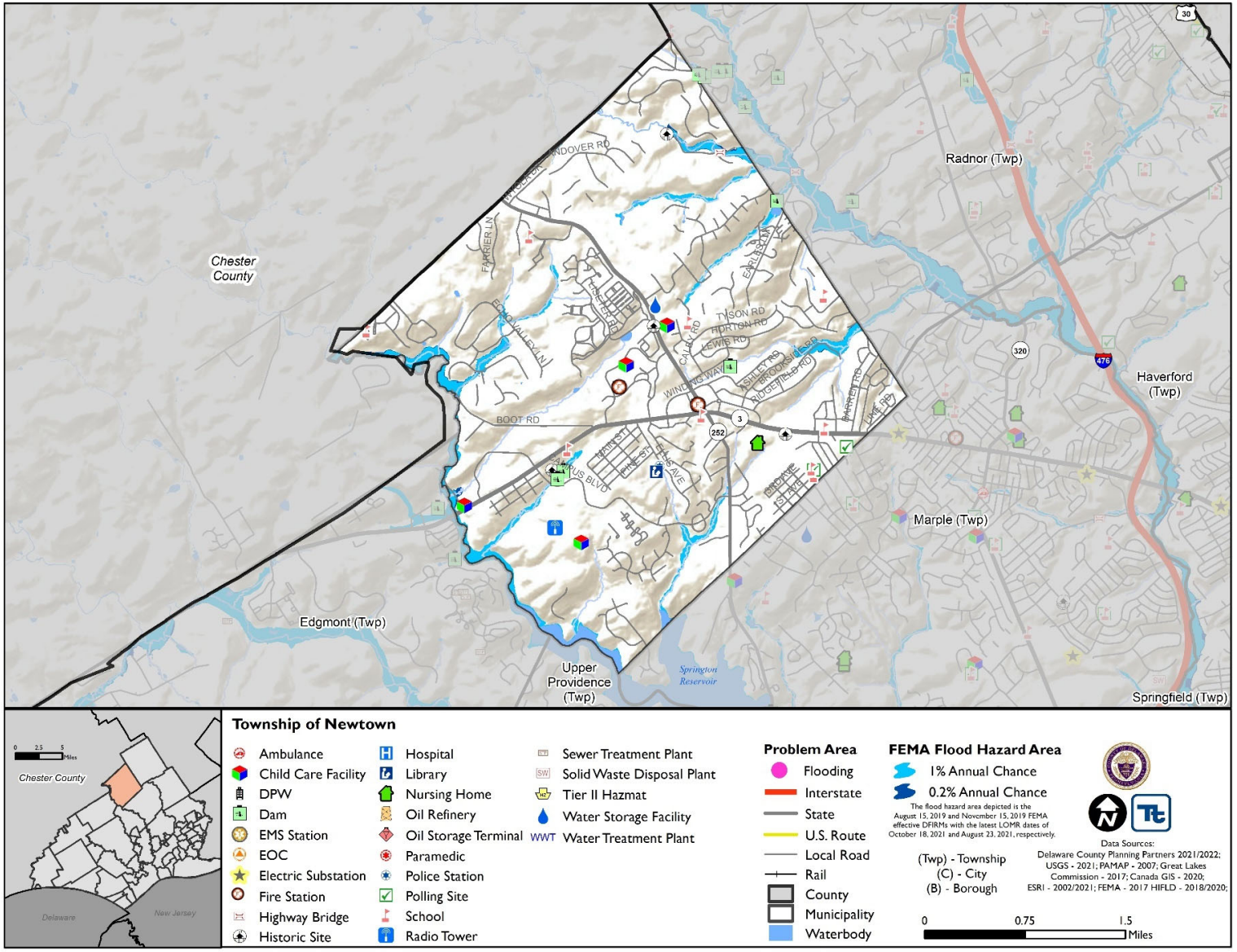
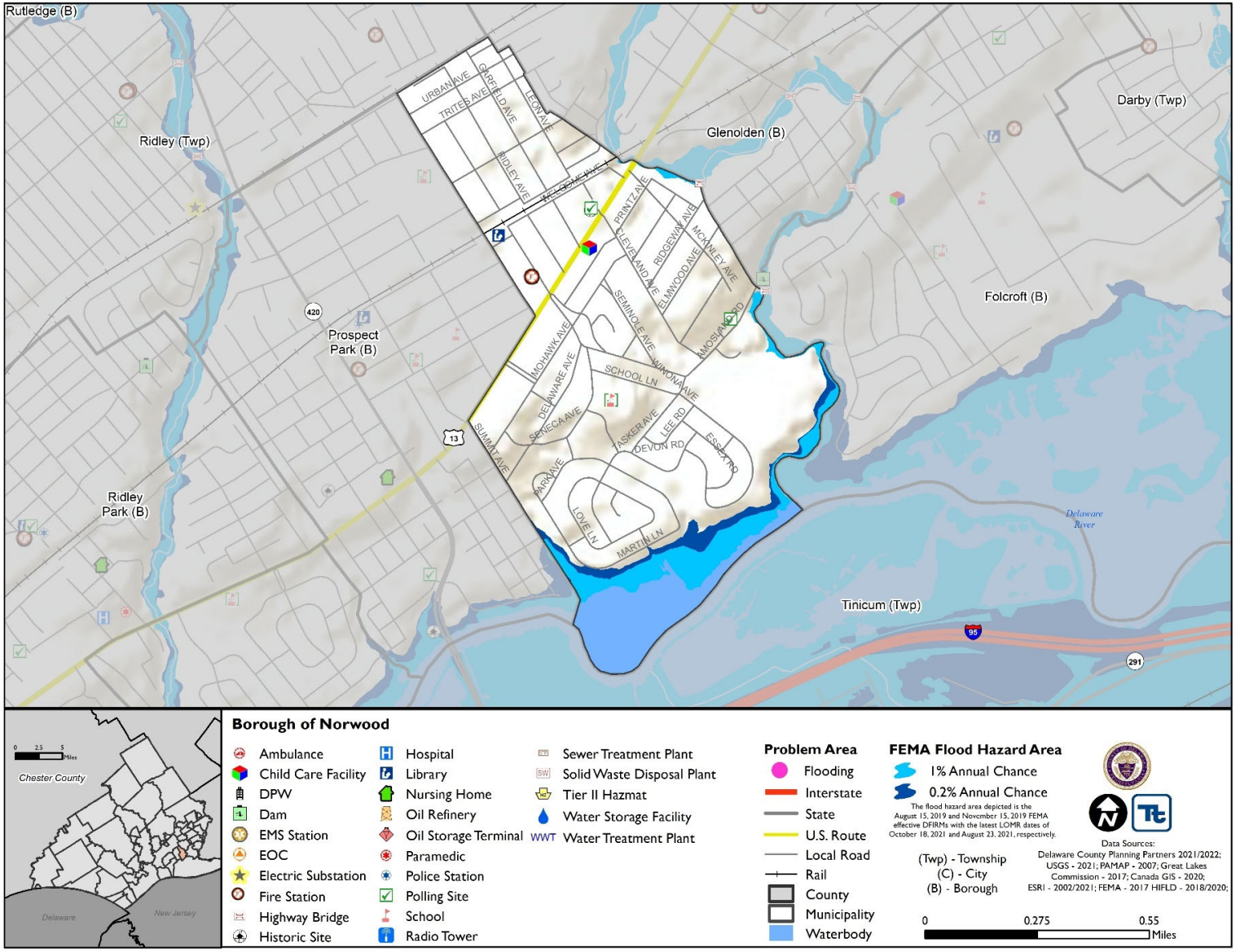
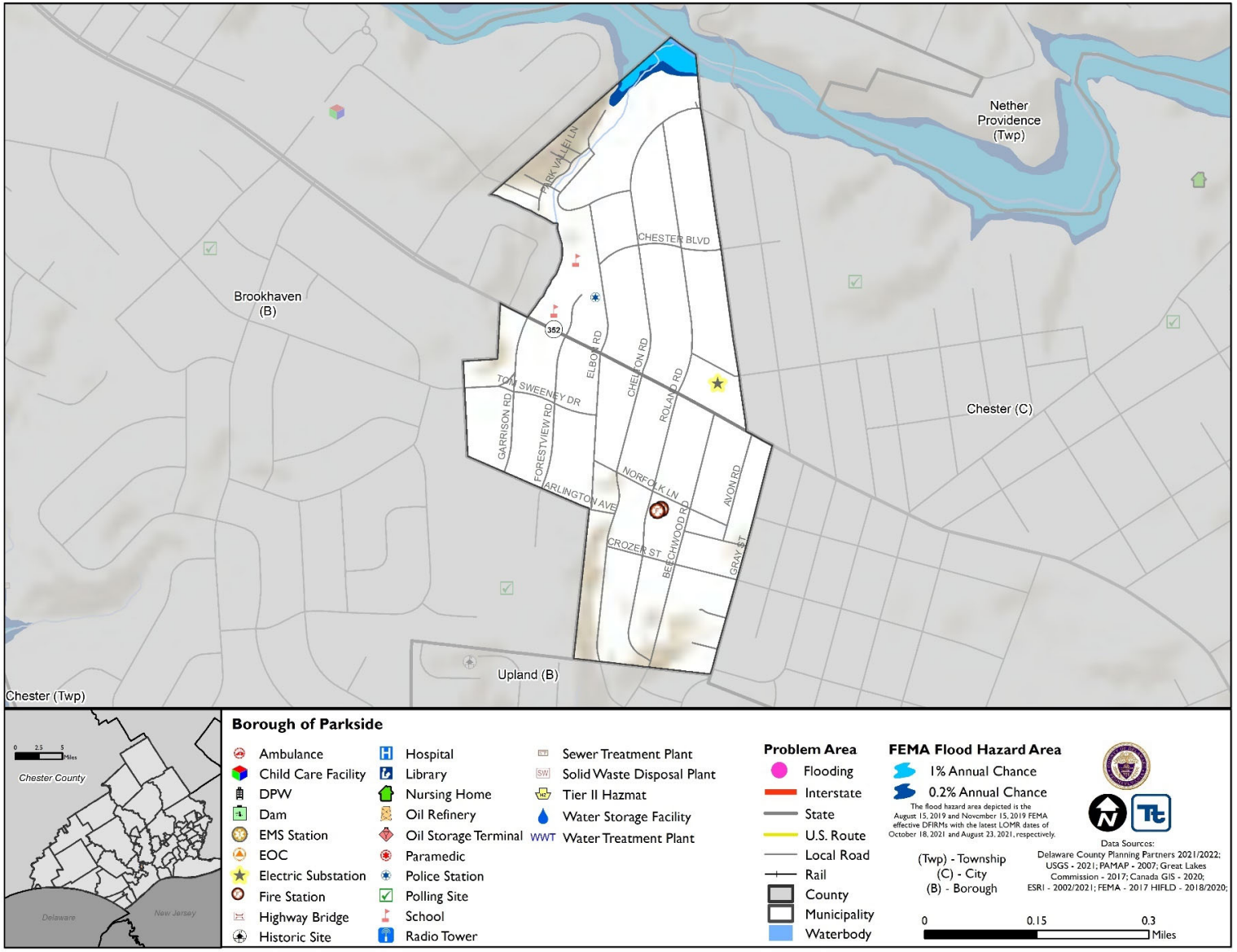


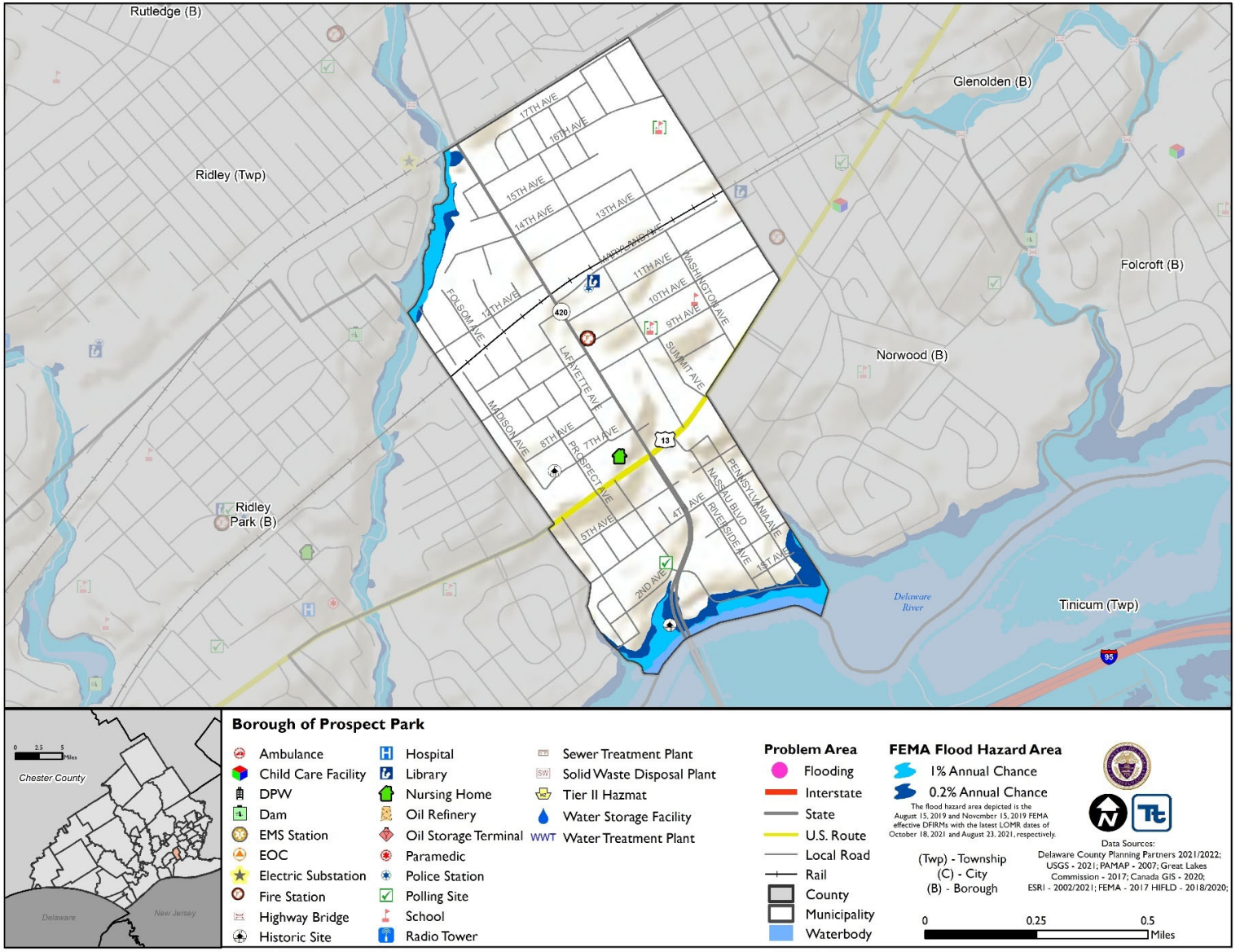
Norwood Borough



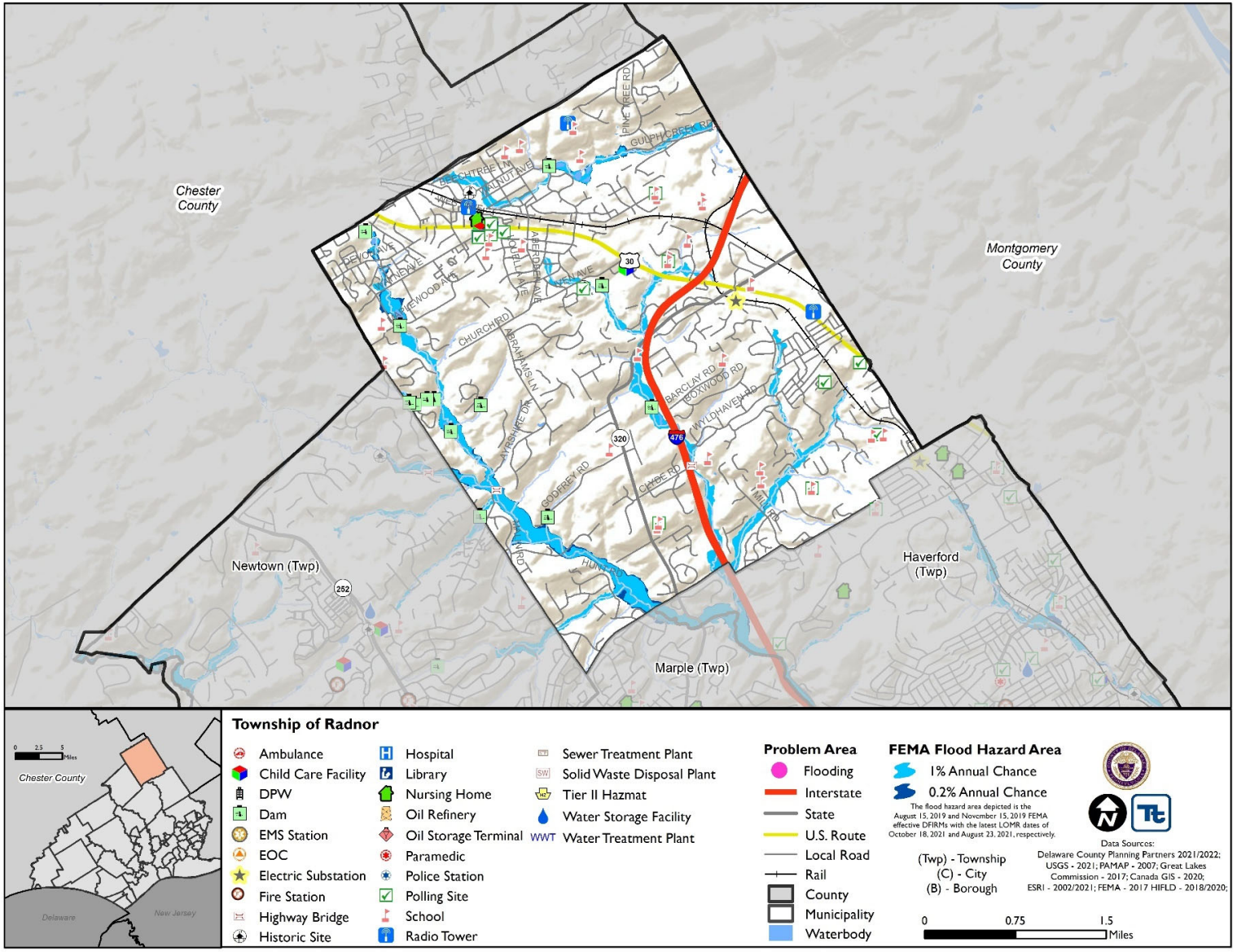
Parkside Borough



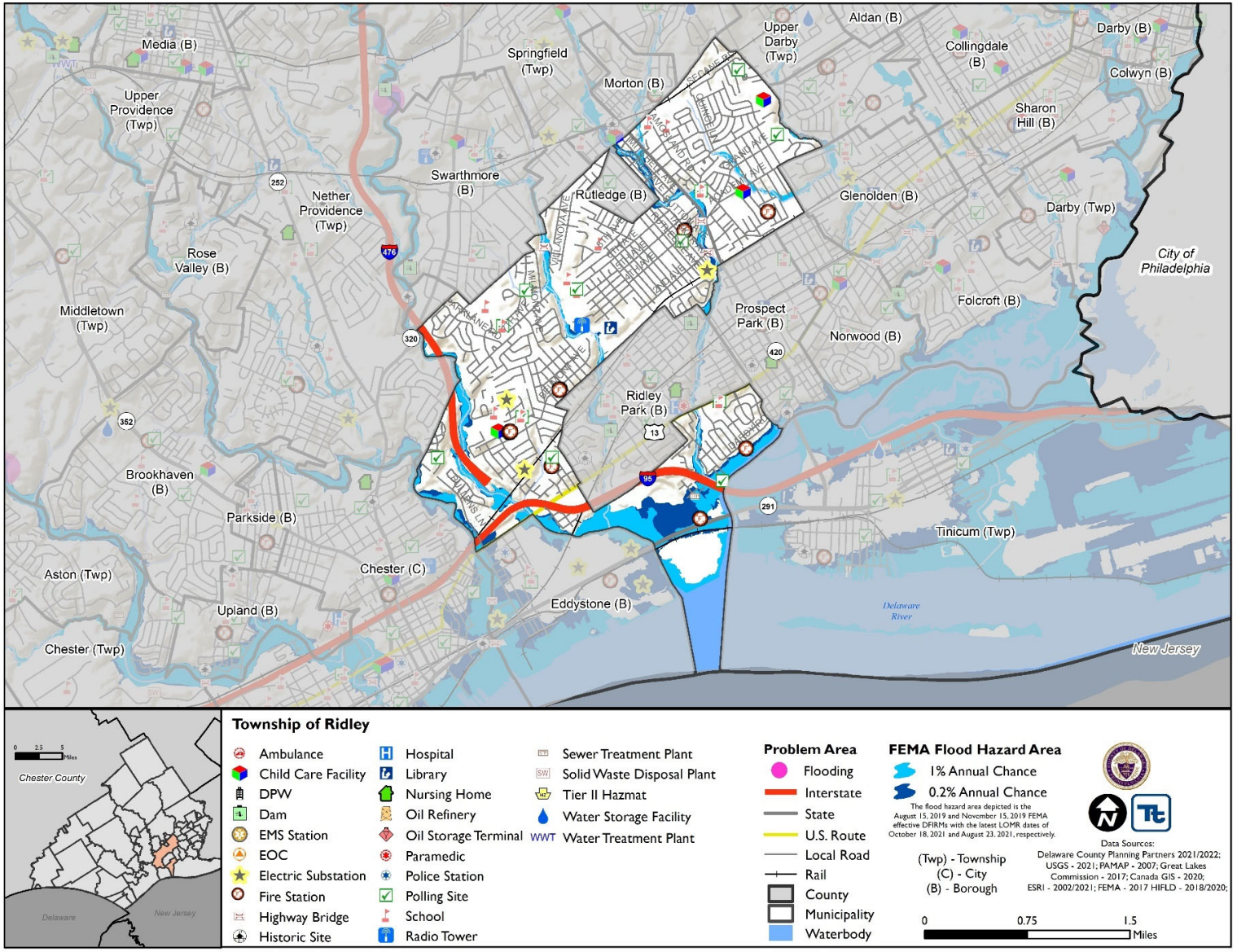
Prospect Park Borough



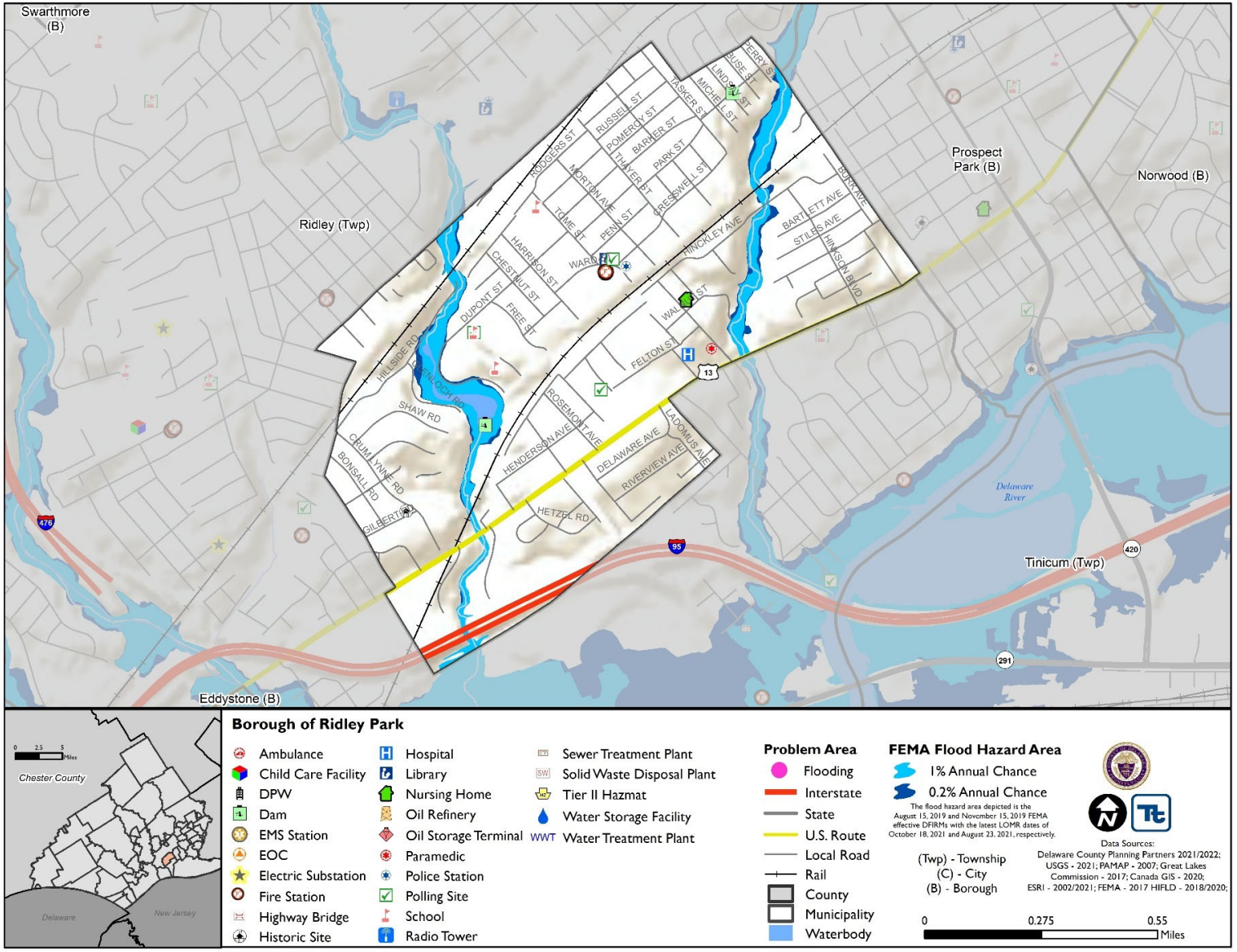
Radnor Township



Ridley Township



Ridley Park Borough



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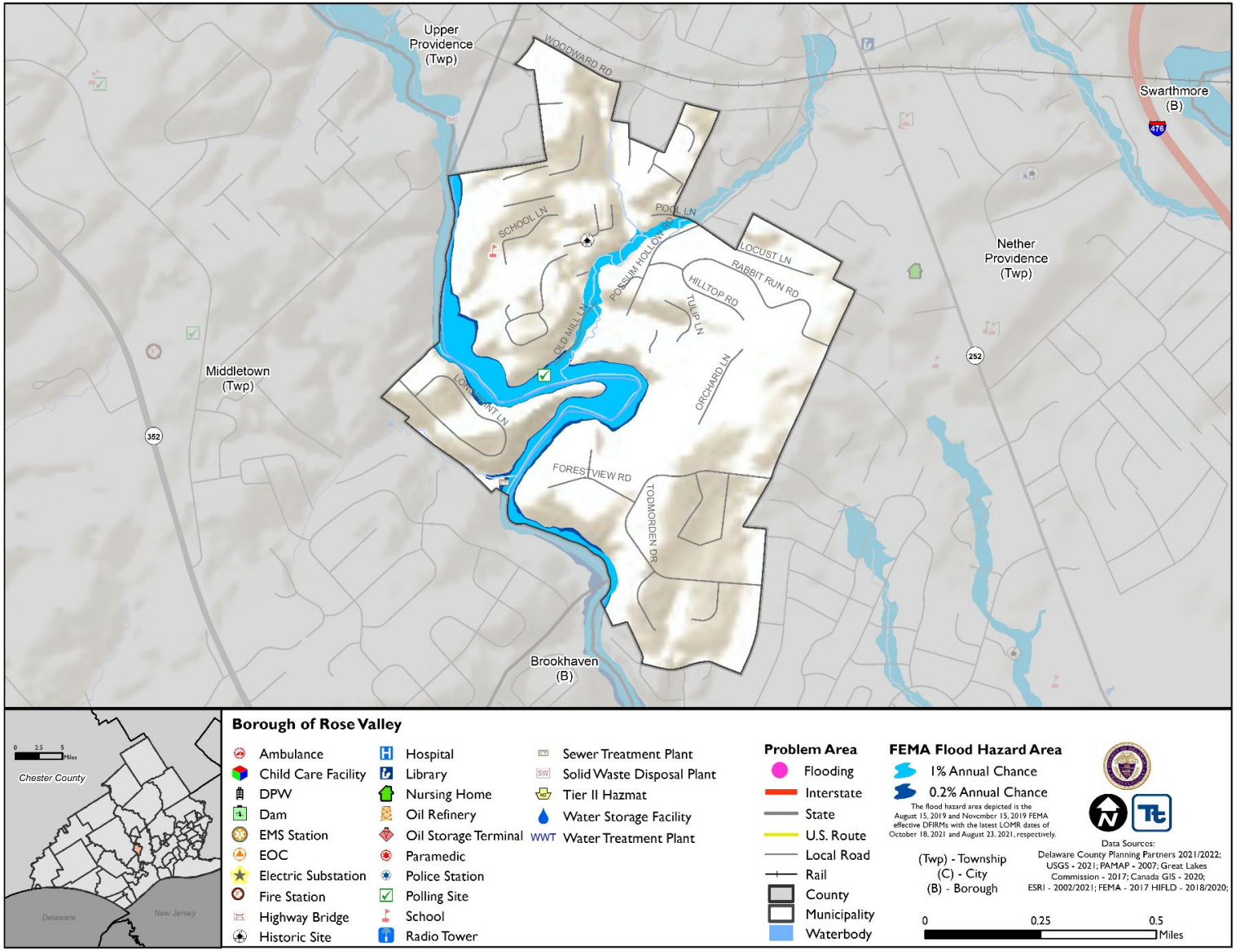

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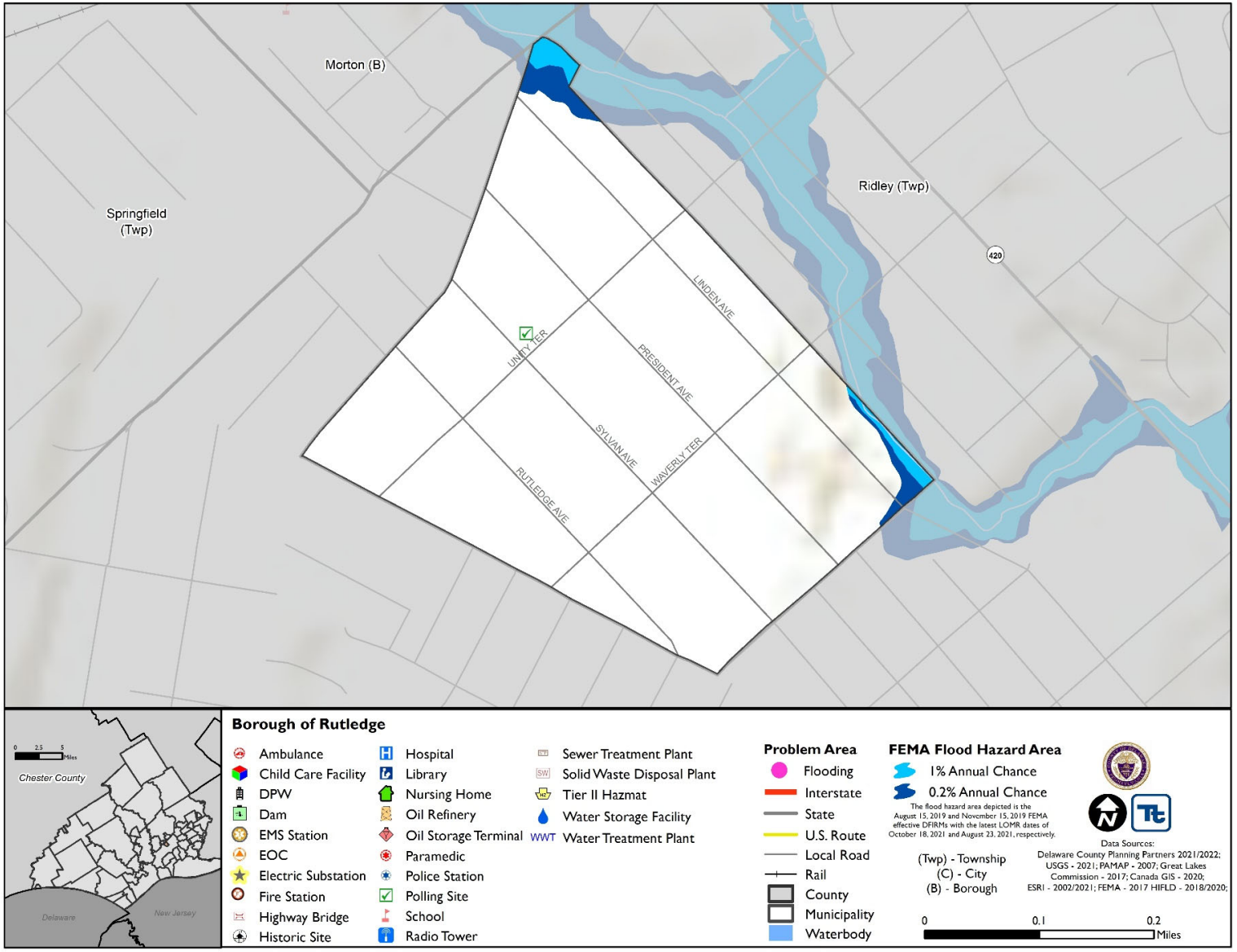
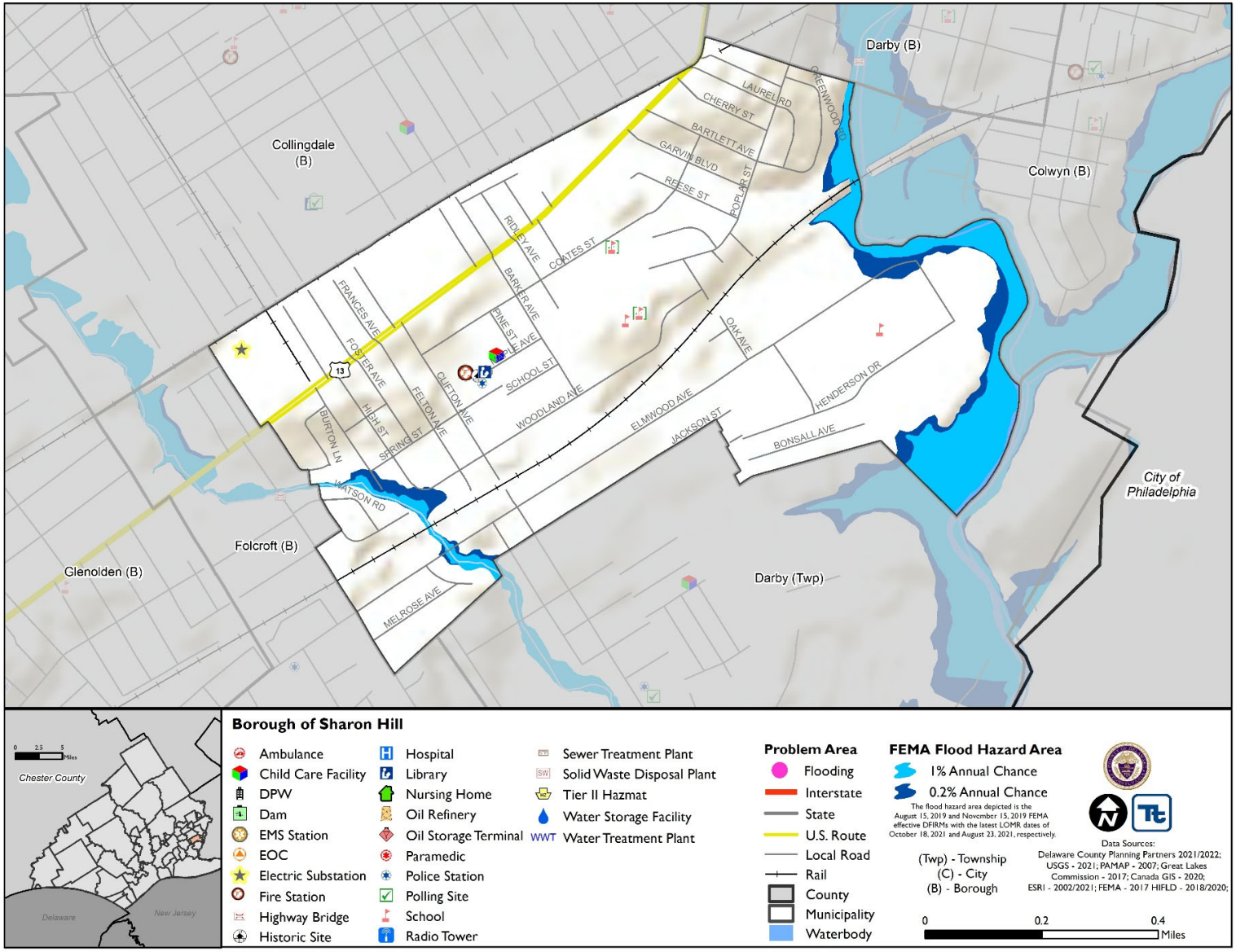
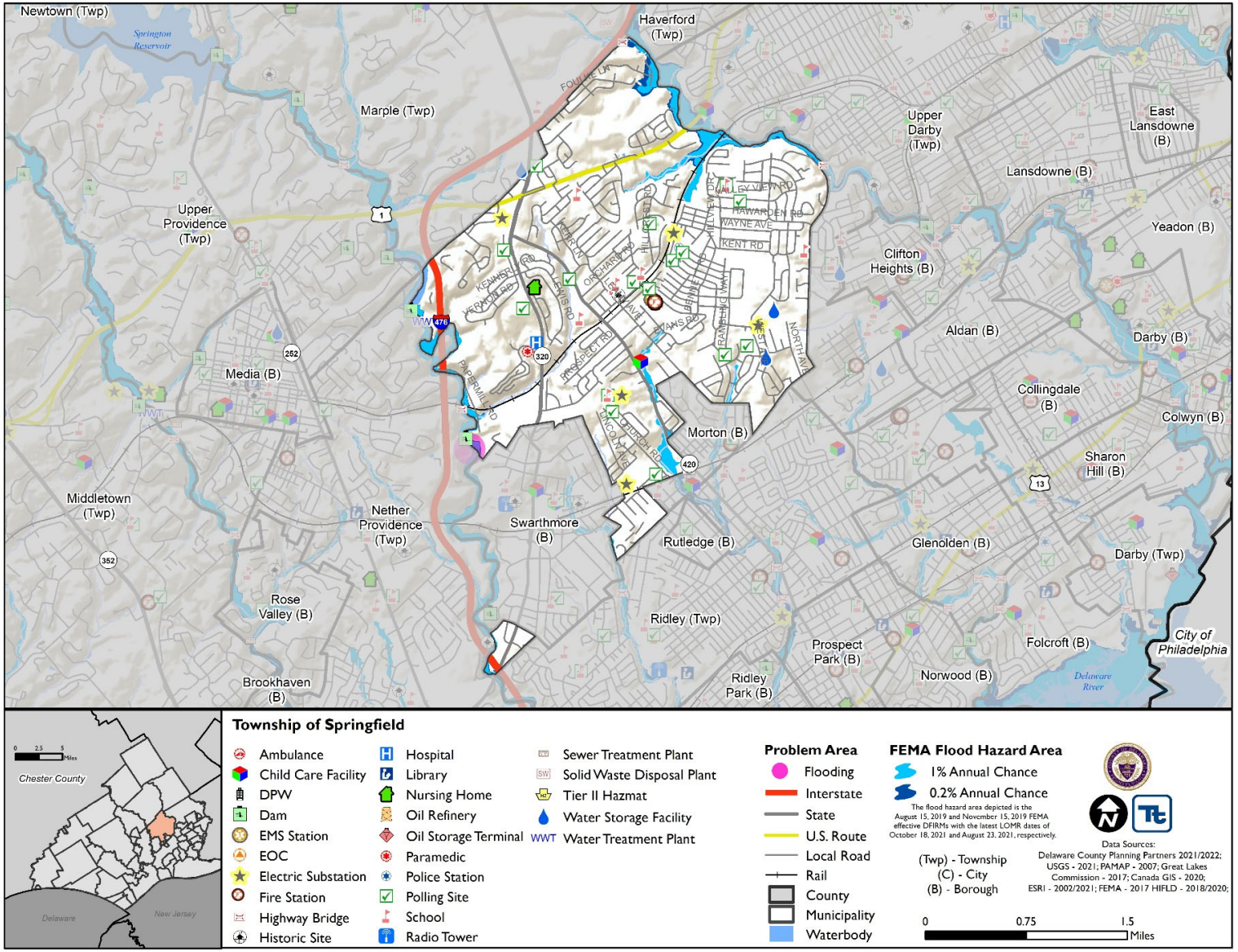


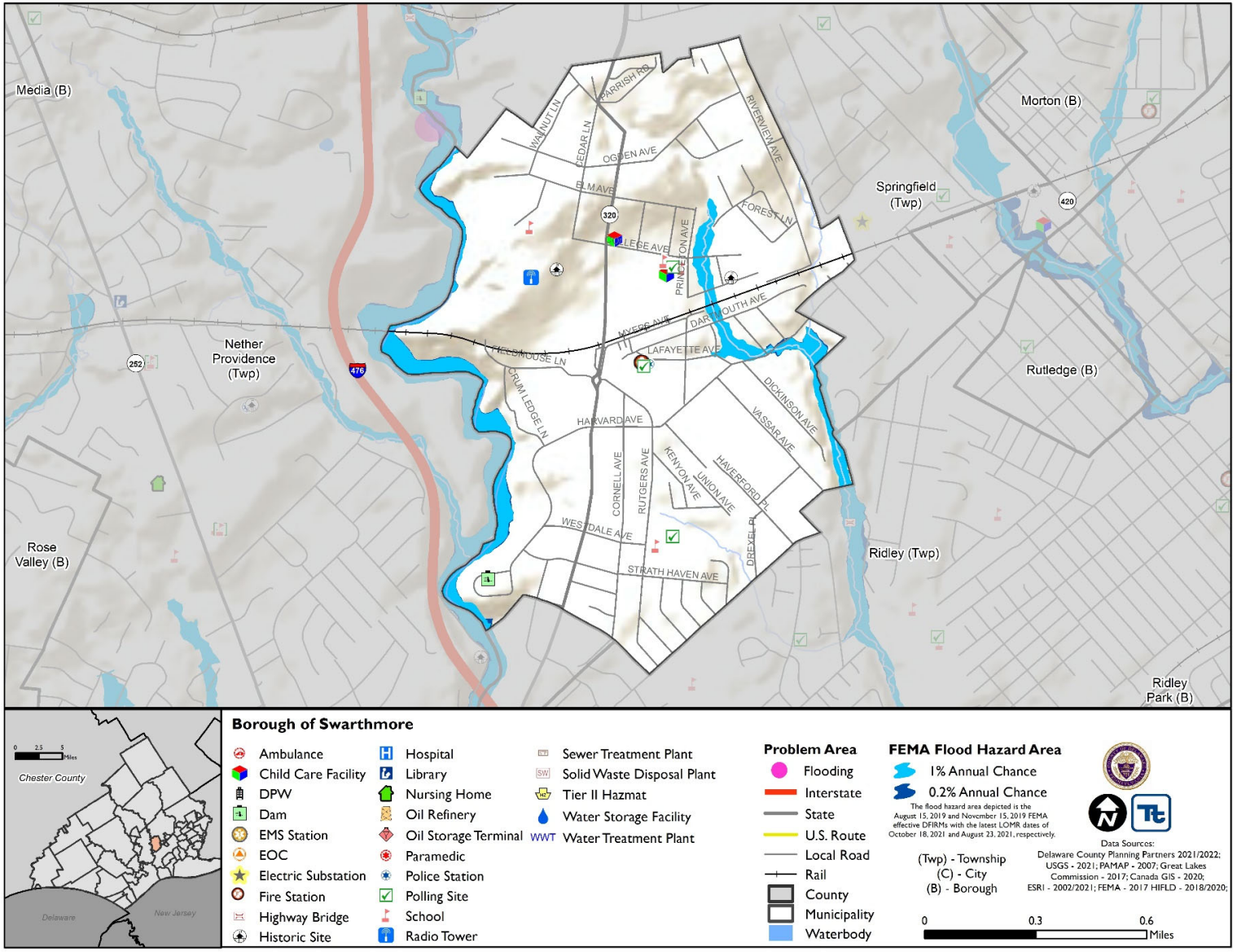
Sharon Hill Borough



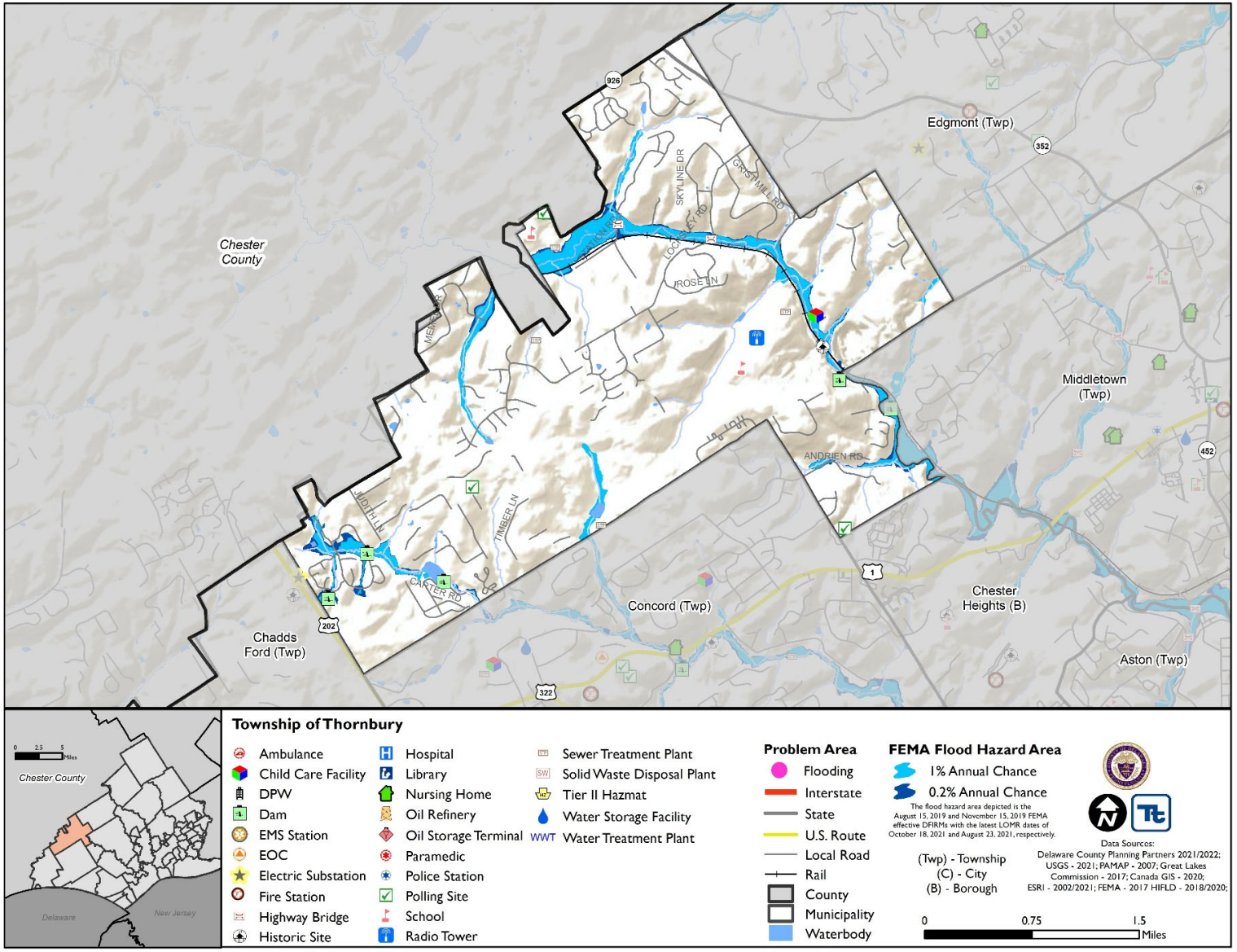
Springfield Township



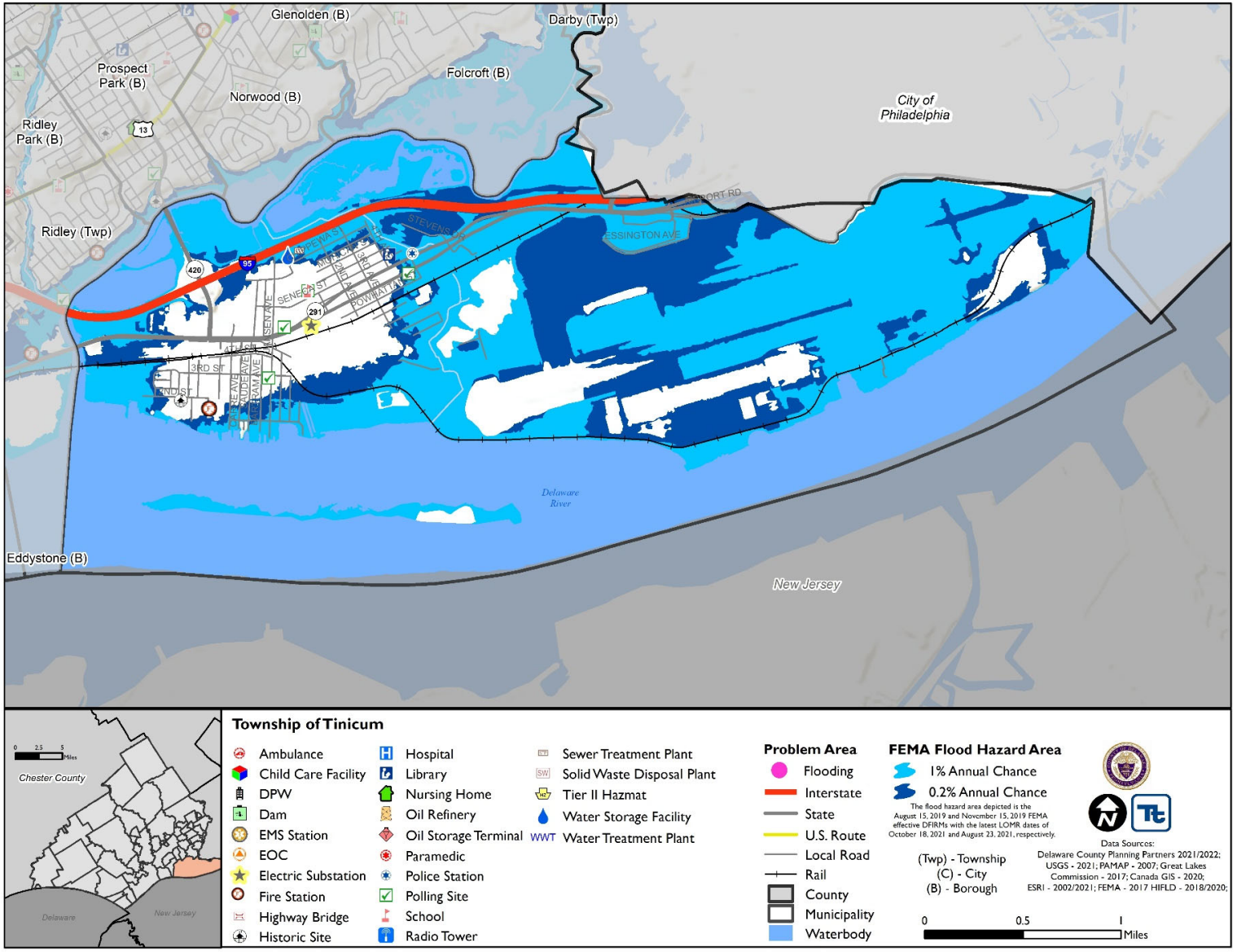
Swarthmore Borough



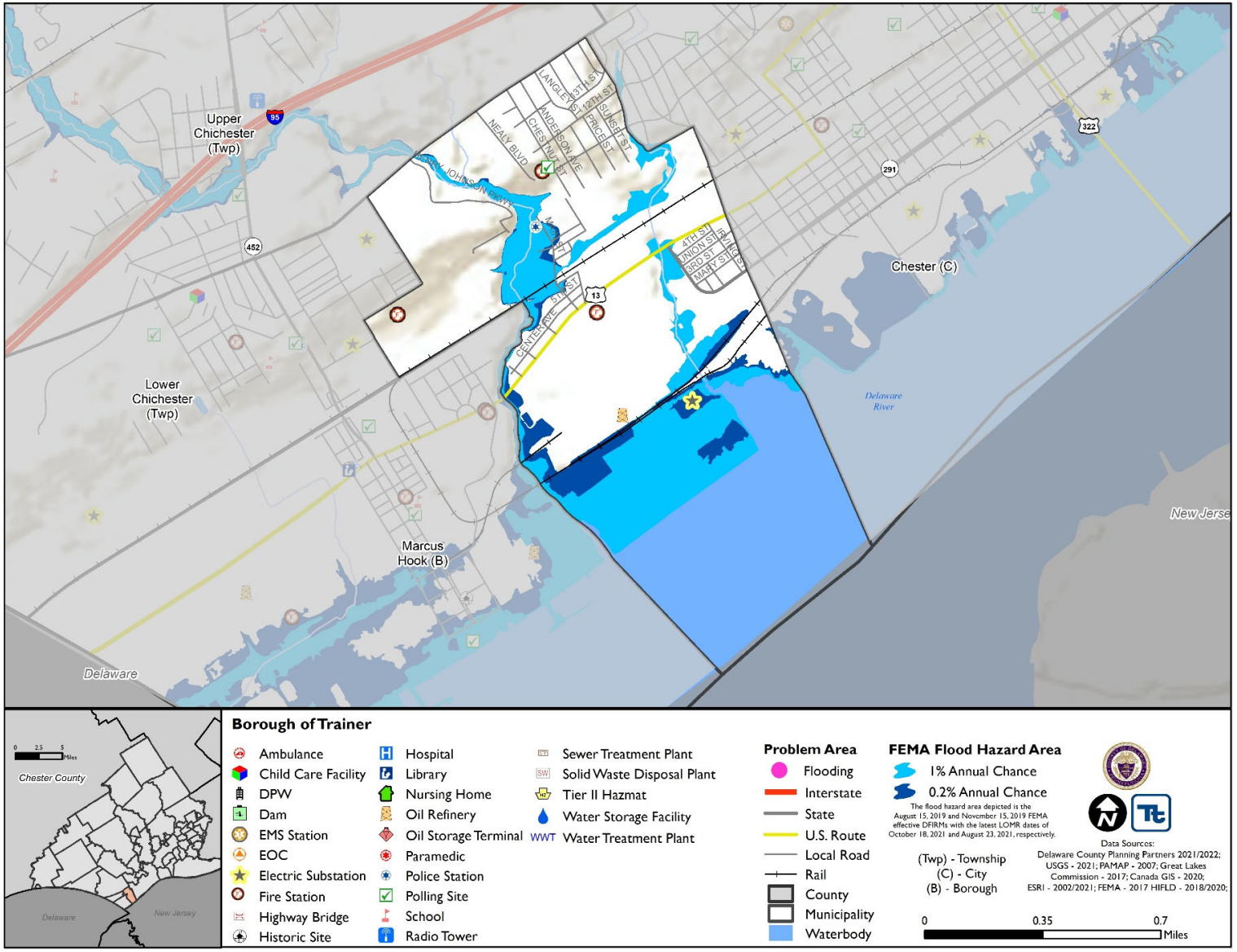
Thornbury Township



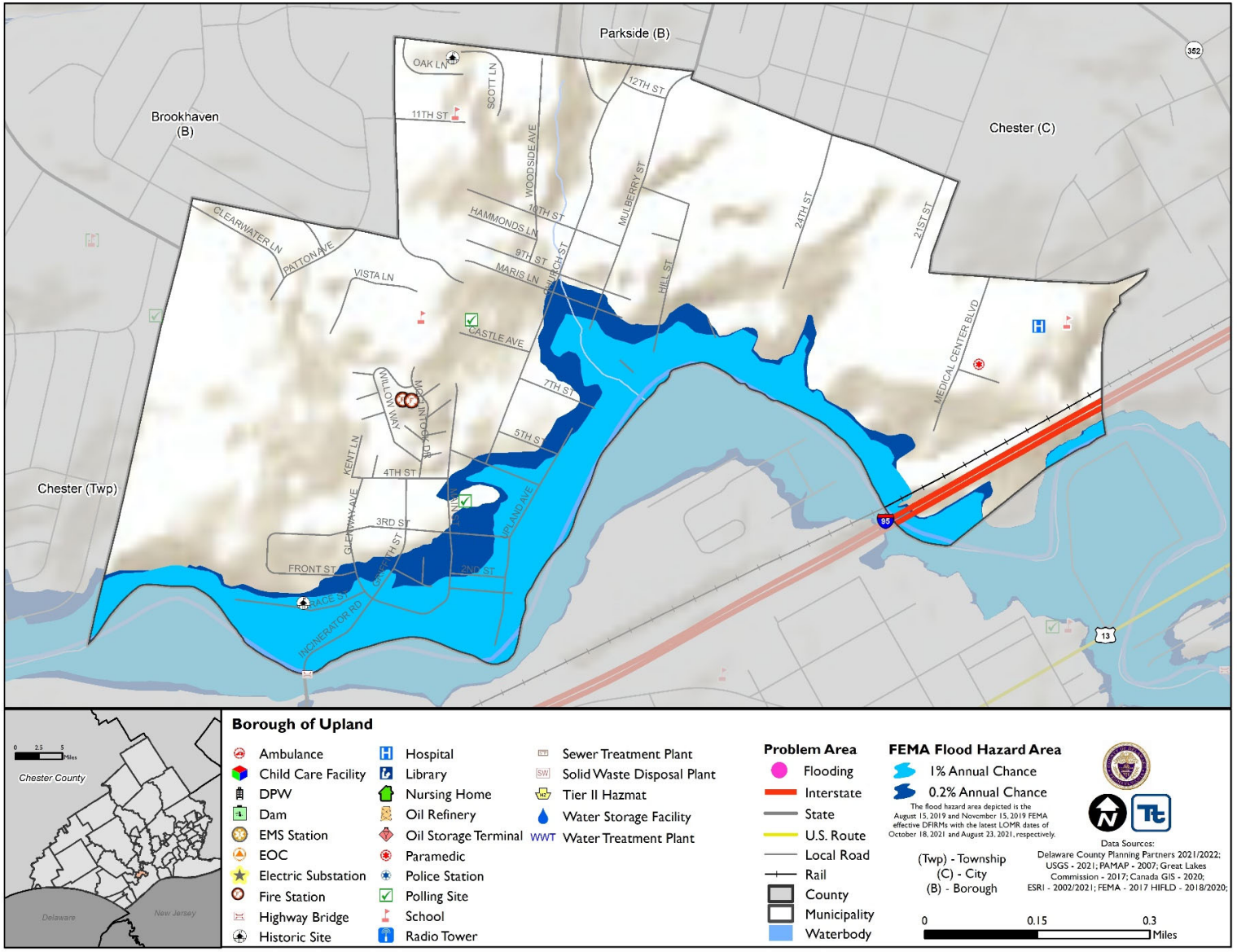
Tinicum Township



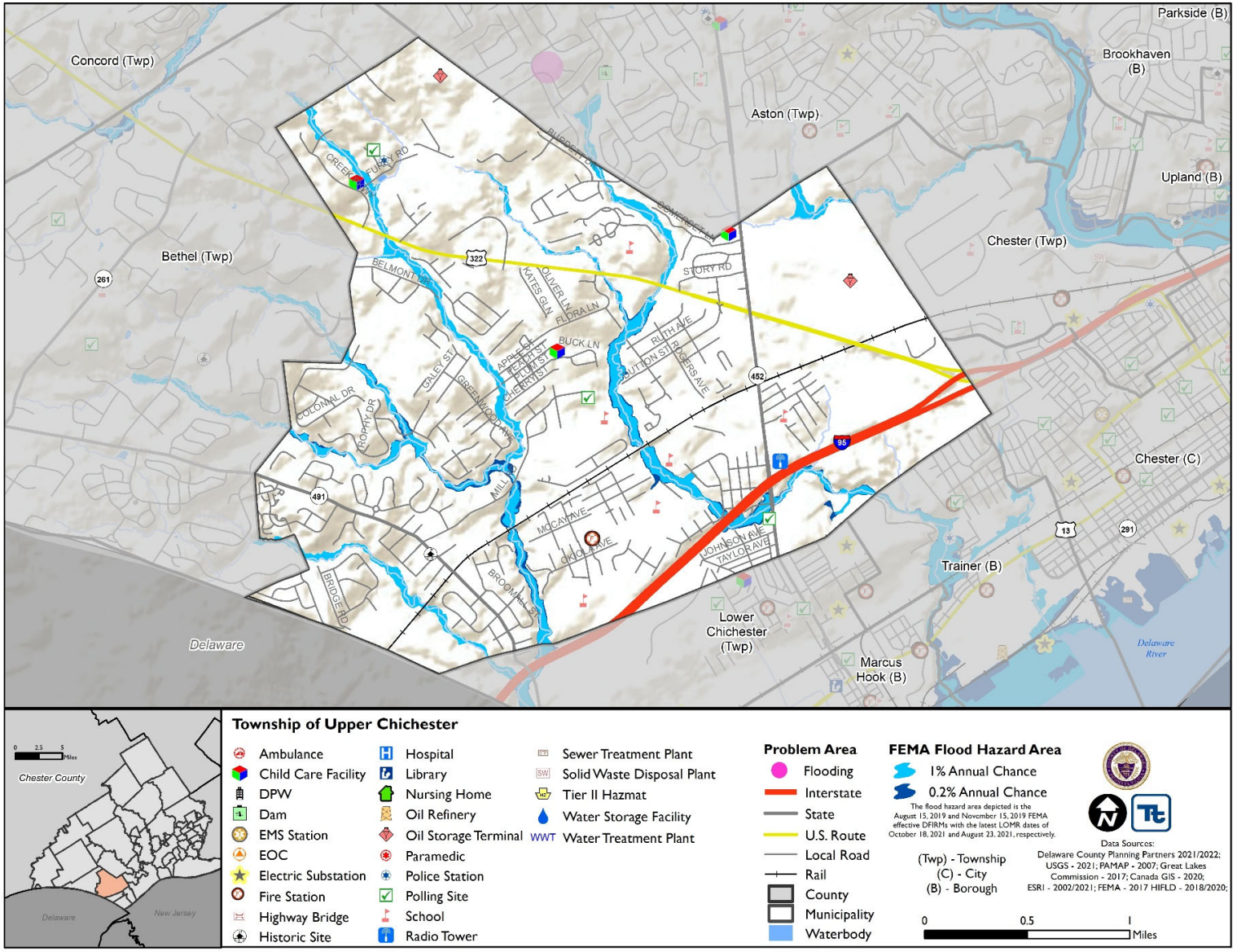
Trainer Borough



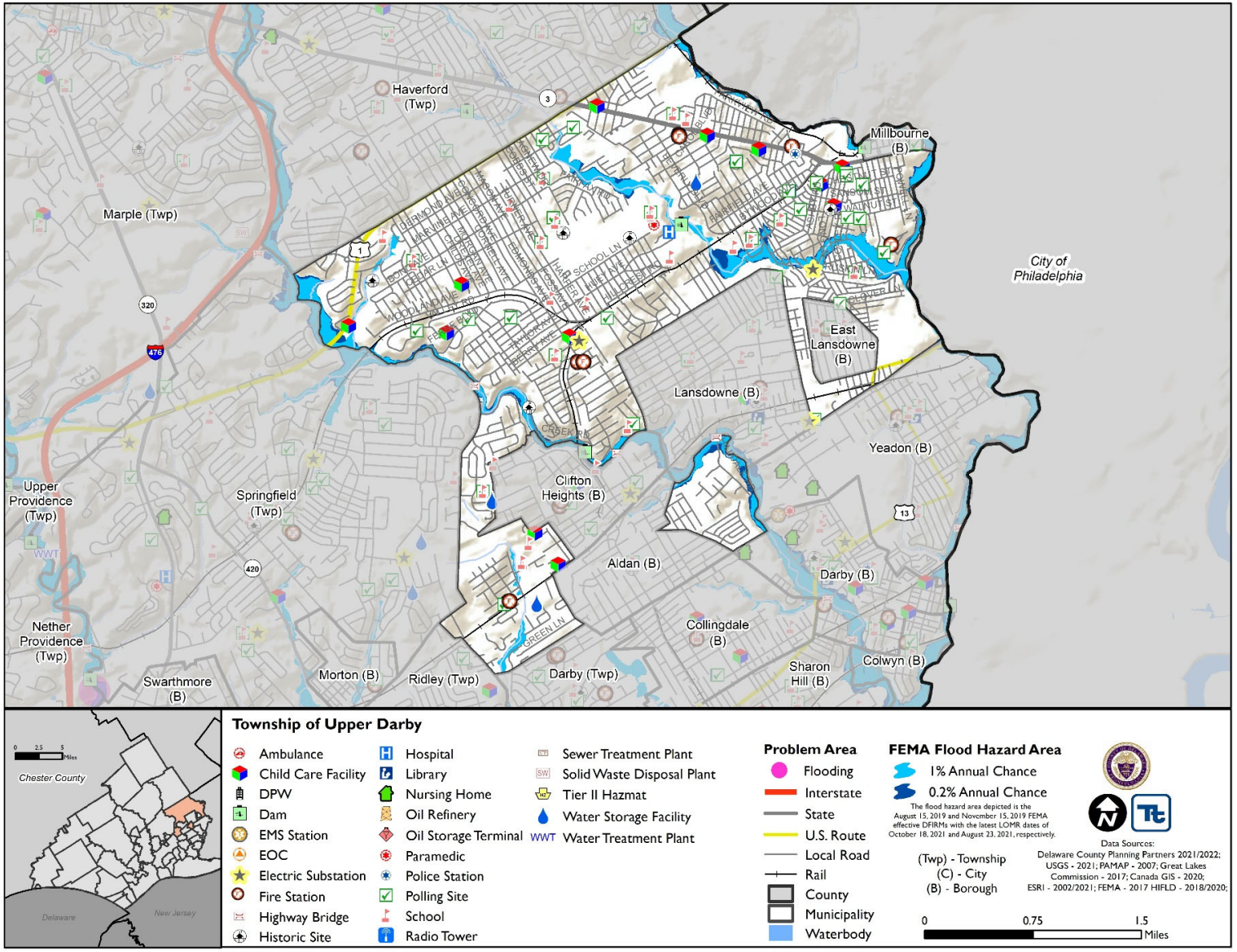
Upland Borough



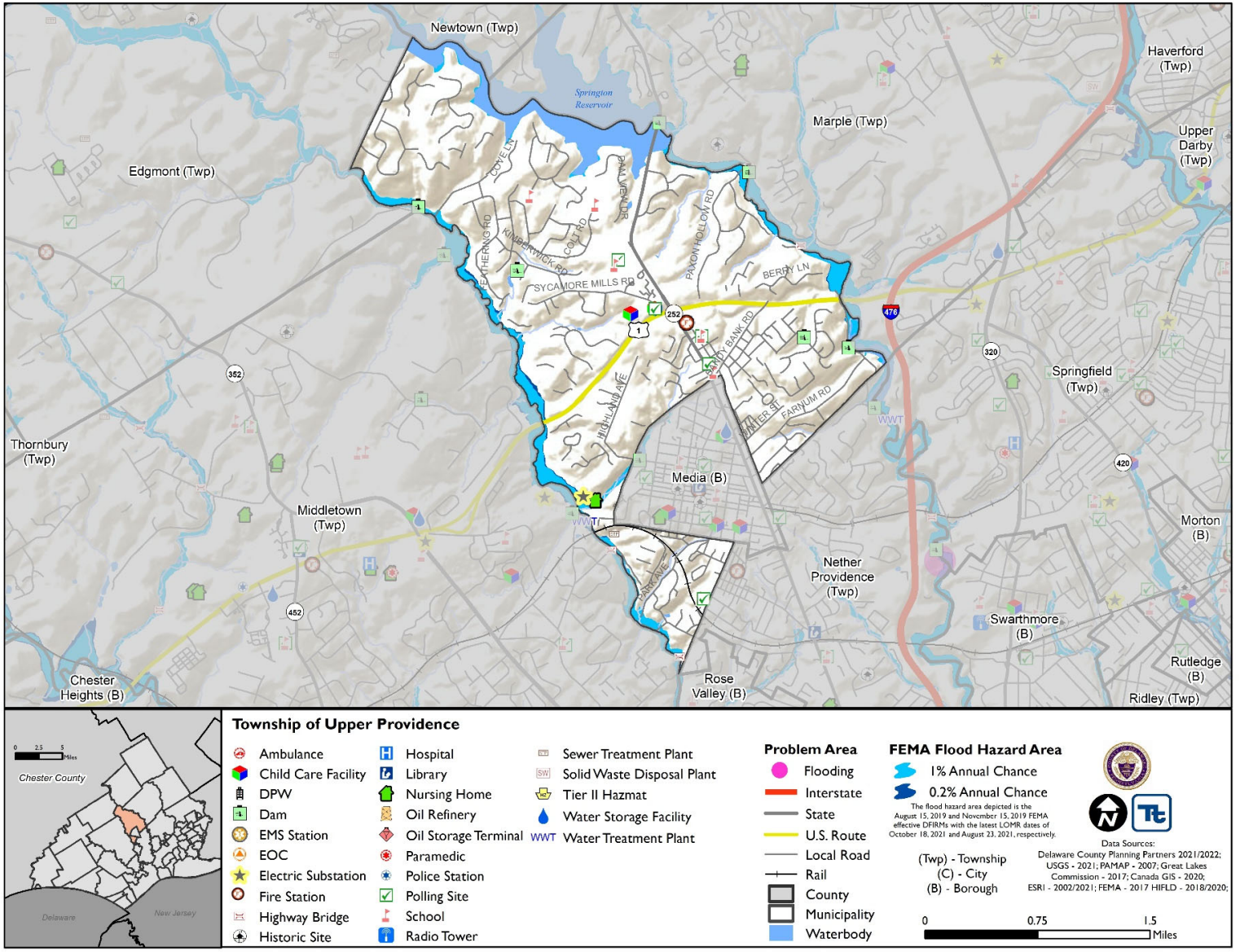
Upper Chichester Township



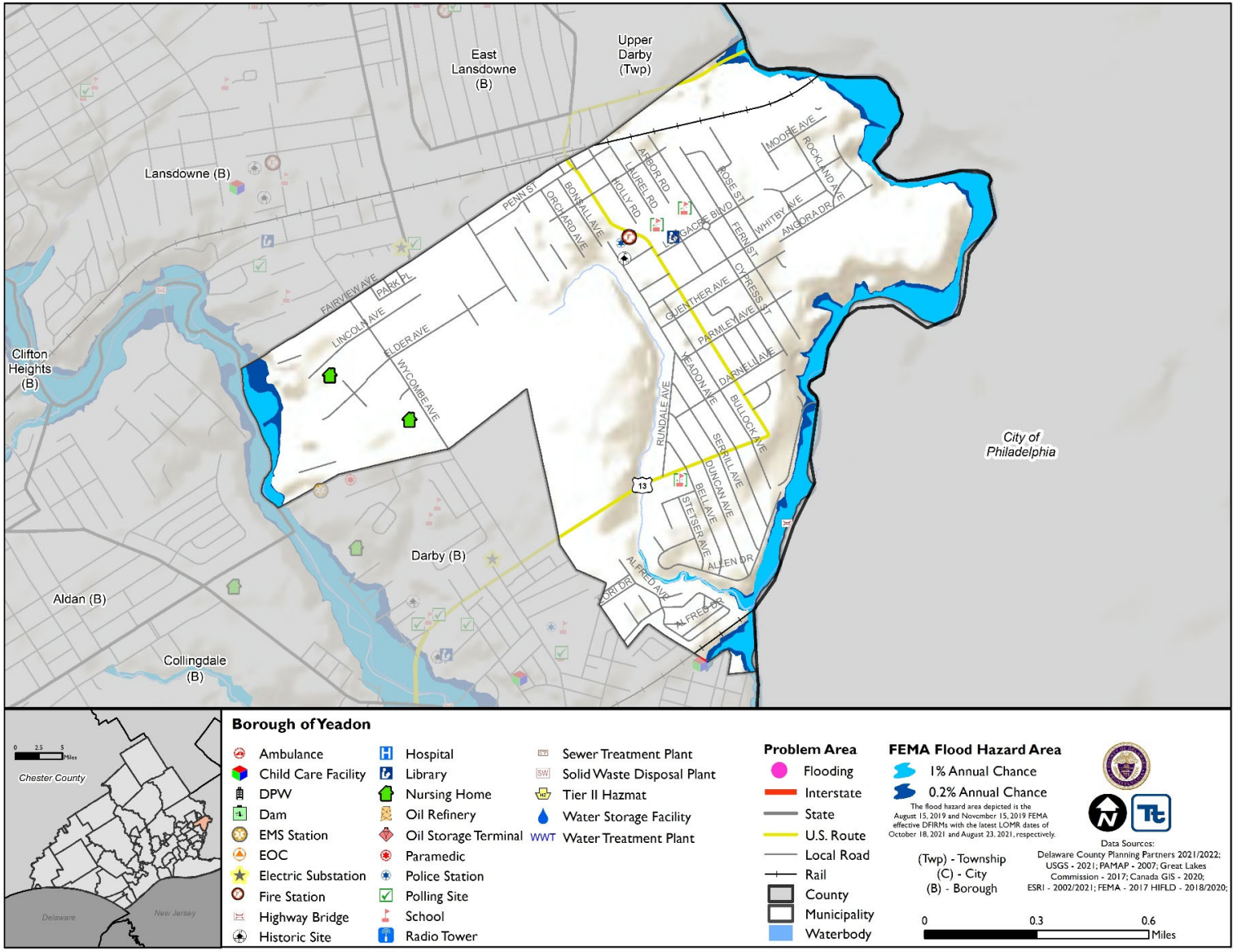
Upper Darby Township



Upper Providence Township



Yeadon Borough



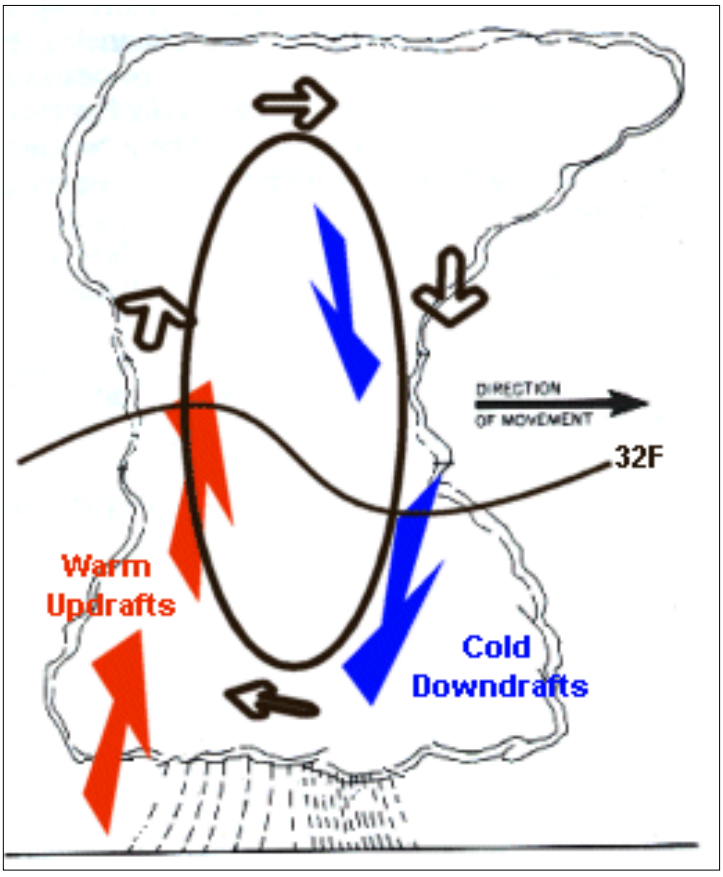
4.3.9 Hailstorm

This section describes the location and extent, range of magnitude, past occurrence, future occurrence, and vulnerability assessment for the hailstorm hazard for Delaware County.

A hailstorm is a storm accompanied by hail, which is precipitation in the form of small balls or lumps of clear ice or compact snow (Merriam Webster 2017). Hail forms inside a thunderstorm when strong updrafts of warm air and downdrafts of cold water are present. If a water droplet is picked up by the updrafts, it can be carried well above the freezing level. Water droplets freeze when temperatures reach 32°F or colder. As the frozen droplet begins to fall, it may thaw as it moves into warmer air toward the bottom of the thunderstorm. However, the droplet may be picked up again by another updraft, carried back into the cold air, and re-frozen. The frozen droplet adds another layer of ice with each trip above and below the freezing level. The frozen droplet, with many layers of ice, falls to the ground as hail. Most hail is small and typically less than 2 inches in diameter (National Weather Service [NWS] 2009). Figure 4.3.9-1 illustrates the process that occurs in hail formulation.

The size of hailstones is directly related to the size and severity of the storm. The higher the temperatures at the earth's surface, the greater the strength of the updrafts, and the greater the amount of time the hailstones are suspended, giving them more time to increase in size. Damage to crops and vehicles is typically the most significant impact of hailstorms.

Figure 4.3.9-1. Hail Formation

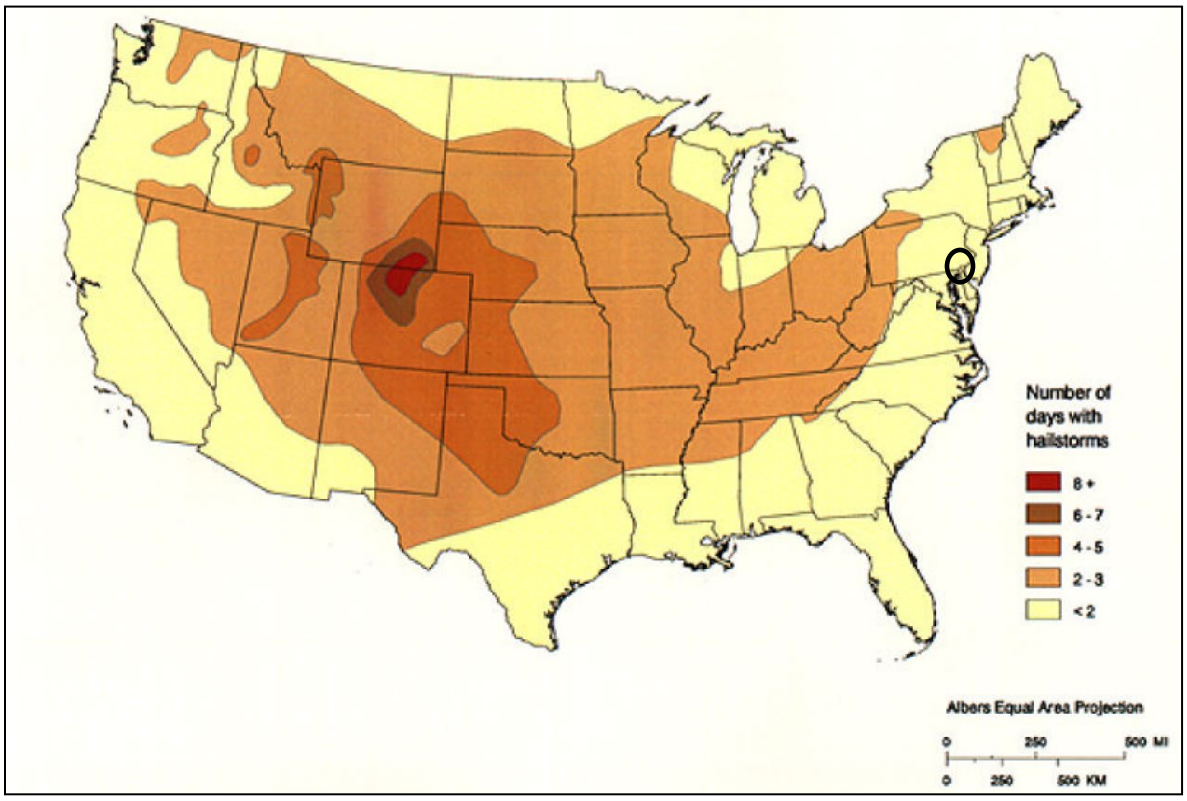


Source: National Oceanic and Atmospheric Administration (NOAA) 2012
°F degrees Fahrenheit

4.3.9-1 Location

Hail causes nearly $2 billion in crop and property damages, on average, each year in the United States. Hail occurs most frequently in states within the southern and central plains; however, hail damage is possible throughout the entire United States because hail may accompany a thunderstorm (Federal Alliance for Safe Homes 2013). As indicated on Figure 4.3.9-2, Delaware County experiences up to two hailstorms per year, on average.

Figure 4.3.9-2. Annual Frequency of Hailstorms in the U.S.



Source: Federal Emergency Management Agency (FEMA) 1997
Note: The black oval indicates the approximate location of Delaware County.

4.3.9-1 Magnitude

Hail can vary in size from less than one inch to several inches in diameter and can cause significant damage to crops and property. Damage depends on the size, duration, and intensity of hail precipitation. Individuals who do not seek shelter could face serious injury. Automobiles and aircraft are particularly susceptible to damage. Effects of other hazards associated with thunderstorms (strong winds, intense precipitation, and lightning) often occur concurrently because hail precipitation usually occurs during thunderstorms.

Delaware County has experienced hail ranging in size from 0.75 to 1.75 inches in diameter (NOAA NCEI 2022). No deaths or injuries due to hail have been recorded in the county.

Hail can be produced during many different types of storms. Typically, hail occurs with thunderstorms. The size of hail is estimated by comparing it with a known object. During most hailstorms, hail is produced in a variety of sizes, and only the very largest hail stones pose serious risk to people who are exposed. Table 4.3.9-1 shows the various sizes of hail as compared to real-world objects.

Table 4.3.9-1. Hail Size

Size	Inches in Diameter	Updraft Speed (mph)
BB	<0.25	< 24
Pea	0.25	24
Marble	0.50	35
Dime	0.70	38
Penny	0.75	40
Nickel	0.88	46
Quarter	1.0	49
Half-dollar	1.25	54
Walnut	1.5	60
Golf Ball	1.75	64
Hen Egg	2.0	69
Tennis Ball	2.5	77
Baseball	2.75	81
Teacup	3.0	84
Grapefruit	4.0	98
Softball	4.5	103

Source: NWS, n.d.

4.3.6.1 Past Occurrence

Hailstorms occur as a routine part of severe weather in Delaware County. The potential for hailstorms exists throughout the county, with a few minor incidents occurring each year. While the future occurrence of hailstorms in the county can be considered likely, Delaware County has a high potential for significant hail events based on previous records.

A hailstorm event is defined as a storm with hail that is 0.75 inch or greater in diameter. Previous versions of the State HMP found that approximately 96 percent of hailstorm events occurred during the months of April, May, June, July, August, and September. In addition, approximately 87 percent of historic events occurred during the afternoon or evening. Both of these results are consistent with the relationship between hail and thunderstorms, which most often occur during late spring, summer, and early fall months (Pennsylvania Emergency Management Agency [PEMA] 2018).

The NOAA-NCEI Storm Events database includes reports of hail appearing during storm incidents in Delaware County from 2000 to July 16, 2021, as shown in Table 4.3.9-2**.** Table 4.3.9-2 indicates that 26 separate reports were issued throughout the county from 2000 to 2021. According to these reports, Delaware County has experienced hail ranging in size from 0.75 inch to 1.25 inches in diameter, with no deaths, injuries, or property damages reported to NOAA. For the purposes of this HMP update, only events occurring between January 1, 2000 and December 31, 2021 were examined in Table 4.3.9-2. Neither Delaware County, nor the Commonwealth of Pennsylvania has ever received a federal disaster declaration because of a hail event.

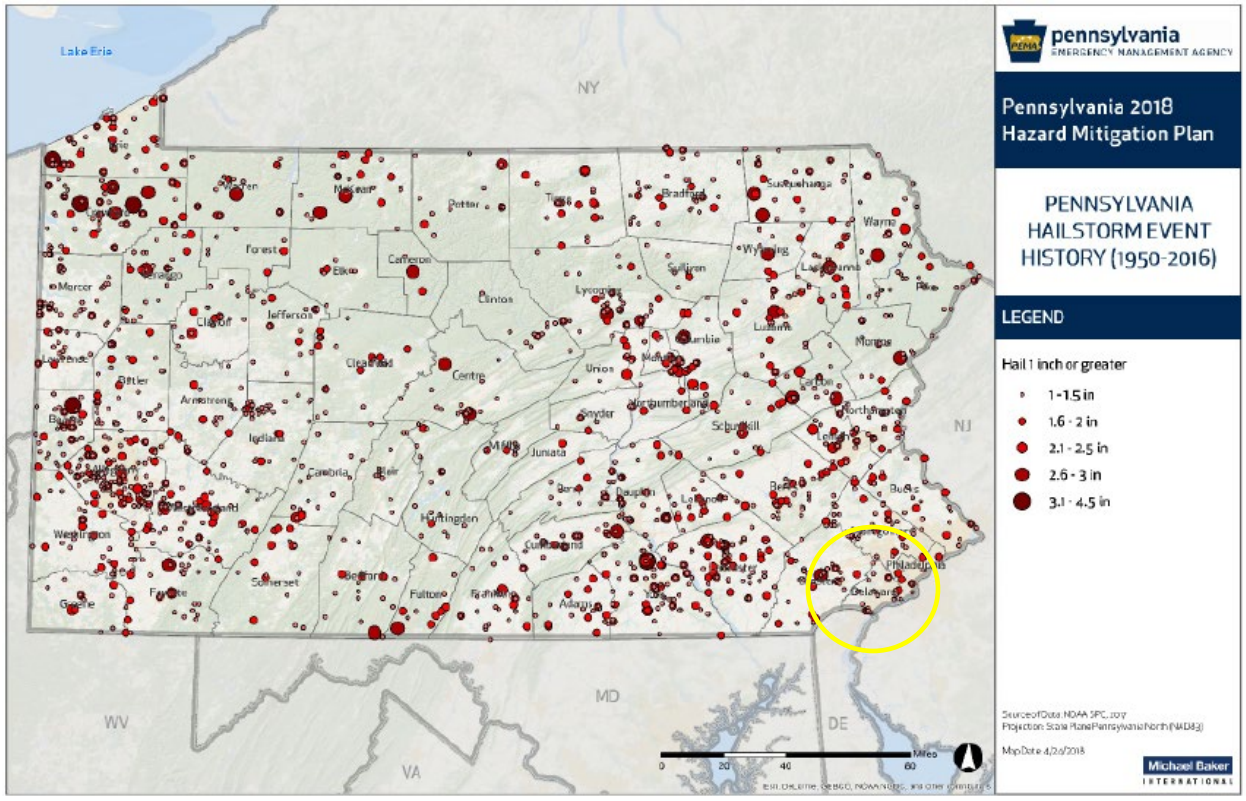
Table 4.3.9-2. Recorded Hail events from 2000-2021 in Delaware County

Location	Date	Maximum Hail Size (in)
Sharon Hill	May 24, 2000	0.75
Sharon Hill	June 18, 2000	0.75
Edgmont	August 12, 2000	1
Aston Mills	May 27, 2002	0.75

Location	Date	Maximum Hail Size (in)
Bryn Mawr	April 24, 2006	0.88
Secane	May 15, 2006	1
Glen Mills	June 2, 2006	1.25
Drexel Hill	June 9, 2006	0.75
Boothwyn	July 24, 2008	0.75
Marcus Hook	August 10, 2008	1
Boothwyn	March 29, 2009	1.75
Brookhaven	July 24, 2009	0.88
Oakmont	June 24, 2010	1.75
Drexel Hill	June 9, 2011	0.88
Drexel Hill	August 1, 2011	0.75
Sharon Hill	August 1, 2011	1
Boothwyn	August 1, 2011	1
Oakmont	June 29, 2012	1
Boothwyn	May 22, 2014	1.25
Chelsea	May 22, 2014	1.5
Glen Mills	May 22, 2014	1.5
Media	July 27, 2014	0.88
East Landsdowne	April 2, 2016	0.75
Cheyney, Glen Mills, Lima	June 2, 2019	1
Chadds 0Ford	08/28/2020	0.88
Broomall, Foxcroft, and Primos	June 14, 2021	1

Source: NOAA NCEI 2022; FEMA 2022

Figure 4.3.9-3. Hail Events in Pennsylvania (1950-2016)



Source: PEMA 2019
Note: The yellow oval indicates the location of Delaware County.

4.3.6.2 Probability of Future Occurrence

The formation of a hailstorm is not possible to predict with more than a few days' lead time. The past occurrences described above, however, indicate that hailstorm events in Delaware County have a 100 percent chance of occurring in any given year.

Table 4.3.9-3. Delaware County Hailstorm Future Occurrence

Hazard Type	Number of Occurrences Between 2000 and 2021	Rate of Occurrence or Annual Number of Events (Average)	Recurrence Interval (in Years) (# Years/Number of Events)	Percent Chance of Occurrence in Any Given Year
Hailstorm	26	1.24	0.85	100%

Source: NOAA NCEI 2022, Delaware County 2016

Future occurrences of hailstorms can be considered *possible* as defined by the Risk Factor Methodology probability criteria (further discussed in Section 4.4).

4.3.6.3 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. Regarding hail events, the entire county has been identified as the hazard area. Therefore, all assets in Delaware County (population, structures, critical facilities, and lifelines), as described in the County Profile

(Section 2), are vulnerable. This section evaluates and estimates the potential impact of hailstorm events on the county in the following sections:

- Overview of vulnerability
- Impacts on: (1) life, health, and safety of residents; (2) general building stock, critical facilities, and economy; (3) the environment; and (4) future growth and development
- Effect of climate change on vulnerability
- Collection of further data that will assist in understanding this hazard

Overview of Vulnerability

The entire county, including all critical infrastructure, is vulnerable to the effects of hail, as the storm cells that produce this hazard can develop over any part of the region. The area of damage caused by these storms is relatively small because a single storm does not cause widespread devastation, but may cause damage within a focused area.

Hail can cause serious damage to automobiles, aircraft, skylights, livestock, and crops. Areas of the county with large amounts of farmland and high agricultural yields are more likely to be affected by hailstorm hazards.

Impact on Life, Health, and Safety

The entire population of the county is considered exposed to the hail hazard. People outdoors (for example, pursuing recreational activities and farming) are considered most vulnerable to the hazard because they ordinarily would receive little to no warning, and shelter may not be available to them. Moving to a lower-risk location decreases a person's vulnerability.

Impact on General Building Stock

Hailstorms primarily affect agricultural products. The facilities most vulnerable to hailstorm threats are food- and agriculture-related producers and manufacturers. These facilities are present within both urban and rural areas and would be directly or indirectly affected by a hailstorm event. However, according to the Pennsylvania HMP, Delaware County is not significantly impacted by hailstorm hazards (PEMA 2018).

Impact on Critical Facilities

Full functionality of critical facilities such as police, fire, and medical services is essential for any emergency response during and after a hailstorm event. These critical facility structures are largely constructed of concrete and masonry; therefore, these should undergo only minimal structural damage from a hailstorm event. Because power interruption can occur, backup power is recommended for critical facilities and infrastructure.

Impact on the Economy

As discussed above in, Delaware County has not experienced historical hailstorm property damage and significant crop damage ($0 in property damage claims per NCEI records). However, given the unpredictability of hailstorms, significant property and crop damage is possible during any hailstorm event. Jurisdictional loss estimation is based on lost agricultural revenues throughout the county. The USDA Census of Agriculture enumerates farmland acreage by county, as well as the annual market value of all agricultural products sold by county, from year 2017. If a hailstorm would eliminate the entire agricultural yield in Delaware County, total losses on the county's 61 farms could reach $9,494,000 (USDA 2017).

Impact on the Environment

Damage to trees, shrubbery, and other vegetation may occur during hailstorm events through defoliation. Unless there are compounding stresses, natural vegetation can typically recover over time following the event(PEMA 2018).

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across Delaware County, and are further discussed in Section 2.4 of this HMP. New developments and new residents are expected to be exposed to the hailstorm hazard in the future.

Effect of Climate Change on Vulnerability

The definition of "climate" is not restricted to average temperature and precipitation, but also includes type, frequency, and intensity of weather events. On both global and local scales, climate change could alter the prevalence and severity of extremes such as hailstorms. While predicting changes of storm events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating effects of future climate change on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).

As directed by the Climate Change Act (Act 70 of 2008), Pennsylvania's Department of Environmental Protection (PADEP) initiated a study of potential impacts of global climate change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment's main findings indicate likelihood that Pennsylvania will undergo increased temperatures in the 21st century. An increase in variability of temperature and precipitation may well lead to increased frequency and severity of hailstorm events. Future improvements in modeling smaller-scale climatic processes such as thunderstorms and associated hailstorms can be expected and will lead to improved understanding of the ways in which the changing climate will alter storms, such as hailstorm events, in Pennsylvania (Shortle et al. 2009).

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Delaware County's vulnerability assessment.

4.3.10 Hurricane, Tropical Storm

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the hurricane and tropical storm hazard in Delaware County.

Hurricanes and Tropical Storm

Tropical cyclones are fueled by a different heat mechanism than other cyclonic windstorms, such as Nor'easters and polar lows. The characteristic that separates tropical storms from other cyclonic systems is that at any height in the atmosphere, the center of a tropical storm will be warmer than its surroundings, a phenomenon called *warm core* storm systems (NOAA 2013). Tropical cyclones strengthen when water evaporated from the ocean is released as the saturated air rises, resulting in condensation of water vapor contained in the moist air. Tropical cyclones begin as disturbed areas of weather, often referred to as tropical waves. As the storm organizes, it is designated as a tropical depression.

A tropical storm system is characterized by a low-pressure center and numerous thunderstorms that produce strong winds of 39 to 73 mph and heavy rain. A hurricane is a tropical storm that attains hurricane status when its wind speed reaches 74 mph or higher. Tropical systems can develop in the Atlantic between the Lesser Antilles and the African coast or in the warm tropical waters of the Caribbean Sea and Gulf of Mexico. These storms can move up the Atlantic Coast of the United States, impacting the eastern seaboard, or move into the United States through the states along the Gulf Coast, bringing wind and rain as far north as New England before moving eastward offshore.

The effects of hurricanes and tropical storms can impact Delaware County from June to November, the official Atlantic hurricane season (NHC 2019).

4.3.10.1 Location and Extent

Delaware County is located about 45 miles inland from the Delaware Bay and approximately 60 miles inland from the Atlantic Coast, meaning it is in an area of Pennsylvania where hurricanes and tropical storms could track inland, causing heavy rainfall and strong winds. These storms are regional events that can impact very large areas hundreds to thousands of miles across over the life the storm. Therefore, all communities within Delaware County are equally subject to the impacts of hurricanes, tropical storms, and nor'easters that track through or near the county. Areas in Delaware County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

Tropical Storm and Hurricane Tracks

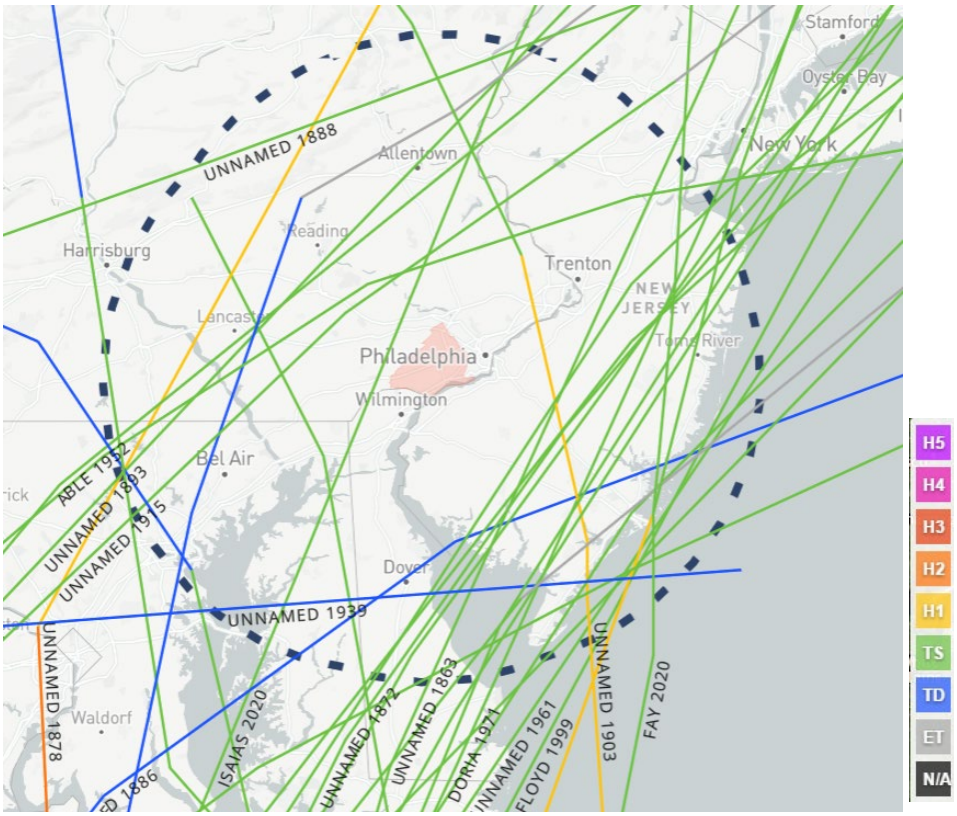
NOAA's Historical Hurricane Tracks tool is a public interactive mapping application that displays Atlantic Basin and East-Central Pacific Basin tropical cyclone data. This interactive tool catalogs tropical cyclones that have occurred from 1842 to 2020 (latest date available from data source). Between 1842 and 2020, 46 events classified as either a hurricane, tropical storm, tropical depression, or extra tropical storm tracked within 60 nautical miles of Delaware County. Figure 4.3.10-1 displays tropical cyclone tracks for Delaware County that tracked with 60 nautical miles between 1842 and 2021. While some events are not shown on this figure, those events did not occur within 60 nautical miles of the county. However, these events could have severely impacted the county with strong winds, power outages, and other damage. The "Previous Events and Losses" section provides further information regarding hurricane and tropical storm events that impacted Delaware County.

The National Weather Service (NWS) issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical when such a storm

poses a significant threat to life and property. The NWS allows the NHC to issue advisories during the post-tropical stage. The following are the definitions of the watches and warnings:

- A *Hurricane/Typhoon Warning* is issued when sustained winds of 74 mph or higher are expected somewhere within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm-force, the warning is issued 36 hours in advance of the anticipated onset of tropical storm-force winds. The warning can remain in effect when dangerously high water or combination of dangerously high water and waves continue, even though winds may be less than hurricane force.
- A *Hurricane Watch* is issued when sustained winds of 74 mph or higher are possible within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm-force, the hurricane watch is issued 48 hours prior to the anticipated onset of tropical storm-force winds.
- A *Tropical Storm Warning* is issued when sustained winds of 39 to 73 mph are expected somewhere within the specified area within 36 hours in association with a tropical, subtropical, or post-tropical storm.
- A *Tropical Storm Watch* is issued when sustained winds of 39 to 73 mph are possible within the specified area within 48 hours in association with a tropical, sub-tropical, or post-tropical storm (NWS 2019).

Figure 4.3.10-1. Historical Tropical Storm and Hurricane Tracks 1842 to 2021



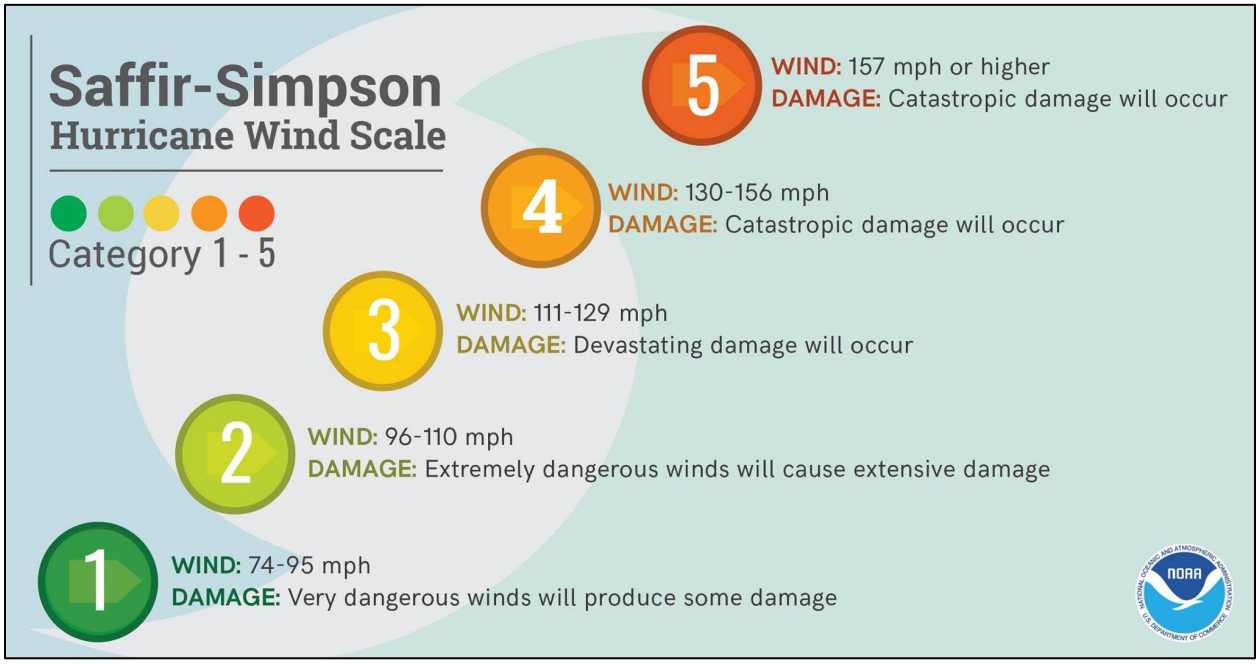
Source: *NOAA 2022*
Note: *Delaware County is outlined in orange*

ET	*Extra-tropical Storm*	*TD*	*Tropical Depression*	*TS*	*Tropical Storm*
H1	*Category 1 Hurricane*	*H2*	*Category 2 Hurricane*	*H3*	*Category 3 Hurricane*
H4	*Category 4 Hurricane*	*H5*	*Category 5 Hurricane*		

4.3.10.2 Range of Magnitude

The extent of a hurricane or tropical storm is commonly categorized in accordance with the Saffir-Simpson Hurricane Wind Scale, which assigns a designation of tropical storm for storms with sustained wind speeds below 74 mph and a hurricane category rating of 1–5 based on a hurricane's increasing sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered *major hurricanes* because of their potential for significant loss of life and damage. Tropical Storms and Category 1 and 2 storms are still dangerous and require preventative measures (NOAA 2013). Figure 4.3.10-2 presents this scale, which is used to estimate the potential property damage and flooding expected when a hurricane makes landfall.

Figure 4.3.10-2. The Saffir-Simpson Scale



Source: Disaster Readiness Portal 2017

Mean Return Period

Peak wind speed projections were generated using Hazus. For the 100-year MRP event, the maximum 3-second wind speeds range from 6.56–70.5 miles per hour (mph), characteristic of a tropical storm. For the 500-year MRP event, the maximum 3-second gust wind speeds range from 83.3-87.4 mph, characteristic of a high-level tropical storm or Category 1 hurricane. Hazus did not generate the hurricane track for the 100- and 500-year probabilistic events. The associated impacts and losses from the 500-year MRP hurricane event model run is reported in the vulnerability assessment.

4.3.10.3 Past Occurrence

Between 1842 and 2021, 30 events classified as either a hurricane, tropical storm, or tropical depression tracked within 60 nautical miles of Delaware County (NOAA 2022). Between 1954 and 2022, Pennsylvania was included in 12 Federal Emergency Management Agency (FEMA) declared hurricane/tropical storm-related major disaster declaration (DR) or emergency (EM) classified as one or a combination of the following hazards: tropical storm, hurricane, and tropical depression. Of those declarations, Delaware County was included in eight of the declarations (FEMA 2022).

Table 4.3.10-1. Hurricane/Tropical Storm-Related FEMA Declarations for Delaware County, 1954 to 2022

FEMA Declaration Number	Date(s) of Event	Declaration Date	Event Type	Details
DR-1294	September 16–29, 1999	September 18, 1999	Hurricane	Pennsylvania Hurricane Floyd
DR-1555	September 8-9, 2004	September 19, 2004	Tropical Depression	Pennsylvania Severe Storms and Flooding Associated with Tropical Depression Frances
DR-1557	September 17–October 1, 2004	September 19, 2004	Tropical Depression	Tropical Depression Ivan
EM-3235	August 29–October 1, 2005	September 10, 2005	Hurricane	Hurricane Katrina, the county was impacted by assisting in the evacuation and relocation of residents in impacted areas along the gulf coast
DR-4025	August 26–30, 2011	September 3, 2011	Hurricane	Hurricane Irene
EM-3339	August 26–September 14, 2011	August 29, 2011	Hurricane	Hurricane Irene
EM-3356	October 26–November 8, 2012	October 29, 2012	Hurricane	Hurricane Sandy
4618-DR-PA	Aug 31, 2021 - Sep 5, 2021	September 10, 2021	Hurricane	Pennsylvania Remnants of Hurricane Ida

Source: FEMA 2022

For this 2022 Hazard Mitigation Plan (HMP) update, hurricane and tropical storms events, including FEMA disaster declarations that impacted Delaware County, from 1861–2021 are identified in Table 4.3.10-2. Because documentation for these types of events is so extensive, not all sources have been identified or researched. Therefore, Table 4.3.10-2 may not include all events that occurred throughout the county.

Table 4.3.10-2. Tropical Cyclone Events Impacting Delaware County, PA from 1861-2021

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Event Details
September 22–29, 1861	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 27–28, 1861	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
October 31-November 03, 1861	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 16–19, 1863	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
October 29–30, 1866	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 10–18, 1867	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
October 22–28, 1872	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 25–October 1, 1874	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 21–October 5, 1877	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
October 18–25, 1878	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 21–24, 1882	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
June 17–24, 1886	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 14–24, 1888	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 6–13, 1888	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 15–September 2, 1893	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
October 26–November 4, 1899	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
June 12–17, 1902	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 12-17, 1903	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 8–15, 1904	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
July 31–August 5, 1915	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
May 13-18, 1916	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event
September 27–October 1, 1924	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Event Details
September 19–October 5, 1929	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
July 4–21, 1934	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 7–19, 1939	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 28–October 2, 1943	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
July 30–August 4 1944	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 12–20, 1945	Hurricane Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 18–September 3, 1952	Hurricane Able	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 7–23, 1955	Hurricane Diane	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
July 27–August 7, 1960	Tropical Storm Brenda	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 12-15, 1961	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
June 1–4, 1963	Tropical Storm Unnamed	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 20–29, 1971	Tropical Storm Doria	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 21–30, 1988	Tropical Storm Chris	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 22–26, 1992	Tropical Storm Danielle	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
July 5–17, 1996	Hurricane Bertha	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 16–29, 1999	Hurricane Floyd	DR-1294	Yes	Delaware County was one of the hardest hit counties in the state. The Borough of Darby was "cut off and decimated" by floods from the Darby and Cobb creeks. Flood waters there, reportedly up to 8 ft (2.4 m) deep, demolished local homes and businesses. In Aston Township, mud accumulated to 3 to 4 ft (0.91 to 1.22 m). In Marcus Hook, the highest verifiable storm rainfall total of 12.13 in (308 mm) was reported.
September 14–21, 2000	Hurricane Gordon	N/A	N/A	1.67 inches of rain fell across southeastern Pennsylvania. Poor drainage especially in low-lying areas but no injuries or serious flooding was reported.
September 18-19, 2003	Tropical Storm Isabel	N/A	N/A	Hurricane Isabel came ashore around midday on September 18th between Cape Hatteras and Cape Lookout, North Carolina. The storm continued on a northwesterly track up through Virginia where it was downgraded to a Tropical Storm. By early Friday morning, September 19th, it was near Latrobe, PA and heading northwest at about 30 miles per hour.

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Event Details
				Heavy rain was falling in southern portions of the State College county warning area (CWA) by late afternoon. The storm exited Pennsylvania by early afternoon, the 19th, with improving conditions beginning state-wide. Sustained winds of 30 mph on average accompanied Isabel as it tracked northward, but damaging gusts of between 50 and 60 mph occurred over a wide area. After a summer of above-normal rainfall, creating soft soils and with trees still in full bloom, the gusty winds resulted in hundreds of reports of trees or tree limbs being knocked down. These took down utility poles and power lines in many parts of the region, causing numerous power outages as well as property damage. Statewide, 1.4 million people lost power.
September 8-9, 2004	Tropical Depression Frances	DR-1555	Yes	Damage estimates were not available.
September 17-October 1, 2004	Tropical Depression Ivan	DR-1557	Yes	The remnants of Hurricane Ivan interacted with an approaching cold front and dropped very heavy rain across Delaware County in the morning and into the early afternoon on the 18th. Heavier rain fell upstream in Chester County and the runoff affected the Brandywine Creek. Doppler Radar storm estimates ranged between 1 and 4 inches with the heaviest amounts along the Chester County border. Chester Creek at Chester was above its 5 foot flood stage. The Crum Creek at Newtown Square was above its 6 foot flood stage. The Brandywine Creek at Chadds Ford was above its 9 foot flood stage. Damage estimates were not available.
July 03-11, 2005	Hurricane Cindy	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 24–September 4, 2006	Hurricane Ernesto	N/A	N/A	It was reported that 1.82 inches fell in Chadds Ford.
September 6, 2008	Tropical Storm Hanna	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
August 26–August 30, 2011	Hurricane Irene	DR-4025, EM-3339	Yes	Preliminary damage estimates were around six million dollars. In addition to property damage, the winds and rains badly damaged the corn crop in southeastern Pennsylvania.
October 26–November 8, 2012	Hurricane Sandy	EM-3356	Yes	Post-Tropical Storm Sandy caused an initial estimate of $20 million dollars in damage in Pennsylvania and directly or indirectly caused 15 deaths across the state. Most of the damage in the eastern part of the state was wind-related as wind gusts reached as high as 81 mph. Moderate creek flooding, road closures, power outages, and downed trees occurred, and 4-6 inches of rain fell.
June 5-8, 2013	Hurricane Andrea	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
September 17–18, 2018	Hurricane Florence	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.
July 4–11, 2020	Tropical Storm Fay	N/A	N/A	Losses and/or damages in Delaware County were not identified for this event.

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Event Details
July 23–August 5, 2020	Hurricane Isaias	N/A	N/A	Hundreds of residents and businesses evacuated for safety in Darby City in after Cobbs Creek broke its banks. Multiple reports of down trees and wires throughout the county.
Aug 31, 2021 - Sep 5, 2021	Remnants of Hurricane Ida	4618-DR-PA	Yes	Post Tropical Cyclone Ida brought heavy rain to eastern Pennsylvania on September 1. Rainfall totals were as high as 5 to 10 inches. The heavy rain caused significant flash flooding, mainly in the southeastern part of the state. It resulted in widespread property damage. There were several fatalities. Widespread flash flooding occurred in Delaware County with numerous road closures. Many creeks in the county overflowed their banks, including Chester Creek, Ridley Creek, Crum Creek and Cobbs Creek. $15 million in damage was reported.

Sources: NOAA-NCEI 2022; PA HMP 2018; FEMA 2022; NOAA NHC 2022

Notes:

DR Federal Disaster Declaration
EM Emergency Management
FEMA Federal Emergency Management Agency
NCEI National Centers for Environmental Information
NOAA National Oceanic Atmospheric Administration
N/A Not applicable / not available

4.3.10.4 Future Occurrence

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of hurricane and tropical storms events for Delaware County. Information from NOAA-NCEI storm events database and a NOAA Historical Hurricane Tracks search were used to identify the number of events between 1861 and 2021. A 60 nautical mile buffer was used to determine future occurrences. It is to be noted, that the storm was counted as the category it was when it passed over or within 60 nautical miles of the county, not its maximum category. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics as well as the annual average number of events and the estimate percent chance of an incident occurring each year.

Table 4.3.10-3. Probability of Future Hurricane and Tropical Storm Events

Hazard Type	Number of Occurrences Between 1861 and 2021	Recurrence Interval (in years) (# Years/Number of Events)	Percent chance of occurrence in any given year
Tropical Depression	5	32.20	3.11%
Tropical Storm	26	6.19	16.15%
Hurricanes (all categories)	3	53.67	1.86%

Source: NOAA Hurricane Tracker 2022; NOAA-NCEI 2022; FEMA 2022

It is estimated that Delaware County will continue to experience direct and indirect impacts of hurricanes, and tropical storms annually that can induce secondary hazards, such as flooding, extreme wind, infrastructure deterioration or failure, utility failures, power outages, water quality, and supply concerns, and transportation delays, accidents, and inconveniences. Therefore, the future occurrence of hurricanes and tropical storms in Delaware County can be characterized as *possible*, as defined by the Risk Factor Methodology probability criteria, as provided in Table 4.4-1.

4.3.10.5 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. For hurricanes and tropical storms, the entirety of Delaware County has been identified as the hazard area. Therefore, all assets in the county (population, structures, critical facilities, and lifelines), as described in the county profile, are vulnerable. Potential losses associated with high-wind events were calculated for the county for two probabilistic hurricane events: the 100-year and 500-year MRP hurricane events. The following text evaluates and estimates the potential impact of the wildfire hazard on the county, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

For the purposes of this HMP, the entire population of Delaware County (576,830 people) is exposed to hurricanes and tropical storm events (U.S. Census 2020). Residents might be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life. Socially vulnerable populations are most susceptible based on several factors, including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Hazus estimates no households will be displaced and temporary shelter will not be required as

a result of the 100-year MRP event. As a result of the 500-year MRP event, two households will be displaced, but none will require temporary shelter.

Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions based on the major economic impact to their family and might lack funds to evacuate. The population over the age of 65 is also more vulnerable and might physically have more difficulty evacuating. The elderly are considered most vulnerable because they require extra time or outside assistance during evacuations and are more likely to seek or need medical attention that might not be available due to isolation during a storm event. Section 2 (County Profile) provides statistics of these populations.

Impact on General Building Stock

It is assumed that the entire county's general building stock is exposed to the severe storm wind hazard ($194.7 billion). Building construction plays a major role in the extent of damage resulting from a severe storm event. Due to differences in construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. High-rise buildings are also very vulnerable structures. Mobile homes are the most vulnerable to damage, even if tied down, and offer little protection to people inside.

The Hazus wind model was run to estimate potential losses to buildings. Expected building damage was evaluated across the following wind damage categories: no damage/very minor damage, minor damage, moderate damage, severe damage, and total destruction. Table 4.3.10-4 summarizes the definition of the damage categories.

Table 4.3.10-4. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
No Damage or Very Minor Damage Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof cover, with no or very limited water penetration.	≤2%	No	No	No	No	No
Minor Damage Maximum of one broken window, door, or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.	>2% and ≤15%	One window, door, or garage door failure	No	<5 impacts	No	No
Moderate Damage Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.	>15% and ≤50%	> one and ≤ the larger of 20% & 3	1 to 3 panels	Typically 5 to 10 impacts	No	No
Severe Damage Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.	>50%	> the larger of 20% & 3 and ≤50%	>3 and ≤25%	Typically 10 to 20 impacts	No	No
Destruction	Typically >50%	>50%	>25%	Typically >20	Yes	Yes

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.				impacts		

Source: HAZUS-MH Hurricane Technical Manual

Table 4.3.10-5 summarizes the building value damage estimated for the 500-year MRP hurricane events. Damage estimates are reported for the county's probabilistic Hazus model scenarios. The data shown indicates total losses associated with wind damage to building structure and content.

The total damage to buildings for all occupancy types across Delaware County is estimated to be approximately $247.8 million for the 500-year MRP hurricane event, respectively. Most of these losses are to the residential building category. Due to differences in building construction, residential structures are generally more susceptible to hurricane damage than commercial and industrial structures. The damage counts include buildings damaged at all severity levels from minor damage to destruction. Total dollar damage reflects the overall impact to buildings at an aggregate level. The Township of Upper Darby would experience the greatest damage, losing approximately $34.5 million in a 500-year MRP event.

Table 4.3.10-5. Estimated Building Value Damaged by the 500-Year MRP Hurricane

Jurisdiction	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Residential Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Commercial Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for All Other Occupancies Structures Only
Aldan (B)	$2,297,241	$2,267,113	$16,256	$13,872
Aston (Twp)	$7,595,137	$7,394,246	$118,248	$82,642
Bethel (Twp)	$4,501,501	$4,460,270	$29,273	$11,958
Brookhaven (B)	$3,608,087	$3,534,523	$48,439	$25,126
Chadds Ford (Twp)	$1,361,438	$1,320,086	$32,292	$9,059
Chester City (C)	$10,130,677	$9,678,458	$220,265	$231,954
Chester (Twp)	$1,454,311	$1,356,062	$39,088	$59,160
Chester Heights (B)	$1,117,039	$1,086,720	$22,681	$7,638
Clifton Heights (B)	$2,475,321	$2,361,956	$75,231	$38,134
Collingdale (B)	$3,094,317	$2,965,579	$78,620	$50,118
Colwyn (B)	$975,924	$956,291	$13,103	$6,531
Concord (Twp)	$7,017,543	$6,810,907	$137,069	$69,566
Darby (B)	$3,509,062	$3,370,911	$96,440	$41,710
Darby (Twp)	$4,302,680	$4,215,945	$64,660	$22,075
East Lansdowne (B)	$1,147,261	$1,111,713	$15,911	$19,636
Eddystone (B)	$849,866	$766,514	$51,234	$32,117
Edgmont (Twp)	$2,546,510	$2,512,579	$24,672	$9,259
Folcroft (B)	$3,019,701	$2,838,733	$94,948	$86,021
Glenolden (B)	$2,969,487	$2,875,041	$70,451	$23,996
Haverford (Twp)	$25,592,413	$24,764,962	$534,992	$292,459
Lansdowne (B)	$5,486,953	$5,358,801	$83,948	$44,203
Lower Chichester (Twp)	$1,293,463	$1,250,794	$19,287	$23,382
Marcus Hook (B)	$790,010	$739,126	$36,201	$14,683
Marple (Twp)	$10,752,411	$10,309,462	$317,756	$125,193
Media (B)	$2,808,602	$2,477,355	$258,636	$72,611
Middletown (Twp)	$6,729,538	$6,425,532	$215,709	$88,296
Millbourne (B)	$285,955	$268,692	$13,866	$3,396
Morton (B)	$1,184,763	$1,126,512	$26,825	$31,425
Nether Providence (Twp)	$6,972,411	$6,851,751	$78,970	$41,691
Newtown (Twp)	$6,119,330	$5,898,311	$170,357	$50,662

Jurisdiction	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Residential Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for Commercial Structures Only	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane for All Other Occupancies Structures Only
Norwood (B)	$2,871,980	$2,813,654	$30,225	$28,101
Parkside (B)	$944,937	$933,937	$5,306	$5,694
Prospect Park (B)	$3,049,754	$2,972,153	$54,836	$22,765
Radnor (Twp)	$12,643,259	$11,839,749	$625,328	$178,182
Ridley (Twp)	$14,036,819	$13,506,634	$298,842	$231,342
Ridley Park (B)	$3,541,541	$3,455,745	$64,343	$21,452
Rose Valley (B)	$1,285,184	$1,270,549	$7,755	$6,880
Rutledge (B)	$457,310	$450,270	$2,893	$4,148
Sharon Hill (B)	$2,373,775	$2,255,778	$95,548	$22,449
Springfield (Twp)	$12,956,535	$12,390,689	$378,927	$186,920
Swarthmore (B)	$3,212,200	$3,029,454	$46,363	$136,383
Thornbury (Twp)	$3,114,266	$3,081,434	$19,763	$13,069
Tinicum (Twp)	$2,225,190	$1,917,816	$184,694	$122,680
Trainer (B)	$509,478	$469,065	$17,258	$23,155
Upland (B)	$1,087,833	$1,029,576	$38,972	$19,285
Upper Chichester (Twp)	$6,567,351	$6,305,447	$153,250	$108,654
Upper Darby (Twp)	$34,577,200	$33,573,675	$769,532	$233,993
Upper Providence (Twp)	$4,853,160	$4,690,129	$113,816	$49,216
Yeadon (B)	$5,519,129	$5,347,270	$82,073	$89,786
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A
Delaware County (Total)	**$247,815,853**	**$238,687,971**	**$5,995,155**	**$3,132,727**

Source: Hazus v5.1
Notes: B – Borough; C – City; Twp. – Township; % - Percent
**The Total Damages column represents the sum of damages for all occupancy classes (residential, commercial, industrial, agricultural, educational, religious, and government) based on improvement value.*

Impact on Critical Facilities

Utility infrastructure could suffer damage from high winds associated with falling tree limbs or other debris, resulting in the loss of power. Loss of service can impact residents and business operations alike. Interruptions in heating or cooling utilities can affect populations such as the young and elderly, who are particularly vulnerable to temperature-related health impacts. Loss of power can impact other public utilities, including potable water, wastewater treatment, and communications. In addition to public water services, property owners with private wells might not have access to potable water due to pump failure until power is restored. Lack of power to emergency facilities, including police, fire, EMS, and hospitals, will inhibit a community's ability to effectively respond to an event and maintain the safety of its citizens.

Overall, all critical facilities are exposed to the wind hazard. Hazus estimates the probability that critical facilities (i.e., medical facilities, fire/EMS, police, EOC, schools, and user-defined facilities such as shelters and municipal buildings) could sustain damage as a result of a 500-year MRP wind event. Additionally, Hazus estimates the loss of use for each facility in number of days. Due to the sensitive nature of the critical facility dataset, individual facility estimated loss is not provided.

Table 4.3.10-6 and summarizes the percent probability that each facility type may experience damage as a result of the 500-year MRP event.

Table 4.3.10-6. Estimated Impacts to Critical Facilities for the 500-Year Mean Return Period Hurricane-Related Winds

Facility Type	500-Year Mean Return Period Hurricane				
	Loss of Days	Percent-Probability of Sustaining Damage			
		Minor	Moderate	Severe	Complete
Medical Facilities	0	0.8% - 1.6%	<0.1% - 0.1%	0.0%	0.0%
Police Stations	0	1.8% - 3.2%	<0.1% - 0.2%	0.0%	0.0%
Fire Stations/EMS	0	0.7% - 1.4%	<0.1% - 0.1%	0.0%	0.0%
Schools	0	1.2% - 3.1%	<0.1% - 0.6%	0.0%	0.0%

Source: HAZUS-MH v5.1

Impact on Economy

Hurricanes and tropical storms also impact the economy, including loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss, and rental loss due to the repair/replacement of buildings. Hazus estimates the total economic loss associated with each storm scenario (direct building losses and business interruption losses). Direct building losses are the estimated costs to repair or replace the damage caused to the building. This is reported in the "Impact on General Building Stock" subsection discussed earlier. Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event

Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage and impacts can result in the loss of power, which can impact business operations and heating or cooling provisions to the population.

Debris management can be costly and impact the local economy. Hazus estimates the amount of debris that might be produced as result of the 500-year MRP wind event. Table 4.3.10-7 summarizes the estimated debris

by municipality, which should be considered a lower-bound analysis. Because the estimated debris production does not include debris generated by flooding, this is likely a conservative estimate and could be higher if multiple impacts occur.

Table 4.3.10-7. Debris Production for a 500-Year Mean Return Period Hurricane-Related Winds

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Aldan (B)	184	0	95	942
Aston (Twp)	456	0	1,079	7,575
Bethel (Twp)	196	0	864	4,862
Brookhaven (B)	280	0	287	2,506
Chadds Ford (Twp)	91	0	1,393	2,501
Chester City (C)	1,125	0	261	2,079
Chester (Twp)	104	0	254	1,128
Chester Heights (B)	87	0	356	1,214
Clifton Heights (B)	273	0	60	558
Collingdale (B)	336	0	64	589
Colwyn (B)	82	0	33	266
Concord (Twp)	482	0	2,182	7,825
Darby (B)	374	0	72	630
Darby (Twp)	322	0	73	431
East Lansdowne (B)	117	0	20	197
Eddystone (B)	108	0	0	1
Edgmont (Twp)	137	0	1,556	2,933
Folcroft (B)	257	0	102	597
Glenolden (B)	311	0	149	1,360
Haverford (Twp)	1,646	0	1,691	12,681
Lansdowne (B)	563	0	203	1,972
Lower Chichester (Twp)	116	0	103	469
Marcus Hook (B)	107	0	0	0
Marple (Twp)	750	0	2,022	12,610
Media (B)	339	0	119	1,102
Middletown (Twp)	475	0	2,321	9,232
Millbourne (B)	35	0	9	65
Morton (B)	126	0	46	445
Nether Providence (Twp)	383	0	909	7,162
Newtown (Twp)	398	0	1,610	6,827
Norwood (B)	234	0	91	840
Parkside (B)	77	0	13	132
Prospect Park (B)	316	0	71	680
Radnor (Twp)	1,059	0	2,474	13,471
Ridley (Twp)	1,240	0	435	3,841
Ridley Park (B)	329	0	124	1,141
Rose Valley (B)	71	0	141	1,184
Rutledge (B)	35	0	14	135
Sharon Hill (B)	230	0	49	387
Springfield (Twp)	857	0	1,123	9,299
Swarthmore (B)	238	0	269	2,205

Jurisdiction	Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event			
	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Thornbury (Twp)	149	0	1,476	4,301
Tinicum (Twp)	234	0	282	539
Trainer (B)	52	0	88	277
Upland (B)	86	0	104	862
Upper Chichester (Twp)	518	0	1,285	8,731
Upper Darby (Twp)	3,305	0	884	7,613
Upper Providence (Twp)	339	0	1,078	6,508
Yeadon (B)	504	0	181	1,384
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A
Delaware County (Total)	**20,130**	**0**	**28,110**	**154,292**

Source: HAZUS-MH 4.2; Delaware County GIS 2021
Notes: B – Borough; C – City; Twp. – Township; % - Percent

Impact on the Environment

Severe wind from a tropical storm can escalate the impacts of flooding and severe winter weather. A severe storm may carry extreme rainfall that could exacerbate flooding and could increase the intensity of snow and blizzard events. More information about flooding and severe winter storm can be found in Section 4.3.7 and Section 4.3.19, respectively.

The impacts of hurricane-related windstorms on the environment typically take place over a larger area. Where these events occur, widespread, severe damage to plant species is likely. This includes uprooting or destruction of trees and an increased threat of wildfire in areas where dead trees are not removed (PEMA 2018). Section 4.3.18 (Tornado, Windstorm) provides additional environmental impacts due to wind, and Section 4.3.8 (Flood, Flash Flood, and Ice Jam) provides additional environmental impacts due to flooding from heavy rainfalls.

Future Growth and Development

Understanding future changes that impact vulnerability in Delaware County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. It is anticipated that any new development and new residents will be exposed to the hurricane and tropical storm hazard. However, due to increased standards and codes, new development might be less vulnerable to wind-related hazards compared to the aging building stock. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to a wind event.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Delaware County's population will continue to increase into 2040, increasing total population to approximately 648,439 persons (The Center of Rural Pennsylvania 2013). With the rise in population, additional persons will be exposed to a hurricane or other wind event.

Effect of Climate Change on Vulnerability

Since the 1970s, globally there has been an increase in 'tropical cyclone destructiveness' as measured by the Power Dissipation Index. This increased tropical cyclone intensity and duration correlates with increased sea surface temperature. This suggests that future increases of tropical sea surface temperature might lead to future

increases in tropical cyclone intensity and duration. However, there is a high level of uncertainty regarding the relationship between climate change and storm events. Future improvements in modeling smaller scale climatic processes can be expected and will lead to improved understanding of how the changing climate will alter temperature, precipitation, and storm events in Pennsylvania (Shortle et al. 2009).

The northeast region of the United States has experienced a greater increase in extreme precipitation than any other region in the U.S. between 1958 and 2010, the northeast region experienced more than 70% increase in the amount of precipitation falling in rain events (NCA 2014). Refer to Section 4.3.7 (Flood) for a discussion related to the impact of climate change due to increases in rainfall. An increase in storms will produce more wind events and may increase tornado activity. Additionally, thunderstorms and increase in temperature can relate to the strength of a storm resulting in tornadoes (NOAA 2020). With an increased likelihood of strong winds and tornado events, all the county's assets will experience additional risk for losses as a result of extreme wind events.

Additional Data and Next Steps

Over time, Delaware County may obtain additional data to support the analysis of this hazard. Data that will support the analysis would include additional detail on past hazard events and impacts, building footprints, and specific building information, such as details on protective features (e.g., hurricane straps).

4.3.11 Landslide

This section provides a profile and vulnerability assessment of the landslide hazard in Delaware County. Landslides include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows (NPS 2018). Landslides are classified by the type of material involved and the type of movement. In addition, they are classified at the rate of movement and the water content of the material (PADCNR 2022). Landslides can be used to describe different types of events displaying different movement characteristics and involving different materials. Rockslides, rock falls, mudflows, mudslides, debris flows, and debris avalanches are all types of landslide events that involve different materials moving in a different manner (PEMA 2019).

Location and Extent

The entire U.S. experiences landslides, with 36 states having moderate to highly severe landslide hazards. Expansion of urban and recreational developments into hillside areas exposes more people to the threat of landslides each year. According to the USGS, Delaware County has little to no landslide potential. For a figure displaying the landslide potential of the conterminous United States, please refer to http://pubs.usgs.gov/fs/2005/3156/2005-3156.pdf (USGS 2005).

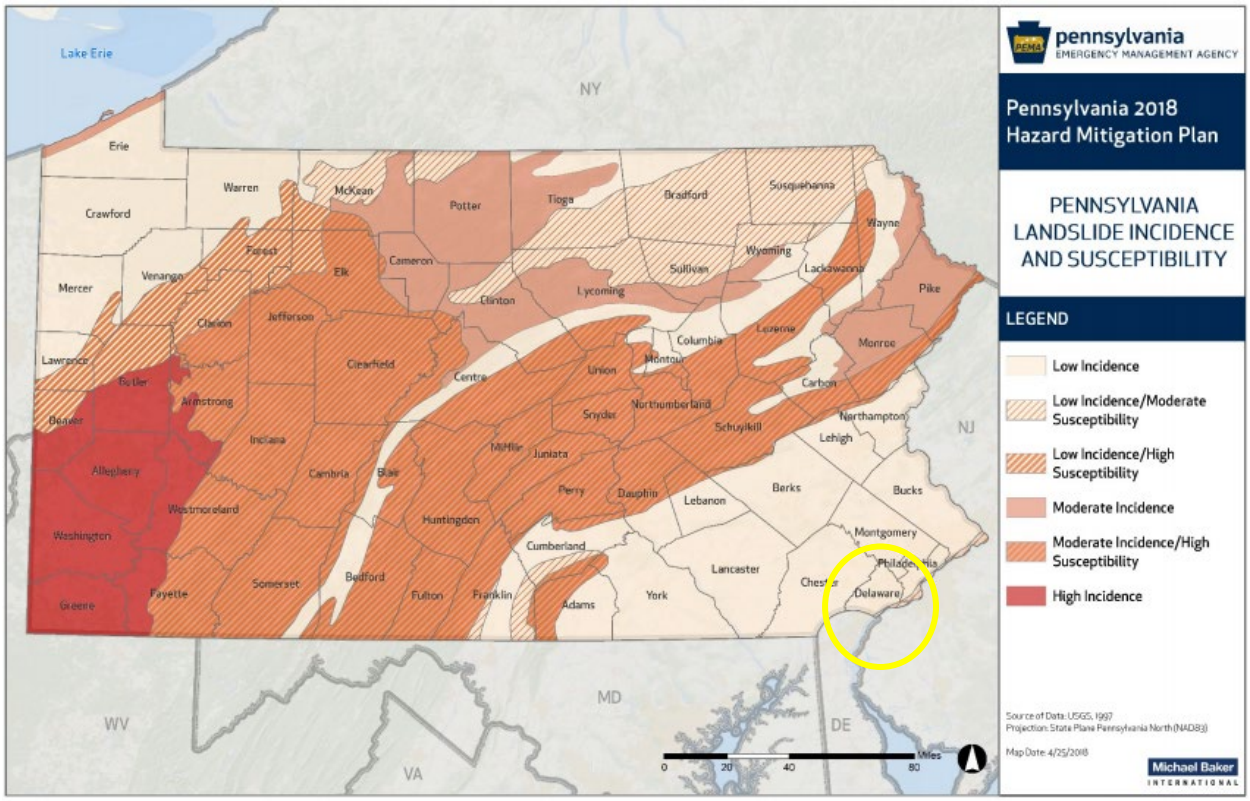
Rock falls and other slope failures occur in areas of Pennsylvania with moderate to steep slopes; however, most of Pennsylvania has areas susceptible to landslides. The southwestern area of Pennsylvania has the highest concentration of landslides (PEMA 2019). According to DCNR, most major and minor highways have sections cut in rock or soil that can lead to slope failure. Steep mountain slopes across Pennsylvania have experienced debris avalanches associated with extreme rainfall or rain-on-snow events. Additionally, urban and rural land development is increasing the number of landslide occurrences. Major highway construction with large excavations and fills creates potential for landslides (PADCNR 2022).

To determine the extent of a landslide hazard, the affected areas need to be identified, and the probability of the landslide occurring within some time period needs to be assessed. Natural variables that contribute to the overall extent of potential landslide activity in any particular area include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult, even under ideal conditions and with reliable information. As a result, the landslide hazard is often represented by landslide incidence and/or susceptibility, as defined below:

- Landslide incidence is the number of landslides that have occurred in a given geographic area. High incidence means greater than 15 percent of a given area has been involved in landsliding; medium incidence means that 1.5 to 15 percent of an area has been involved; and low incidence means that less than 1.5 percent of an area has been involved (USGS 2016)
- Landslide susceptibility is defined as the probable degree of response of geologic formations to natural or artificial cutting, to loading of slopes, or to unusually high precipitation. It can be assumed that unusually high precipitation or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced numerous landslides in the past. Landslide susceptibility depends on slope angle and the geologic material underlying the slope. Landslide susceptibility only identifies areas potentially affected and does not imply a time frame when a landslide might occur. High, medium, and low susceptibility are delimited by the same percentages used for classifying the incidence of landsliding (USGS 2016).

Figure 4.3.11-1 shows the landslide susceptible areas across the Commonwealth. Delaware County is shown has noted as being low incidence and therefore having low susceptibility to landslides.

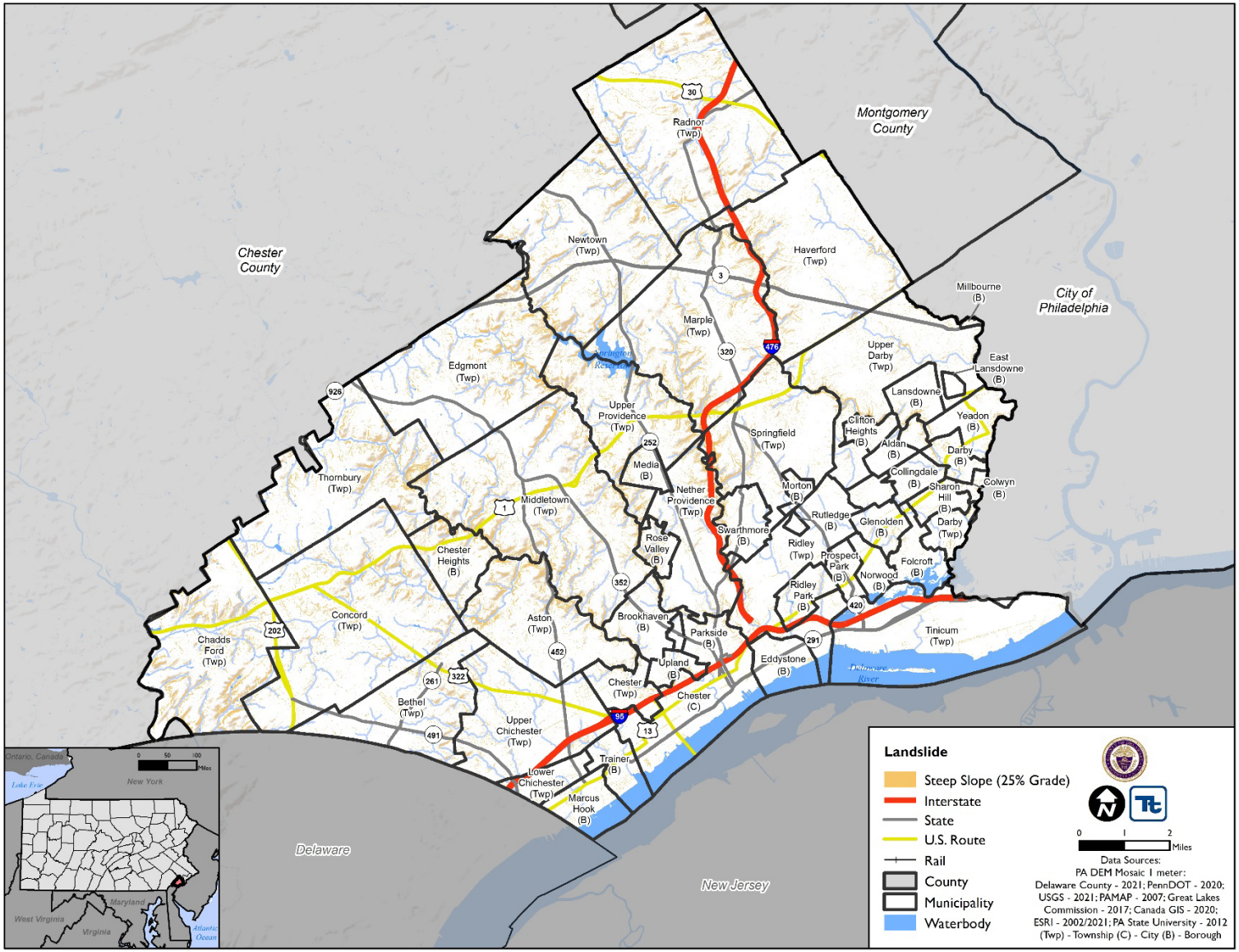
Figure 4.3.11-1. Areas of Pennsylvania Susceptible to Landslides



Source: PEMA 2019
Note: The yellow circle indicates the approximate location of Delaware County.

For the purposes of this planning effort, any area with a slope greater than 25-percent is considered the hazard area. Figure 4.3.11-2 shows the areas throughout Delaware County with slopes greater than 25-percent. Areas in the western portion of the County contain areas of steep slopes and may be more susceptible to landslide events.

Figure 4.3.11-2. Steep Slopes in Delaware County



Range of Magnitude

Landslides have the potential to damage transportation routes, utilities, and buildings. They can also create travel delays and other side effects. Fortunately, deaths and injuries caused by landslides are rare in Pennsylvania, and most landslides in the Commonwealth are moderate to slow moving, damaging objects rather than people. Almost all of the known deaths caused by landslides have occurred when rock falls or other slides along highways have involved vehicles. Storm-induced debris flows are another type of landslide likely to cause death and injuries. As residential and recreational development increases on and near steep mountain slopes, the hazards from these events will also increase (PEMA 2019).

According to DCNR, the Pennsylvania Department of Transportation (PennDOT), large municipalities incur substantial costs because of landslide damage and from extra construction costs for new roads in known landslide-prone areas. One PennDOT estimate in 1991 showed an average of $10 million per year in landslide repair contracts across the Commonwealth and a similar amount in mitigation costs for grading projects (PADCNR 2001).

Past Occurrence

Pennsylvania has a long history of landslide activity. This has resulted from a combination of the state's humid temperate climate, locally steep and rugged topography, and great diversity in the erosion and weathering characteristics of near-surface sedimentary rocks. Human activities such as commercial, industrial, and residential developments, transportation, and mining often compound landslide problems. Precipitation events which have triggered significant landslides in Pennsylvania include Tropical Storm Agnes in June 1972, the Johnstown (Cambria County) storm in July 1977, and the East Brady (Armstrong County) storm in August 1980 (PEMA 2019).

A comprehensive inventory of landslide events across the Commonwealth is not available, and the USGS does not maintain a formal inventory of landslides (PEMA 2019). For this 2022 HMP update, the NOAA-NCEI database, FEMA, and the 2016 Delaware County HMP were used to identify landslide events that occurred in the County. Due to the limited resources available to identify landslide events, not all occurrences were identified or researched for this plan update.

Between 1954 and 2021, FEMA issued a disaster (DR) or emergency (EM) declaration for Pennsylvania for one geological hazard-related event, classified as severe storms, flooding, and mudslide. This declaration (DR-1649-PA) did not include Delaware County.

According to the NOAA-NCEI database, since 2015, there has been one reported landslide incident:

- August 19, 2021 – heavy rain impacted Delaware County, leading to water rescues and roadway flooding. A rockslide was reported in Radnor Township on Strafford Avenue near Lancaster Avenue. There were no reported damages or injuries.

Probability of Future Occurrence

Based upon risk factors but lack of occurrences, it is unlikely landslides will occur in Delaware County in the future. However, severity of the landslides can vary depending on type and location of event. Landslide probabilities are largely a function of surface geology but are also influenced by both weather and human activities. Mismanaged, intense development in steeply sloped areas could increase the frequency of a landslide occurrence. Periods of intense rain or snowmelt can also increase the risk of landslides.

Mismanaged, intense development in steeply sloped areas could increase the frequency of landslides in Delaware County. Building and road construction are contributing development factors to landslides, as they can often

undermine or steepen otherwise stable soil. Increased deforestation and soil disturbances caused by development on sloped areas further increases these risks. As timbering and development of sloped land continue, the risk of significant landslides increases. The probability of future occurrence of landslides in Delaware County, according to FEMA's National Risk Index, is relatively low, with a score of 11.04.

Based on available historical data, the future occurrence of landslides can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. The following section includes an evaluation and estimation of potential landslide impacts on the county, including:

- Data and methodology used for the evaluation
- Impacts on life, health, and safety; general building stock; critical facilities; economy; environment; and future growth and development
- Effect of climate change on vulnerability
- Further data collections that will increase understanding of this hazard over time

Impact on Life, Health, and Safety

Generally, a landslide event would be an isolated incidence and impact the populations within the immediate area of the incident. Specifically, the populations located downslope of the landslide hazard areas are particularly vulnerable to this hazard. In addition to causing damage to residential buildings and displacing residents, landslide events can block off or damage major roadways and inhibit travel for emergency responders or populations trying to evacuate the area.

Several municipalities in Delaware County have adopted steep slope ordinances to reduce the amount of development taking place on steep slopes in the County and reduce vulnerability to landslides. Table 4.3.11-1 depicts municipalities in Delaware County that have adopted steep slope ordinances.

Table 4.3.11-1. Municipal Steep Slope Ordinance Status

Jurisdiction	Steep Slope Ordinance	Jurisdiction	Steep Slope Ordinance
Aldan (B)	Yes	Middletown (T)	Yes
Aston (T)	Yes	Millbourne (B)	No
Bethel (T)	No	Morton (B)	No
Brookhaven (B)	No	Nether Providence (T)	Yes
Chadds Ford (T)	Yes	Newtown (T)	Yes
Chester (C)	Yes	Norwood (B)	No
Chester (T)	No	Parkside (B)	No
Chester Heights (B)	Yes	Prospect Park (B)	No
Clifton Heights (B)	No	Radnor (T)	Yes
Collingdale (B)	No	Ridley (T)	Yes
Colwyn (B)	No	Ridley Park (B)	No
Concord (T)	Yes	Rose Valley (B)	Yes
Darby (B)	No	Rutledge (B)	No
Darby (T)	No	Sharon Hill (B)	No

Jurisdiction	Steep Slope Ordinance	Jurisdiction	Steep Slope Ordinance
East Landsdowne (B)	No	Springfield (T)	Yes
Eddystone (B)	No	Swarthmore (B)	Yes
Edgmont (T)	Yes	Thornbury (T)	Yes
Folcroft (B)	No	Tinicum (T)	No
Glenolden (B)	No	Trainer (B)	No
Haverford (T)	Yes	Upland (B)	No
Landsdowne (B)	Yes	Upper Chichester (T)	Yes
Lower Chichester (T)	No	Upper Darby (T)	No
Marcus Hook (B)	No	Upper Providence (T)	Yes
Marple (T)	Yes	Yeadon (B)	No
Media (B)	Yes		

Sources: 2016 HMP
Note: B – Borough; T - Township; C – City

Table 4.3.11-2 shows the number of people in Delaware County living in the landslide hazard area. Overall, 4.7-percent of the county's population (27,156 persons) lives within this hazard area. Upper Providence Township has the highest percentage (10.5-percent) of population in the hazard area.

Table 4.3.11-2. Estimated Population Located in the Steep Slope (>25% Degrees) Landslide Hazard Area

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Steep Slope (>25% Degrees) Landslide Hazard Area	
		Number of People	Percent of Total
Aldan (B)	4,244	116	2.7%
Aston (Twp)	16,791	1,072	6.4%
Bethel (Twp)	9,574	485	5.1%
Brookhaven (B)	8,300	349	4.2%
Chadds Ford (Twp)	3,972	258	6.5%
Chester City (C)	32,605	981	3.0%
Chester (Twp)	4,080	159	3.9%
Chester Heights (B)	2,897	300	10.4%
Clifton Heights (B)	6,863	298	4.3%
Collingdale (B)	8,908	235	2.6%
Colwyn (B)	2,474	124	5.0%
Concord (Twp)	18,295	1,324	7.2%
Darby (B)	10,715	564	5.3%
Darby (Twp)	9,219	266	2.9%
East Lansdowne (B)	2,714	17	0.6%
Eddystone (B)	2,459	51	2.1%
Edgmont (Twp)	4,283	324	7.6%
Folcroft (B)	6,792	298	4.4%
Glenolden (B)	7,223	393	5.4%
Haverford (Twp)	50,431	1,925	3.8%

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Steep Slope (>25% Degrees) Landslide Hazard Area	
		Number of People	Percent of Total
Lansdowne (B)	11,107	436	3.9%
Lower Chichester (Twp)	3,425	79	2.3%
Marcus Hook (B)	2,454	14	0.6%
Marple (Twp)	24,214	1,444	6.0%
Media (B)	5,901	448	7.6%
Middletown (Twp)	16,373	1,288	7.9%
Millbourne (B)	1,212	120	9.9%
Morton (B)	2,778	51	1.8%
Nether Providence (Twp)	14,525	838	5.8%
Newtown (Twp)	15,002	1,018	6.8%
Norwood (B)	5,943	80	1.3%
Parkside (B)	2,321	73	3.1%
Prospect Park (B)	6,427	162	2.5%
Radnor (Twp)	33,228	1,886	5.7%
Ridley (Twp)	31,053	898	2.9%
Ridley Park (B)	7,186	302	4.2%
Rose Valley (B)	1,017	104	10.3%
Rutledge (B)	782	5	0.6%
Sharon Hill (B)	6,014	303	5.0%
Springfield (Twp)	25,070	1,036	4.1%
Swarthmore (B)	6,543	149	2.3%
Thornbury (Twp)	6,904	438	6.3%
Tinicum (Twp)	3,983	33	0.8%
Trainer (B)	1,976	56	2.8%
Upland (B)	3,068	126	4.1%
Upper Chichester (Twp)	16,898	653	3.9%
Upper Darby (Twp)	85,681	3,828	4.5%
Upper Providence (Twp)	10,852	1,136	10.5%
Yeadon (B)	12,054	610	5.1%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**27,156**	**4.7%**

Source: Census 2010/2020
Notes: Census 2020 decennial population data was used to update the Census 2010 daysmetric block population estimates. Census 2010 dasymetric blocks were used to estimate the areas where development exists in each municipality. These boundaries may over or underestimate the density location of population within each municipality, impacting the exposure results.

Impact on General Building Stock

In general, the built environment located in the landslide-susceptibility area and the population, structures and infrastructure located downslope are vulnerable to this hazard. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary losses to businesses and residents. There are 8,874 buildings located in the landslide hazard area countywide. The Township of Upper Providence has the greatest percentage of buildings located in the landslide hazard area, with 10.6-percent of its buildings being located in

the hazard area. Table 4.3.11-3 summarizes the exposed building stock located in the landslide-susceptibility area throughout the county by jurisdiction.

Table 4.3.11-3. Estimated General Building Stock Exposure to the Landslide Hazard Area

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located in the Steep Slope (>25% Degrees) Landslide Hazard Area	
		Number of Buildings	Percent of Total
Aldan (B)	1,673	41	2.5%
Aston (Twp)	6,202	407	6.6%
Bethel (Twp)	3,164	160	5.1%
Brookhaven (B)	3,185	127	4.0%
Chadds Ford (Twp)	1,402	90	6.4%
Chester City (C)	11,646	316	2.7%
Chester (Twp)	1,596	64	4.0%
Chester Heights (B)	1,022	102	10.0%
Clifton Heights (B)	2,324	106	4.6%
Collingdale (B)	3,130	83	2.6%
Colwyn (B)	839	44	5.2%
Concord (Twp)	5,400	379	7.0%
Darby (B)	3,569	188	5.3%
Darby (Twp)	3,763	109	2.9%
East Lansdowne (B)	906	5	0.6%
Eddystone (B)	876	21	2.4%
Edgmont (Twp)	1,579	115	7.3%
Folcroft (B)	2,500	108	4.3%
Glenolden (B)	2,453	117	4.8%
Haverford (Twp)	17,876	655	3.7%
Lansdowne (B)	3,838	129	3.4%
Lower Chichester (Twp)	1,266	30	2.4%
Marcus Hook (B)	831	5	0.6%
Marple (Twp)	8,652	519	6.0%
Media (B)	2,076	144	6.9%
Middletown (Twp)	5,161	401	7.8%
Millbourne (B)	243	23	9.4%
Morton (B)	927	17	1.8%
Nether Providence (Twp)	5,153	283	5.5%
Newtown (Twp)	4,691	308	6.6%
Norwood (B)	2,092	30	1.4%
Parkside (B)	851	25	3.0%
Prospect Park (B)	2,086	54	2.6%
Radnor (Twp)	8,992	510	5.7%
Ridley (Twp)	11,070	299	2.7%
Ridley Park (B)	2,403	97	4.0%
Rose Valley (B)	402	41	10.1%
Rutledge (B)	287	2	0.6%
Sharon Hill (B)	2,024	95	4.7%
Springfield (Twp)	9,233	387	4.2%
Swarthmore (B)	1,721	39	2.3%
Thornbury (Twp)	2,361	149	6.3%
Tinicum (Twp)	1,917	20	1.1%
Trainer (B)	678	19	2.9%
Upland (B)	1,297	56	4.3%
Upper Chichester (Twp)	6,005	231	3.9%
Upper Darby (Twp)	27,681	1,187	4.3%
Upper Providence (Twp)	3,636	384	10.6%
Yeadon (B)	3,741	154	4.1%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located in the Steep Slope (>25% Degrees) Landslide Hazard Area	
		Number of Buildings	Percent of Total
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**196,420**	**8,874**	**4.5%**

Source: Census 2010

Note: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 data may over or underestimate the number of buildings found in each municipality.

B – Borough; T - Township; C – City

Critical Facilities and the Economy

Landslides can also impact the critical facilities in Delaware County. There are 36 critical facilities located in the identified landslide-susceptibility hazard area (Table 4.3.11-4). Bridges, hazardous material facilities, and historic sites are the types of critical facilities primarily in the landslide hazard area. Overall, all 36 of the critical facilities exposed to the landslide hazard area are considered lifelines for the county.

Table 4.3.11-4. Number of Critical Facilities and Lifeline Facilities Located in the Steep Slope (>25% Degrees) Landslide Hazard Area

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Steep Slope (>25% Degrees) Landslide Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	0	0.0%	0	0.0%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	1	6.3%	1	6.7%
Chadds Ford (Twp)	17	16	1	5.9%	1	6.3%
Chester City (C)	88	83	1	1.1%	1	1.2%
Chester (Twp)	21	20	0	0.0%	0	0.0%
Chester Heights (B)	5	5	0	0.0%	0	0.0%
Clifton Heights (B)	14	12	1	7.1%	1	8.3%
Collingdale (B)	16	13	0	0.0%	0	0.0%
Colwyn (B)	7	6	0	0.0%	0	0.0%
Concord (Twp)	49	45	3	6.1%	3	6.7%
Darby (B)	31	27	2	6.5%	2	7.4%
Darby (Twp)	22	21	0	0.0%	0	0.0%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	1	5.6%	1	5.6%
Edgmont (Twp)	16	16	1	6.3%	1	6.3%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	0	0.0%	0	0.0%
Haverford (Twp)	87	83	2	2.3%	2	2.4%
Lansdowne (B)	26	24	0	0.0%	0	0.0%
Lower Chichester (Twp)	13	12	0	0.0%	0	0.0%
Marcus Hook (B)	21	20	1	4.8%	1	5.0%
Marple (Twp)	64	57	2	3.1%	2	3.5%
Media (B)	26	21	0	0.0%	0	0.0%
Middletown (Twp)	62	59	3	4.8%	3	5.1%
Millbourne (B)	4	4	1	25.0%	1	25.0%
Morton (B)	6	5	0	0.0%	0	0.0%
Nether Providence (Twp)	34	33	1	2.9%	1	3.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Steep Slope (>25% Degrees) Landslide Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Newtown (Twp)	44	39	0	0.0%	0	0.0%
Norwood (B)	15	13	0	0.0%	0	0.0%
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	1	5.0%	1	5.3%
Radnor (Twp)	78	74	4	5.1%	4	5.4%
Ridley (Twp)	66	62	0	0.0%	0	0.0%
Ridley Park (B)	23	22	0	0.0%	0	0.0%
Rose Valley (B)	4	4	0	0.0%	0	0.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%
Sharon Hill (B)	18	16	0	0.0%	0	0.0%
Springfield (Twp)	63	61	1	1.6%	1	1.6%
Swarthmore (B)	16	13	1	6.3%	1	7.7%
Thornbury (Twp)	22	21	2	9.1%	2	9.5%
Tinicum (Twp)	24	23	0	0.0%	0	0.0%
Trainer (B)	13	13	0	0.0%	0	0.0%
Upland (B)	14	14	1	7.1%	1	7.1%
Upper Chichester (Twp)	31	28	1	3.2%	1	3.6%
Upper Darby (Twp)	153	138	3	2.0%	3	2.2%
Upper Providence (Twp)	27	25	0	0.0%	0	0.0%
Yeadon (B)	23	22	1	4.3%	1	4.5%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**36**	**2.5%**	**36**	**2.7%**

Source: Delaware County 2021/2022; HIFLD 2018/2022; PA State University 2012
Note: B – Borough; T - Township; C – City

Impact on the Economy

Geologic hazards can impose direct and indirect impacts on society. Direct costs include actual damage sustained by buildings, property, and infrastructure. Indirect costs, such as cleanup costs, business interruption, loss of tax revenues, reduced property values, and loss of productivity, are difficult to measure. Additionally, ground failure threatens transportation corridors, fuel and energy conduits, and communication lines (Spiker and Gori 2000).

Impact on the Environment

A landslide event alters the landscape. In addition to changes in topography, vegetation and wildlife habitats may be damaged or destroyed. Soil and sediment runoff will accumulate downslope, potentially blocking waterways and roadways and impacting quality of streams and other water bodies. Additional environmental impacts include loss of forest productivity (Schuster and Highland 2001).

Future Growth and Development

Any sections of growth located in the landslide-susceptible hazard areas could be potentially impacted by the geologic ground movement caused by landslides. It is recommended that the county and jurisdictional partners implement design strategies that mitigate against the risk of landslides. Figure 4.3.11-2 shows the areas of steep slopes (greater than 25-percent) in the County; any growth in these locations would be more susceptible to landslides and their impacts.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Delaware County's population will continue to increase into 2040, increasing total population to approximately 648,439 persons

(Center for Rural Pennsylvania 2022). Persons that move into areas with steep slope are at greater risk to be impacted if a landslide were to occur.

Effect of Climate Change on Vulnerability

A direct impact of climate change on landslides is difficult to determine. However, multiple secondary effects of climate change have the potential to increase the likelihood of landslides. Warming temperatures resulting in wildfires would reduce vegetative cover along steep slopes and destabilize the soils because of destruction of the root system. Additionally, increased intensity of rainfall events would increase saturation of soils on steep slopes. Under these future conditions, the county's assets located on or at the base of these steep slopes will have an increased risk to landslides.

Additional Data and Next Steps

Any additional information regarding localized concerns and past impacts will be collected and analyzed for the HMP update. These data will be developed to support future revisions to the plan.

4.3.12 Levee Failure

This section provides a profile and vulnerability assessment for the levee failure hazard for the Delaware County Hazard Mitigation Plan (HMP).

Levees and flood walls are manmade structures designed to protect specific areas within a community from flooding. These structures fail when flood waters exceed the height of the protective levee structure, or when the maximum pressure exerted by the flood waters against the levee or flood wall exceeds its capability.

Levee failures, like dam failures, have the potential to place large numbers of people and great amounts of property at risk. Unlike dams, levees are built parallel to a river or another body of water to protect the population and structures behind it from risks to human health and property damage that could be caused by flooding events (Federal Emergency Management Agency [FEMA] 2008). Levees do not serve a purpose beyond providing flood protection and (less frequently) recreational space for community residents. Dams, on the other hand, can serve to store water or generate energy, in addition to protecting areas from flooding.

Levee failures can be caused by a number of factors and can be catastrophic. Damage to the area beyond a failed levee could be more significant than damage caused by the uninhibited flow of flood water (FEMA 2008). Levees are designed to provide a specific level of protection; therefore, excessive water from a flooding event could overtop a levee if the water volume exceeds the levee specifications. Additionally, because levees can fail if they are allowed to decay or deteriorate, regular maintenance is critical.

Regulatory Oversight for Levees

USACE and FEMA

U.S. Army Corps of Engineers (USACE) and FEMA have differing roles and responsibilities related to levees. USACE addresses a range of operation and maintenance, risk communication, risk management, and risk-reduction issues as part of its responsibilities under the Levee Safety Program. FEMA addresses mapping and floodplain management issues related to levees, and it accredits levees as meeting requirements set forth by the National Flood Insurance Program.

Depending on the levee system, USACE and FEMA may be involved with the levee sponsor and community independently or—when a levee system overlaps both agency programs—jointly. Under both scenarios, the long-term goals are similar: to reduce risk and lessen the devastating consequences of flooding. Some USACE and FEMA partnering activities related to levees include:

- Joint meetings with levee sponsors and other stakeholders
- Integration of levee information into the National Levee Database
- State Silver Jackets teams
- Sharing of levee information
- Targeted task forces to improve program alignment

The Silver Jackets is a program that provides an opportunity to consistently bring together multiple state, federal, tribal, and local agencies to learn from each other and apply their knowledge to reduce risk. The Program's primary goals include the following:

- Create or supplement a mechanism to collaboratively identify, prioritize, and address risk management issues and implement solutions
- Increase and improve risk communication through a unified interagency effort

- Leverage information and resources and provide access to such national programs as FEMA's Risk Mapping, Assessment, and Planning (MAP) and USACE's Levee Inventory and Assessment Initiative
- Provide focused, coordinated hazard mitigation assistance in implementing high-priority actions such as those identified by state hazard mitigation plans
- Identify gaps among agency programs and/or barriers to implementation, such as conflicting agency policies or authorities, and provide recommendations for addressing these issues

Pennsylvania has an active Silver Jackets team. The team is an interagency organization dedicated to working collaboratively with the Commonwealth and appropriate stakeholders in developing and implementing solutions to flood hazards by combining available agency resources, which include funding, programs, and technical expertise. The team provides a variety of flood risk management resources for the public – before, during and after a flood – on their website at http://www.nab.usace.army.mil/Home/Silver-Jackets/.

Coordination between USACE and FEMA with regard to levees is now standard within many of each agency's policies and practices. Over the past several years, both agencies coordinated policies where appropriate; jointly participated in meetings with stakeholders; and participated in many multiagency efforts, such as the National Committee on Levee Safety, the Federal Interagency Floodplain Management Task Force, and the Silver Jackets Program.

National Committee on Levee Safety

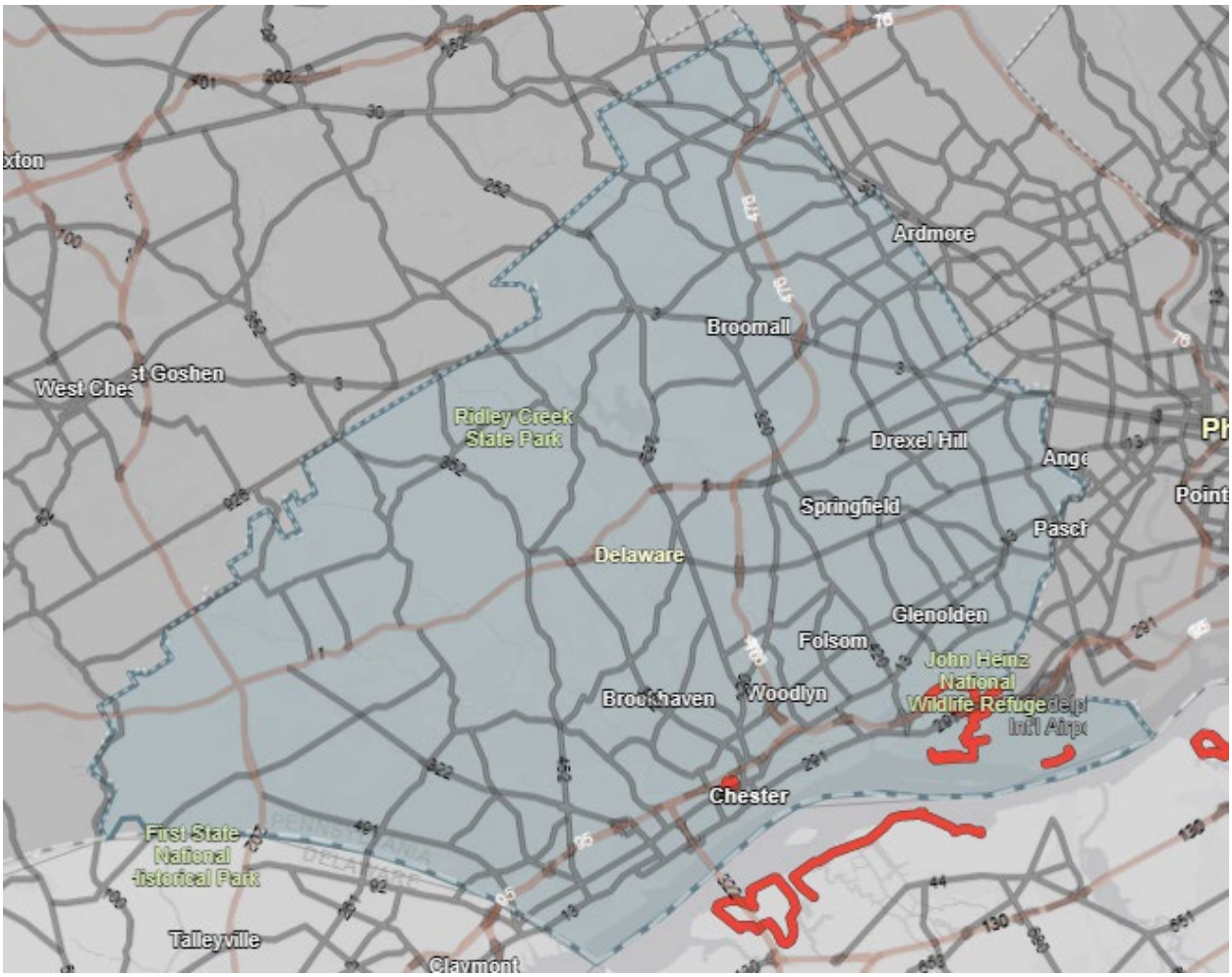
Congress created the National Committee on Levee Safety to "develop recommendations for a national levee safety program, including a strategic plan for implementation of the program." The Committee adopted the vision of "an involved public and reliable levee systems working as part of an integrated approach to protect people and property from floods," and has been working toward this goal since October 2008 (National Committee on Levee Safety 2009).

The Committee is made up of representatives from state, regional, and local agencies; the private sector; USACE; and FEMA.

4.3.12.1 Location and Extent

According to the USACE National Levee Database, there are a total of 199 levee systems throughout Pennsylvania. The USACE National Levee Database identifies eight levees within Delaware County (USACE 2022). There are seven levees in Tinicum Township and one in the City of Chester.

Figure 4.3.12-1. Levee Systems in Delaware County, Pennsylvania



Source: USACE 2022

A complete levee failure, like a dam failure, is rather infrequent and typically coincides with events that cause them such as heavy rainfall, storm surge, or hurricanes. In the event of a levee failure, floodwaters may ultimately inundate the protected area landward of the levee. The extent of inundation is dependent on the flooding intensity. Failure of a levee during a 1-percent annual chance flood will inundate the approximate 100-year flood plain previously protected by the levee. Residential and commercial buildings located nearest the levee failure or breach location will suffer the most damage from the initial embankment failure flood wave. Landward buildings will be damaged by inundation (FEMA 2004).

Levees require maintenance to continue to provide the level of protection they were designed and built to offer. Maintenance responsibility belongs to a variety of entities including local, state, and federal government and private landowners. Well-maintained levees may obtain certification through independent inspections. Levees may not be certified for maintaining flood protection when the levee owner does not maintain the levee or pay for an independent inspection. The impacts of an un-certified levee include higher risk of levee failure. In addition, insurance rates may increase because FEMA identifies on Flood Insurance Rate Maps that the structures are not certified to protect from a 1-percent annual chance flood event (FEMA 2004).

4.3.12.2 Range of Magnitude

Levee failures can be caused by a number of factors and can also result in catastrophic effects. If a levee fails, damage to the area beyond the levee could be more significant than if the levee was not present. Levees are designed to provide a specific level of protection; flooding events could overtop the levees if these events exceeded the levee specifications. Additionally, levees can also fail if they are allowed to decay or deteriorate, so regular maintenance of levees is critical.

A levee failure or breach causes flooding in landward areas adjacent to the structure. The failure of a levee or other flood protection structure could be devastating, depending on the level of flooding for which the structure is designed and the amount of landward development present. Large volumes of water may be moving at high velocities, potentially causing severe damage to buildings, infrastructure, trees, and other large objects. Levee failures are generally worse when they occur abruptly with little warning and result in deep, fast-moving water through highly developed areas.

The environmental impacts of a levee failure can include significant water-quality and debris-disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be off line for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties. In addition, severe erosion is likely; such erosion can negatively impact local ecosystems.

The effects of a levee failure are exacerbated when the failure occurs abruptly or with little warning and if it results in deep, fast-moving water through highly developed areas. The worst-case scenario for a levee failure in Delaware County would be the complete failure of the Tinicum – Long Hook Creek Levee 3. If this occurred during a flood with a 1-percent annual chance of occurrence, the failure would lead to effects consistent with those described in Section 4.3.8, Flood, Flash Flood, and Ice Jam Hazard Profile.

4.3.12.3 Past Occurrence

No known levee failures have been recorded in Delaware County. There have been no FEMA declarations associated with levee failure in Delaware County or the Commonwealth of Pennsylvania.

4.3.12.4 Future Occurrence

A complete levee failure is rather infrequent and typically coincides with events that cause them such as heavy rainfall, storm surge, or hurricanes. Additionally, future climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Because levee failure is often caused by excessive rainfall, it is appropriate to relate the future vulnerability of levees directly with the potential for increased rainfall in Delaware County.

In Section 4.4, the identified hazards of concern for Delaware County were ranked for relative risk. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and reference to the Pennsylvania State HMP, the probability of occurrence for levee failure events in Delaware County is considered *unlikely*. Section 4.4 includes further information on PEMA's risk factor methodology and the risk factors used to determine each hazard's risk ranking.

4.3.12.5 Vulnerability Assessment

To understand risk, a community must evaluate the assets exposed and/or vulnerable within the identified hazard area. This section evaluates and estimates the potential impact of levee failure in Delaware County in the following subsections:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; (5) the environment; and (6) future growth and development
- Effects of climate change on vulnerability

Overview of Vulnerability

As discussed above, the USACE's NLD indicates that Delaware County has eight levees totaling eight miles in length and protects approximately 0.1 square mile of land (USACE 2022).

Data and Methodology

Information from USACE regarding the location of levee-protected areas of Delaware County were used to estimate exposure. Levee-protected areas are typically protected from flooding but can becoming inundated in the event of a levee failure event.

Impact on Life, Health, and Safety

Impacts of levee failure on life, health, and safety depend on several factors, including severity of the event, protection level of the level, and whether or not adequate warning time is provided to residents. Assumedly, the population living in or near floodplain areas and in the levee-protected area could be impacted by a failure event. According to the USACE National Levee Database, levees in Delaware County protect 4,068 residents from flooding (USACE 2022). More information on the impact on life, health, and safety is included in Section 4.3.5, Flood, Flash Flood, and Ice Jam Hazard Profile.

Impact on General Building Stock

According to the USACE National Levee Database, levees in Delaware County protect 128 buildings (USACE 2022). Section 4.3.5, Flood, Flash Flood, and Ice Jam Hazard Profile, includes more information regarding the impact of levee failure and flooding on the economy in Delaware County.

Impact on Critical Facilities

It is important to determine the critical facilities and infrastructure within the county that may be at risk to flooding due to a levee failure, and that may be impacted should damage occur. Critical services during and after a levee failure event may not be available if facilities are directly damaged or transportation routes to access these critical facilities are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout the planning area to many service providers needing to get to vulnerable populations or to make repairs. Utilities, such as overhead power, cable, and phone lines, could also be vulnerable because of damage to utility poles by standing water or the surge of water from a dam failure event. Loss of these utilities could create additional isolation issues for the inundation zones.

Critical facility exposure to the levee failure hazard event boundary was examined. Table 4.3.12-1 lists critical facilities and utilities within the areas protected by levees in Delaware County. Section 4.4 (Hazard Vulnerability Summary) provides more information about the critical facilities and lifelines in Delaware County.

Of the eight critical facilities located in the areas protected by a levee, all eight are considered lifelines for the county.

Table 4.3.12-1 Critical Facilities within the Areas Protected by Levees

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Areas Protected by Levees			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	0	0.0%	0	0.0%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	0	0.0%	0	0.0%
Chadds Ford (Twp)	17	16	0	0.0%	0	0.0%
Chester City (C)	88	83	5	5.7%	5	6.0%
Chester (Twp)	21	20	0	0.0%	0	0.0%
Chester Heights (B)	5	5	0	0.0%	0	0.0%
Clifton Heights (B)	14	12	0	0.0%	0	0.0%
Collingdale (B)	16	13	0	0.0%	0	0.0%
Colwyn (B)	7	6	0	0.0%	0	0.0%
Concord (Twp)	49	45	0	0.0%	0	0.0%
Darby (B)	31	27	0	0.0%	0	0.0%
Darby (Twp)	22	21	0	0.0%	0	0.0%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	0	0.0%	0	0.0%
Edgmont (Twp)	16	16	0	0.0%	0	0.0%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	0	0.0%	0	0.0%
Haverford (Twp)	87	83	0	0.0%	0	0.0%
Lansdowne (B)	26	24	0	0.0%	0	0.0%
Lower Chichester (Twp)	13	12	0	0.0%	0	0.0%
Marcus Hook (B)	21	20	0	0.0%	0	0.0%
Marple (Twp)	64	57	0	0.0%	0	0.0%
Media (B)	26	21	0	0.0%	0	0.0%
Middletown (Twp)	62	59	0	0.0%	0	0.0%
Millbourne (B)	4	4	0	0.0%	0	0.0%
Morton (B)	6	5	0	0.0%	0	0.0%
Nether Providence (Twp)	34	33	0	0.0%	0	0.0%
Newtown (Twp)	44	39	0	0.0%	0	0.0%
Norwood (B)	15	13	0	0.0%	0	0.0%
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	0	0.0%	0	0.0%
Radnor (Twp)	78	74	0	0.0%	0	0.0%
Ridley (Twp)	66	62	0	0.0%	0	0.0%
Ridley Park (B)	23	22	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Areas Protected by Levees			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Rose Valley (B)	4	4	0	0.0%	0	0.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%
Sharon Hill (B)	18	16	0	0.0%	0	0.0%
Springfield (Twp)	63	61	0	0.0%	0	0.0%
Swarthmore (B)	16	13	0	0.0%	0	0.0%
Thornbury (Twp)	22	21	0	0.0%	0	0.0%
Tinicum (Twp)	24	23	1	4.2%	1	4.3%
Trainer (B)	13	13	2	15.4%	2	15.4%
Upland (B)	14	14	0	0.0%	0	0.0%
Upper Chichester (Twp)	31	28	0	0.0%	0	0.0%
Upper Darby (Twp)	153	138	0	0.0%	0	0.0%
Upper Providence (Twp)	27	25	0	0.0%	0	0.0%
Yeadon (B)	23	22	0	0.0%	0	0.0%
Brandywine Conservancy and Museum of Art Special District	0	0	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**8**	**0.6%**	**8**	**0.6%**

Source Delaware County 2021/2022; HIFLD 2018/2022; FEMA 2017
Note: B – Borough; C – City; Twp. – Township

Impact on the Economy

According to the USACE National Levee Database, levees in Delaware County protect a property value of approximately $266.3 million (USACE 2022). Section 4.3.5, Flood, Flash Flood, and Ice Jam Hazard Profile, includes more information regarding the impact of levee failure and flooding on the economy in Delaware County.

Impact on the Environment

The environmental impacts of a levee failure result in significant water-quality and debris-disposal issues. Flood waters will back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterway. The contents of unsecured containers of oil, fertilizers, pesticides and other chemicals get added to flood waters. Water supplies and wastewater treatment could be off line for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed. Contaminated sediment must be removed from buildings, yards, and properties (PEMA 2018).

Future Growth and Development

As discussed in Section 4.4, areas targeted for future growth and development have been identified across the Delaware County. Any areas of growth could be impacted by the flood hazard if the areas are within identified hazard areas. The county intends to discourage development in vulnerable areas, or to encourage higher regulatory standards on the local level.

Effect of Climate Change on Vulnerability

Climate is defined not simply as average temperature and precipitation, but also by the type, frequency, and intensity of weather events. Both globally and at the local level, climate change can alter the prevalence and severity of extremes such as flood events. While predicting changes of flood events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).

Pennsylvania Department of Environmental Protection (PADEP) was directed by the Climate Change Act (Act 70 of 2008) to initiate a study of potential impacts of global climate change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment's main findings indicate that Pennsylvania is very likely to undergo increased temperatures in the 21st century. An increase in variability of temperature and precipitation may lead to increased frequency and/or severity of storm events. Summer floods and general stream flow variability are projected to increase due to increased precipitation. Even with the anticipated increase in winter precipitation occurring as rain rather than snow, increased winter temperatures and a reduced snowpack may decrease rain-on-snow events and thus affect major flooding events in Pennsylvania. This conclusion regarding trends toward increased temperatures, however, remains speculative until further studies can validate it. Future improvements in modeling smaller-scale climatic processes are expected and will lead to improved understanding of the ways in which the changing climate will alter temperature, precipitation, storms, and flood events in Pennsylvania (Shortle et al. 2009).

Additional Next Steps

For future plan updates, levee failure inundation areas may be used to estimate potential impacts to life, buildings, and critical assets.

4.3.13 Lightning

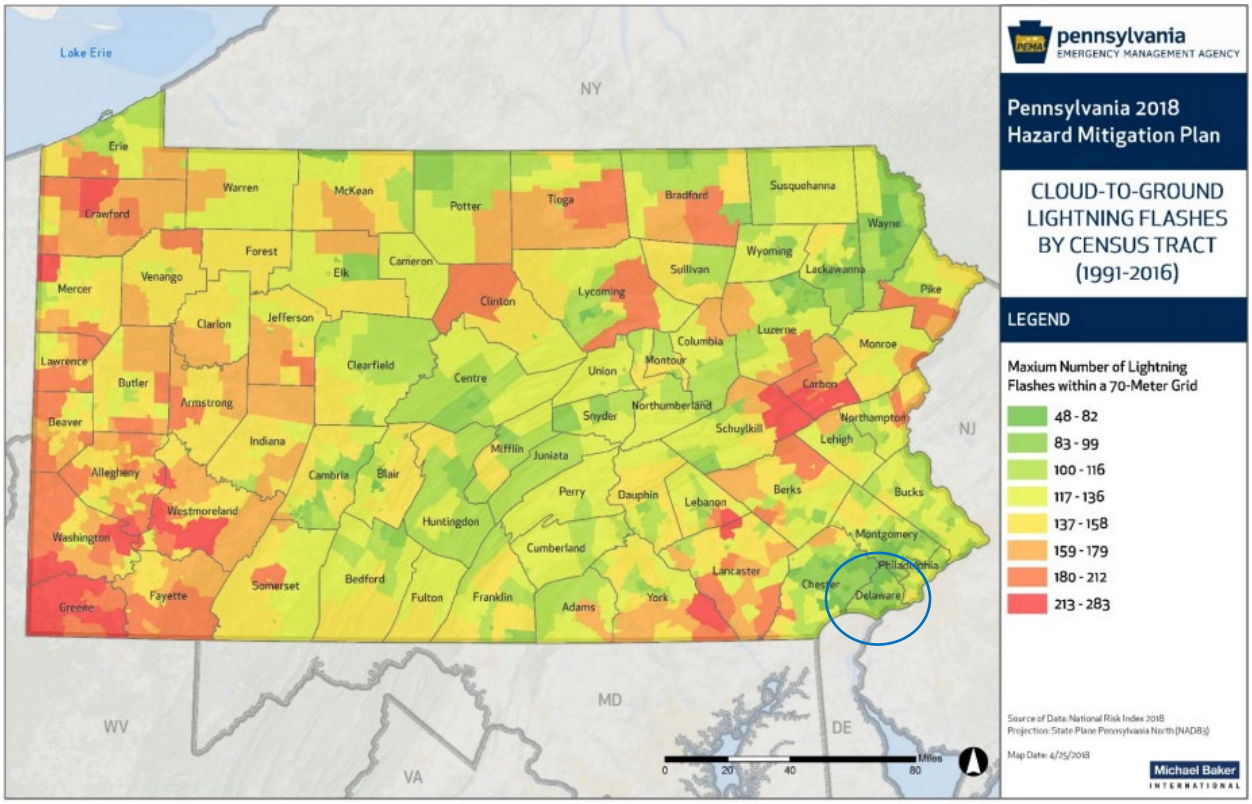
This section provides a profile and vulnerability assessment of the lightning hazard in Delaware County. Lighting is a rapid discharge of electrical energy in the atmosphere. The clap of thunder is the result of a shock wave created by the rapid heating and cooling of the air in the lightning channel. All thunderstorms produce lightning and are very dangerous. It ranks as one of the top weather killers in the United States and kills approximately 50 people and injures hundreds each year. Lightning can occur anywhere there is a thunderstorm (NOAA 2022).

Location and Extent

Lightning can occur anywhere in Delaware County. It can occur with all thunderstorms, making the entire county susceptible to the impacts of lightning. Different geographic areas may experience varying event frequencies, but in all cases, lighting strikes and associated fatalities occur primarily during the summer months.

According to the 2018 Commonwealth of Pennsylvania State Hazard Mitigation Plan, most lightning flashes occur in southwestern Pennsylvania and in the Lehigh Valley; however, eastern and southeastern portions of the Commonwealth are at greater risk for death, injury or damage to lightning than central and north-central due to high population density (PEMA 2019). Figure 4.3.13-1 shows the frequency of cloud-to-ground lightning flashes by census tract across Pennsylvania.

Figure 4.3.13-1. Cloud-to-Ground Lightning Flashes by Census Tract, 1991-2016



Source: *PEMA 2019*
Note: *Delaware County is shown by the blue oval.*

Range of Magnitude

The damage caused by a lightning strike can be significant, depending on what it hits. If the lightning strikes a person, it will cause significant injury or death. Houses may catch fire if hit, and trees may fall. These issues are worsened by (typically) concurrent severe storms with heavy winds (Delaware County Planning Department 2022).

Lightning kills about 20 people each year in the United States and hundreds more are injured. In 2021, lightning resulted in 11 fatalities, with one in Lackawanna County, Pennsylvania (NWS 2022). In many cases, lightning events have caused heart damage. Inflated lungs and brain damage have also been observed from lightning fatality history. Loss of consciousness, amnesia, paralysis, and burns are reported by many who have survived. Deaths and injuries to livestock and other animals, thousands of forest and brush fires, as well as millions of dollars in damage to buildings, communications systems, power lines, and electrical systems are also the result of lightning (PEMA 2019).

The worst-case scenario for lightning strikes would be a strike in a large group of people, such as at an outdoor sporting event or concert, in Delaware County. Numerous injuries or deaths could occur (PEMA 2019).

Past Occurrence

Between 1954 and 2022, Pennsylvania was not included in any FEMA declared major disaster declarations (DR) or emergencies (EM) related to lightning events. Generally, disasters cover a wide region of the Commonwealth; therefore, many counties could have experienced various types of impacts (FEMA 2021).

The NOAA-NCEI Storm Events database records lightning events. According to the database, between 1950 and 2021, there were 39 reported lightning events, causing one fatality, five injuries, and over $800,000 in property damage (NOAA-NCEI 2022).

For this HMP update, known lightning events that have impacted Delaware County between 1950 and December 2021 are identified in Table 4.3.13-1. Only events that caused injuries, fatalities, or at least $10,000 in property damage are listed in the table. With documentation for Pennsylvania and Delaware County being extensive, not all sources have been identified or researched. Table 4.3.13-1 documents events listed in the NOAA-NCEI database.

Table 4.3.13-1. Lightning Events in Delaware County, 1950 to 2021

Date	Event	Location	Total Fatalities	Total Injuries	Total Property Damage	Description
August 13, 1997	Lightning	Chester	0	0	$26,000	-
June 18, 2000	Lightning	Springfield	0	0	$100,000.00	-
April 23, 2005	Lightning	Aston Mills	0	0	$100,000.00	-
August 14, 2005	Lightning	Haverford	0	0	$25,000.00	-
June 2, 2006	Lightning	Boothwyn	1	0	$0.00	-
July 23, 2008	Lightning	Bethel	0	2	$1,000.00	A Bethel Township police officer and a firefighter were struck and injured by lightning at the Bethel Township fire house on Foulk Road. Lightning struck the building and moved down along its frame. Both were

Date	Event	Location	Total Fatalities	Total Injuries	Total Property Damage	Description
						hospitalized for observations and released on the 24th. The lightning strike itself damaged the garage door opener, telephone, and electronics systems in the fire house.
July 17, 2009	Lightning	Ridley Park	0	0	$25,000.00	A lightning strike and ensuing fire damaged a three-story Victorian home on East Ridley Avenue in Ridley Park Borough. The fire was confined to the roof, but smoke damage occurred throughout the home.
August 18, 2009	Lightning	Lansdowne	0	0	$10,000.00	A lightning strike and the ensuing fire damaged a home in Lansdowne Borough.
August 19, 2011	Lightning	Norwood	0	0	$50,000.00	A lightning strike and ensuing fire damaged a home on Leon Avenue in Norwood Borough. Lightning struck the roof and the fire started in the attic. No injuries were reported.
August 19, 2011	Lightning	Springfield	0	0	$250,000.00	A lightning strike and ensuing fire gutted a house on Norwinden Drive in Springfield Township. No injuries were reported.
August 21, 2011	Lightning	Radnor	0	0	$25,000.00	A lightning strike and ensuing fire caused basement damage to one home on West Beechtree Lane in Radnor Township as well as a Sports Utility Vehicle next door. The lightning strike damaged a tree which fell on top of the vehicle. It then started a basement fire at the neighboring house. No injuries were reported.
June 24, 2013	Lightning	Concord	0	1	$0.00	A man was injured by a lightning strike while working on the Glen Mills Reform School's baseball field in Concord Township.
June 24, 2013	Lightning	Swarthmore	0	0	$15,000.00	A lightning strike damaged a home in Swarthmore.
June 24, 2013	Lightning	Moore	0	0	$100,000.00	A lightning strike and ensuing fire damaged a home on Lindsay Street in Ridley Park. Lightning struck and started a fire in the basement and also traveled along the electrical wiring within the house.
June 24, 2013	Lightning	Bethel	0	0	$100,000.00	A lightning strike and ensuing electrical surge started a couple of small basement fires in a home on Half Mile Post in Bethel Township.
July 14, 2014	Lightning	Folsom	0	0	$10,000.00	Lightning struck a building in Folsom (Ridley Township) and started a fire. No injuries were reported.
July 14, 2014	Lightning	Glenolden	0	1	$0.00	Lightning struck and injured a 14-year-old boy on East Ashland Avenue in Glenolden Borough. Lightning caused about 5,000 PECO Energy customers to lose power in Delaware County.

Date	Event	Location	Total Fatalities	Total Injuries	Total Property Damage	Description
May 27, 2015	Lightning	Broomall	0	1	$0.00	A lee side trough coupled with an unseasonably warm air mass triggered scattered thunderstorms in Eastern Pennsylvania during the afternoon on the 27th. A couple of the thunderstorms were severe. A 52-year-old man was struck by lightning while walking his dog.

Sources: NOAA-NCEI 2021

Probability of Future Occurrence

Lightning can be expected in any severe storm event. While injuries or fatalities caused by lightning strikes are rare, lightning events severe enough to be reported can be expected at least once every two years. It is estimated that the County will continue to experience lightning events annually.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of lightning events for Delaware County. Information from NOAA-NCEI Storm Events Database was used to identify the number of lightning strike events that occurred between 1997, the earliest year data was collected, and 2021. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics as well as the annual average number of events and the estimated percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a lightning strike event occurring in any given year in Delaware County.

Table 4.3.13-2. Probability of Future Lightning Events

Hazard Type	Number of Occurrences Between 1997 and 2021	Percent Chance of Occurrence in Any Given Year
Lightning	39	100%

Sources: NOAA-NCEI 2021
Note: NOAA-NCEI lightning reports start in 1997.

Based on available historical data, the future occurrence of lightning strikes that cause deaths, injuries, or property damage can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

Vulnerability Assessment

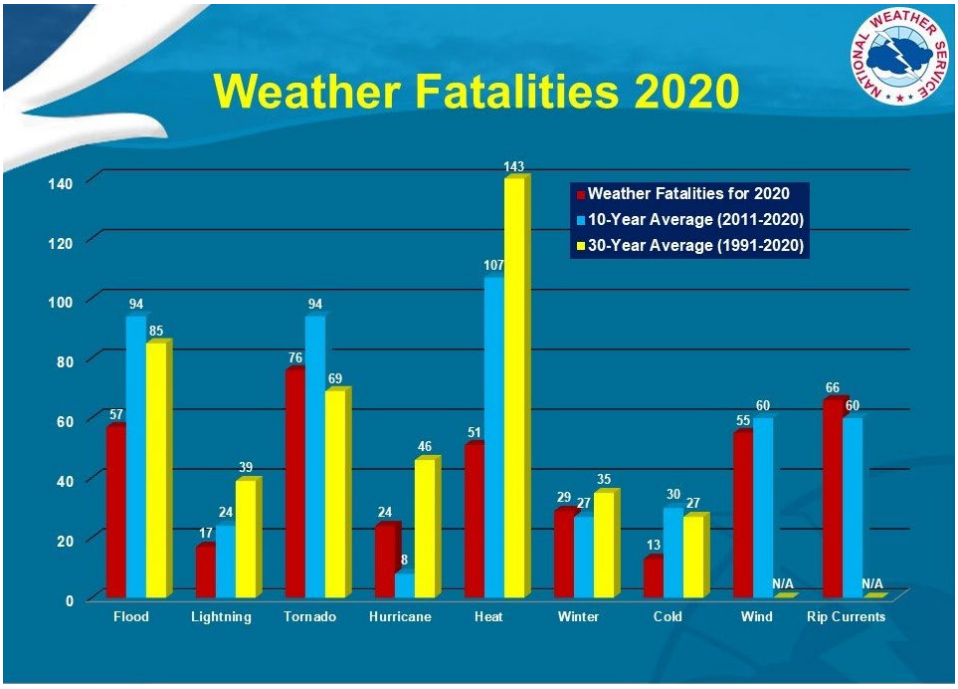
To understand risk, a community must evaluate the assets that are exposed or vulnerable in the identified hazard area. For lightning events, all of Delaware County has been identified as the hazard area. Therefore, all assets (population, structures, critical facilities, and lifelines), as described in Section 2, are potentially vulnerable. This section evaluates and estimates the potential impact of lightning strike events on Delaware County, including the following subsections:

- Impact on (1) life; (2) health and safety; (3) general building stock; (4) critical facilities, (5) economy; and (6) future growth and development
- Effect of climate change on vulnerability
- Additional data and next steps.

Impact on Life, Health, and Safety

Across the United States, the 10-year average (2011 to 2020) for fatalities caused by lightning is 24, while the 30-year average (1991 to 2020) is 39 (NWS 2022). Figure 4.3.13-2 illustrates these statistics. According to NOAA-NCEI, there has been one fatality and 5 injuries associated with lightning strike events from 1997 to 2021 in Delaware County (NOAA-NCEI 2022).

Figure 4.3.13-2. Weather Fatalities in the United States



Source: NWS 2022

The entire population of the County is considered exposed to the lightning hazard. Lightning strikes in Pennsylvania occur primarily during the summer months. In general, population and building density have a correlation with hazard vulnerability and loss. The more-developed areas of Delaware County are at greater risk to lightning strikes than others because of the greater population density. People outside are considered at risk and more vulnerable to a lightning strike compared to those inside a shelter. Moving to a lower-risk location will decrease a person's vulnerability.

Impact on General Building Stock and Critical Facilities

For the purposes of this HMP, the entire general building stock and all infrastructure of Delaware County are considered exposed to the lightning strike hazard. In general, developed areas in the County are at greater risk than more rural areas others due to population and structure density. Taller buildings can act as lightning rods; therefore, they naturally have experienced greater vulnerability and loss during past lightning strike events (PEMA 2019).

The precise vulnerability of lightning strikes will depend on a facility's height in relation to surrounding buildings as well as the absence or presence of a lightning rod or other lightning channeling technology on the structure. According to the PA HMP, fire departments, schools, police departments, and dams are the most vulnerable to lightning strikes. Food and agriculture facilities that raise livestock may also be more vulnerable to lightning strikes as these animals tend to shelter under trees in storm situations (PEMA 2019).

According to NOAA's Technical Paper titled *Lightning Fatalities, Injuries, and Damage Reports in the United States from 1959–1994*, monetary losses for lightning events range from less than $50 to greater than $5 million (larger losses associated with forest fires with homes destroyed and crop loss) (NOAA 1997). Lightning can be responsible for damages to buildings; cause electrical, forest, and/or wildfires; and damage infrastructure such as power transmission lines and communication towers. Agricultural losses caused by lightning and lightning-resulting fires can be devastating. NOAA-NCEI estimates that lightning strikes between 1997 and 2021 have caused $864,200 in property damage in Delaware County.

Impact on the Economy

The 2019 State HMP conducted a jurisdictional vulnerability assessment to lightning strikes using GIS, looking at areas characterized as high risk to lightning. According to this analysis, none of Delaware County's buildings or people are vulnerable to lightning strikes, resulting in a predicted economic impact of $0 (PEMA 2019).

Impact on the Environment

The environmental impacts most often associated with lightning strikes include damage or death to trees or ignition of wildfires (PEMA 2019). Refer to Section 4.3.22 (Wildfire) for the impacts on the environment from wildfires.

Future Growth and Development

As discussed in Section 2.4 of this HMP, areas targeted for future growth, development and re-development have been identified across Delaware County. Any areas of growth could be affected by the lightning hazard because the entire county is exposed and potentially vulnerable to the lightning hazard.

Effect of Climate Change on Vulnerability

Climate is defined not simply as average temperature and precipitation but also by the type, frequency, and intensity of weather events. Both globally and the local level, climate change has the potential to alter the prevalence and severity of weather extremes such as storms, including those that may bring lightning. While predicting changes of lightning events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society and the environment (EPA 2022).

Climate change may lead to an increase in the number of lightning-producing storms. Major clusters of summertime thunderstorms in North America will grow larger, more intense, and more frequent later this century in a changing climate, unleashing far more rain and posing a greater threat of flooding across wide. At century's end, the number of summertime storms that produce extreme downpours could increase by more than 400% across parts of the United States, including sections of the Gulf Coast, Atlantic Coast, and the Southwest. In addition, the volume of rainfall during mesoscale connective systems (MSCs) could increase by as much as 80% in some areas (Hensen 2017).

Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with the lightning strike hazard. Research performed at NOAA and other private organizations is ongoing to improve warning and threat information for the public. The continued collection of additional/actual loss data specific to the Plan participants will further enhance Delaware County's vulnerability assessment.

4.3.14 Pandemic and Infectious Disease

Pandemics are large-scale disease outbreaks, defined by the way in which a disease spreads rather than the number of fatalities associated with it. A pandemic outbreak has several recognizable characteristics, including rapid, large-scale (potentially global) spread causing (1) overloaded healthcare systems; (2) inadequate medical supplies; (3) medical supply shortages; and (4) a disrupted economy and society (Flu.gov 2015). Pandemics typically result from infectious diseases. An infectious disease, as defined by the World Health Organization (WHO), is caused by pathogenic organisms (e.g., bacteria, viruses, fungus, or parasites) that spread from one person to another, whether through direct or indirect contact. Zoonotic disease is a type of infectious disease that occurs when animals transmit a disease to humans (WHO 2015). Although any infectious disease can reach pandemic levels, the 2019 Coronavirus (COVID-19), is the current pandemic the United States is facing.

This section describes the location and extent, range of magnitude, past occurrence, future occurrence, and vulnerability assessment for the pandemic and infectious disease hazard for the Delaware County Hazard Mitigation Plan (HMP).

4.3.14.1 Location and Extent

Pandemic events cover a wide geographic area and can affect large populations, which can include multiple countries or continents. Size and extent of an infected population depends on how easily the illness is spread, mode of transmission, and amount of contact between infected and uninfected individuals. Locations with higher-density populations are more susceptible to pandemic outbreaks, as the disease can be transmitted more easily. Additionally, vulnerable populations—especially the young and the elderly (who have weaker immune systems)—are at greater risk for both contracting a disease and suffering fatal or severe consequences. Flu most frequently spreads through the air or by touch; when an infected person coughs, infected droplets go into the air or onto their hands, facilitating transmission of the disease to other people (WHO 2015).

When a pandemic or disease outbreak occurs, WHO and other public health institutions begin tracking the disease outbreak, treatment, and more. The 2019 Coronavirus (COVID-19) is a global health threat and, as of the date of publication of this HMP update, continues to be a significant pandemic concern for American public health officials in the United States as well as the rest of the world. The Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) is actively involved in managing the outbreak and treatment of the disease.

The first human cases of COVID-19 were first reported by officials in Wuhan City, China, in December 2019. In the United States, community transmission of COVID-19 was first detected in February 2020. By mid-March, all 50 states and four U.S. territories had reported cases of COVID-19. As of January 17, 2022, a total of 65,159,554 cases and 847,577 deaths related to COVID-19 have been reported in the United States (CDC 2022). Delaware County has had a total of 86,948 cases of COVID-19 and 1,631 deaths as of January 17, 2022 (PA DOH 2022).

In addition to COVID-19, Delaware County is concerned about the possibility of a pandemic flu outbreak. Influenza viruses with the potential to reach pandemic levels include the avian influenza A (H5N1) and avian influenza H7N9 (CDC 2015). Several years ago, the swine influenza (H1N1) was of particular concern. H1N1 was first detected in people in the United States in April 2009. On June 11, 2009, WHO signaled that a pandemic of 2009 H1N1 flu was underway (CDC 2009).

4.3.14.2 Range of Magnitude

Severity of a pandemic disease depends on a number of factors, including the aggressiveness of the disease, ease of transmission, and factors associated with the impacted community (e.g., access to medical care, demographic data, and population density). Advancements in medical technologies have greatly reduced the number of deaths caused by influenza, a disease most likely to reach pandemic scale in Pennsylvania. Consequently, global effects of various influenza outbreaks have declined over the past century. High-risk populations considered more vulnerable to various pandemic diseases are described in the vulnerability assessment presented in Section 4.3.12.5.

COVID-19 is currently the biggest pandemic threat to the county because (1) it is easily spreadable, (2) infected people can be asymptomatic, and (3) the virus is new and is not yet fully understood.

Pandemic flu should not be confused with seasonal flu. Seasonal flu is a less severe concern because of its regularity of occurrence and predictability. Table 4.3.14-1 lists key differences between pandemic and seasonal flu.

Table 4.3.14-1. Seasonal Flu vs. Pandemic Flu

Pandemic Flu	Seasonal Flu
Rarely happens (three times in 20th century).	Happens annually and usually peaks in January or February.
People have little or no immunity because they have no previous exposure to the virus.	Sufferers usually have some immunity built up from previous exposure.
Healthy people may be at increased risk for serious complications.	Usually only people in vulnerable populations, not healthy adults, are at risk of serious complications.
Healthcare providers and hospitals may be overwhelmed.	Healthcare providers and hospitals can usually meet public and patient needs.
Vaccine probably would not be available in the early stages of a pandemic.	Vaccine is available for annual flu season.
Effective antivirals may be in limited supply	Adequate supplies of antivirals are usually available.
Number of deaths could be high (U.S. death toll during the 1918 pandemic was approximately 675,000).	Seasonal flu-associated deaths in the United States over 30 years ending in 2007 have ranged from about 3,000 per season to about 49,000 per season.
Symptoms may be more severe.	Symptoms include fever, cough, runny nose, and muscle pain.
May cause major impact on the general public, such as widespread travel restrictions and school or business closings.	Usually causes minor impact on the general public; some schools may close, and sick people are encouraged to stay home.
Potential for severe impact on domestic and world economy.	Manageable impact on domestic and world economy.

Source: Flu.gov 2015

Approximately 12,470 Americans died from H1N1 within a roughly 1-year period from April 2009 to April 2010 (CDC 2010). Between October 2014 and late May 2015, 6.4 percent of deaths were attributable to pneumonia and influenza—below the epidemic threshold of 6.6 percent (an epidemic occurs when the incidence rate exceeds the expected rate but is not at the magnitude of a pandemic) (CDC FluView 2016).

In 2014, CDC updated the Pandemic Intervals Framework (PIF), which describes the progression of an influenza pandemic using six intervals. The framework is used to guide planning for an influenza pandemic and provides recommendations for risk assessment, decision-making, and action in the United States. Descriptions of the CDC pandemic intervals are presented in Table 4.3.14-2.

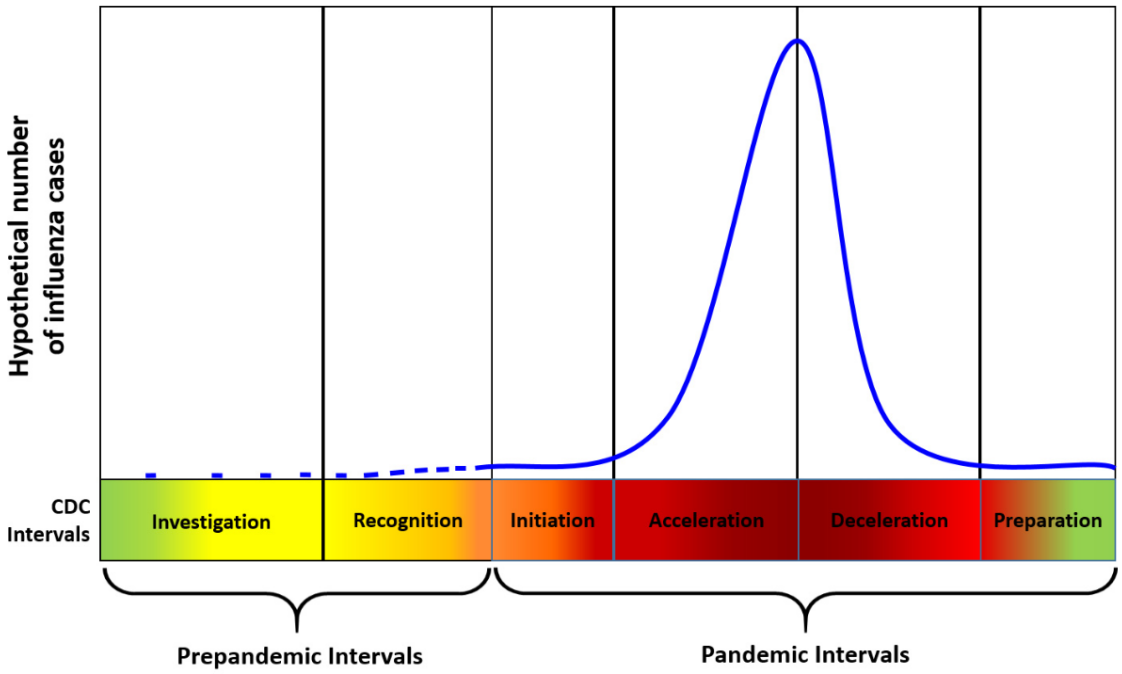
Table 4.3.14-2. CDC Pandemic Intervals Framework

Interval	Description
Interval 1: Investigation of cases of novel influenza A virus infection in humans	When novel influenza A viruses are identified in people, public health actions focus on targeted monitoring and investigation. This can trigger a risk assessment of that virus with the Influenza Risk Assessment Tool (IRAT), which is used to evaluate whether the virus has the potential to cause a pandemic.
Interval 2: Recognition of increased potential for ongoing transmission of a novel influenza A virus	When increasing numbers of human cases of novel influenza A illness are identified and the virus has the potential to spread from person to person, public health actions focus on control of the outbreak, including treatment of sick persons.
Interval 3: Initiation of a pandemic wave	A pandemic occurs when people are easily infected with a novel influenza A virus that has the ability to spread in a sustained manner from person to person.
Interval 4: Acceleration of a pandemic wave	The acceleration (or "speeding up") is the upward epidemiological curve as the new virus infects susceptible people. Public health actions at this time may focus on the use of appropriate non-pharmaceutical interventions in the community (e.g., school and child-care facility closures, social distancing), as well the use of medications (e.g., antivirals) and vaccines, if available. These actions combined can reduce the spread of the disease and prevent illness or death.
Interval 5: Deceleration of a pandemic wave	The deceleration (or "slowing down") happens when the number of reported pandemic influenza cases consistently decreases in the United States. Public health actions include continued vaccination, monitoring of pandemic influenza A virus circulation and illness, and reducing the use of non-pharmaceutical interventions in the community (e.g., school closures).
Interval 6: Preparation for future pandemic waves	When pandemic influenza has subsided, public health actions include continued monitoring of pandemic influenza A virus activity and preparing for potential additional waves of infection. It is possible that a second pandemic wave could have higher severity than the initial wave. An influenza pandemic is declared "ended" when enough data show that the reported cases of influenza virus worldwide are similar to cases of seasonal influenza virus in the way they spread and the severity of the illness they can cause.

Source: CDC 2014

Conclusion of Interval 6 leads to the post-peak period, where the pandemic is declared "ended" when enough data show that the influenza virus, worldwide, presents similar to a seasonal influenza virus. Despite a decrease in activity, countries still must be prepared for additional waves of the pandemic. Pandemic waves can be separated by a period of months leading to a long recovery time, to guarantee entry of the pandemic into the post-pandemic interval (CDC 2014). Figure 4.3.14-1 illustrates the six intervals of pandemic influenza described by CDC.

Figure 4.3.14-1. Preparedness and Response Framework for Novel Influenza A Virus Pandemics



Source: CDC 2014

COVID-19 Symptoms and Prevention Measures

Symptoms may appear 2-14 days after exposure to the virus. Symptoms of COVID-19 include fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea. Anyone can have mild to severe symptoms but older adults and people who have severe underlying medical conditions seem to be at higher risk for developing more serious complications. Ways to prevent the spread of COVID-19 include social distancing, staying home whenever possible and avoiding crowds, taking care of personal health (by resting and staying hydrated), staying in touch with family doctor or healthcare professional, and avoiding public transportation. COVID-19 has caused a major impact on the general public, such as widespread travel restrictions and school and business closings. COVID-19 has the potential for severe impact on domestic and world economy (CDC 2020). Three COVID-19 Vaccines are Authorized for Emergency Use or FDA-Approved. Pfizer-BioNTech and Moderna are a two shot series (COVID-19 mRNA vaccines) and have been FDA approved in 2021.The Johnson & Johnson's Janssen vaccine is a single shot and is authorized for Emergency Use only. Everyone ages five (5) and older are authorized to receive the COVID-19 vaccine. Everyone ages 16 years and older can get a booster shot. Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines) are preferred in most situations. (CDC 2022).

4.3.14.3 Past Occurrence

Several pandemic influenza outbreaks have occurred worldwide over the past 100 years, as listed in Table 4.3.14-3. Deaths occurred in the United States as a result of Spanish Flu, Asian flu, and Hong Kong Flu outbreaks. In the United States, about 675,000 people died while 22 million caught the Spanish Flu (1918-1920). Pennsylvania, one of the states that was hit the hardest, faced over 60,000 deaths (Shetty 2018). Most deaths resulting from Asian flu occurred between September 1957 and March 1958; within the United States, approximately 70,000 people died, and approximately 15 percent of the population of Pennsylvania was affected. The first cases of Hong Kong Flu in the United States were detected in September 1968, with deaths peaking

between December 1968 and January 1969 (Global Security 2009). As of August 2010, H1N1 was in a post-pandemic period. The COVID-19 virus has no "past occurrence" data, as it was first reported in 2019.

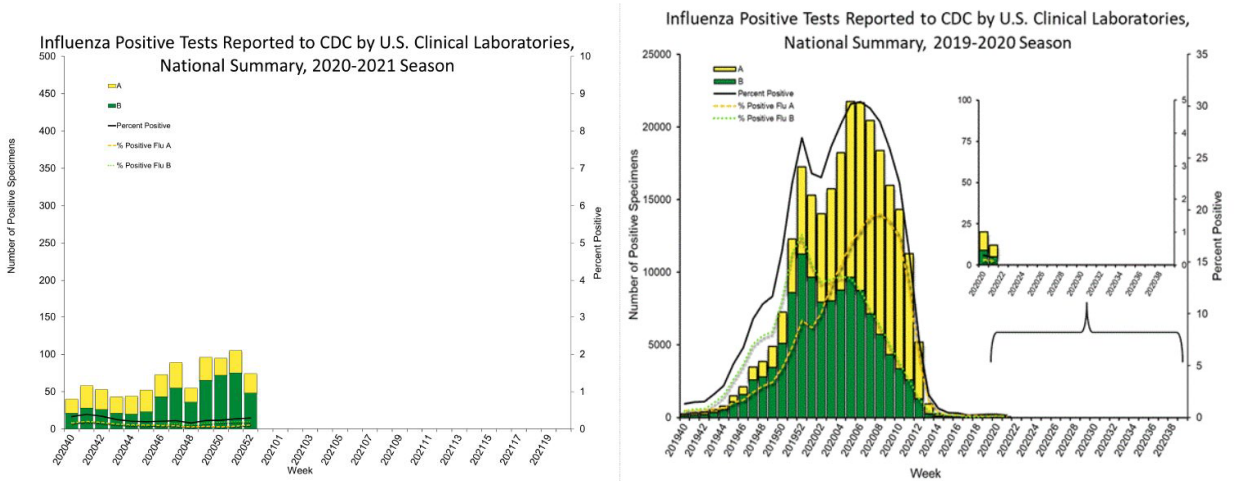
Table 4.3.14-3. Previous Pandemic Outbreaks

Date	Pandemic/Subtype	Worldwide Deaths (Approx.)
1918-1920	Spanish Flu/H1N1	50 Million
1957-1958	Asian Flu/H2N2	1.5-2 Million
1968-1969	Hong Kong Flu/H3N2	1 Million
2009-2010	Swine Flu/H1N1	> 18,000
2019- ongoing	COVID-19	5.5 Million of 1/17/2022

Source: CDC 2010

Epidemiologists and public health officials consistently track the rate of influenza or influenza-like illnesses (ILI) to monitor potential pandemic threats. This also allows them to provide annual data on ILI seasonal outbreaks. Figure 4.3.14-2 below shows the national number of cases of ILI during the 2019-2021 season, distinguishing each type of ILI (Influenza A and Influenza B) with a unique color.

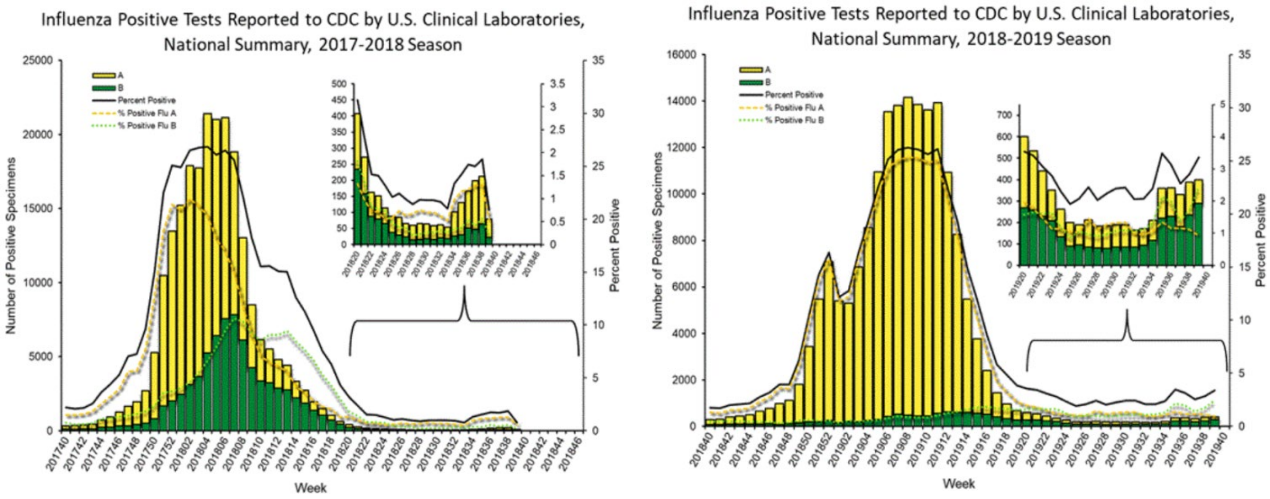
Figure 4.3.14-2. ILI Cases in the United States, 2020- 2021 and 2019-2020 Season



Source: CDC Weekly Flu 2019, 2020, 2021

Figure 4.3.14-3 below shows the number of positive cases for Influenza A and B over the 2017-2018 and 2018-2019 seasons.

Figure 4.3.14-3. ILI Cases in the United States, 2018-2019 and 2017- 2018 Season



Source: CDC Weekly Flu 2017, 2018, 2019

4.3.14.4 Future Occurrence

Based on historical data, Delaware County is expected to undergo pandemic influenza outbreaks every 11 to 41 years. Because COVID-19 is so new, the likelihood of how often it will occur is unknown. Exact timing of pandemic influenza outbreaks is unpredictable, and complete avoidance is impossible (U.S. Department of Health and Human Services [DHHS] 2009). Future occurrence is considered *possible*, as defined by the Risk Factor Methodology probability criteria (shown in Table 4.4-1 in Section 4.4 of this HMP).

4.3.14.5 Vulnerability Assessment

Depending on the characteristics of the disease or virus, certain population groups can be at higher risk of infection than others. About 60 percent of hospitalizations related to seasonal flu and 90 percent of flu-related deaths occur among people 65 and older. However, during the H1N1 pandemic, 90 percent of hospitalizations and 87 percent of H1N1-related deaths occurred in people younger than 65. As with seasonal flu, people with underlying health conditions face a much higher probability of contracting H1N1. Schools, convalescent centers, and other institutions are highly conducive to faster transmission of pandemic diseases (CDC 2010).

Table 4.3.14-4 shows the demographic change in children and the elderly from 2000 through 2020 in Delaware County. Delaware County has seen population increases in both individuals 18 years and over as well as individuals over 65 years of age. Therefore, Delaware County is more vulnerable to both seasonal influenza and pandemic influenza, such as the H1N1 pandemic.

Pandemics and infectious diseases can also affect first responders in many ways including the need for more personal protection equipment to keep them safe and able to perform job duties. There is also an added layer of complexity to triaging patient care and a higher patient volume during pandemics.

Table 4.3.14-4. Demographic Trends for Vulnerable Populations

Vulnerable Population	2010 Census	2020 Census	2010 to 2020 Change
Under 5 years	33,388	33,734	346

Vulnerable Population	2010 Census	2020 Census	2010 to 2020 Change
18 years and over	425,141	439,657	14,516
65 years and over	79,574	90,402	10,828

Source: U.S. Census Bureau 2010, U.S Census Bureau 2020, and 2015 – 2019 American Community Survey 5-Year Estimates

Impact on General Building Stock and Critical Facilities

No structures are anticipated to be directly impacted by a pandemic or infectious disease. However, structures, especially critical facilities, could be damaged due to the lack of maintenance personnel due to the personnel being sick. This is especially true of critical facilities and businesses with processes (e.g., chemical reactions) that occur continuously.

Impact on the Economy

The impact disease outbreaks have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address pandemic have not been quantified in available documentation. Instead, activities and programs implemented by the County to address this hazard are described below, all of which could impact the local economy.

The COVID-19 outbreak in 2020-2022 resulted in significant negative impacts to economic activity in the County, Commonwealth, and country due to the identified need to enforce social distancing and quarantine conditions until the disease spread was lessened. During the height of the COVID outbreak, all non-essential businesses were forced to close. The virus outbreak has also had a deleterious impact on government finances due to tax delinquency and user fees loss. Decreased revenues can lead to service cuts and prevent the county and community from procuring necessary supplies to weather the outbreak. Though the full-scale of the economic fallout is yet to be quantified, the economic impact from the pandemic was clearly felt in Bedford County.

Smaller-scale disease outbreaks can also cause negative economic impacts, though the extent of impact is variable.

Impact on the Environment

A pandemic and infectious disease has no direct impact on the environment. However, pandemics and infectious disease can have the following cascading impacts to the environment (not an exhaustive list):

- Pollution of land and waterways/waterbodies due to prophylactic supplies (e.g., masks) being improperly disposed of (e.g., littered).
- Environmental contamination due to waste being improperly disposed of or treated, due to lack of personnel to carry out proper disposal procedures.
- Environmental contamination due to runaway chemical reactions causing releases of hazardous materials from facilities (see Impact on General Building Stock and Critical Facilities).
- A lack of environmental regulators due to them being sick can reduce the effectiveness of environmental programs or requirements, having a detrimental impact on the environment.

Future Growth and Development

As the population increases, so too does the possibility for spreading an infectious disease. This is exacerbated by future growth causing higher density in populated areas.

Effect of Climate Change on Vulnerability

The relationship between climate change and increase in infectious diseases is difficult to predict with certainty; however, there may be linkages between the two. Changes in the environment may create a more livable habitat for vectors carrying disease as suggested by the Centers for Disease Control and Prevention (CDC n.d.). Localized changes in climate and human interaction may also be a factor in the spread of disease.

The relationship between climate change and infectious diseases is somewhat controversial. The notion that rising temperatures will increase the number of mosquitoes that can transmit malaria among humans (rather than just shift their range) has been the subject of debate over the past decade. Some believe that climate change may affect the spread of disease, while others are not convinced. However, many researchers point out that climate is not the only force at work in increasing the spread of infectious diseases into the future. Other factors, such as expanded rapid travel and evolution of resistance to medical treatments, are already changing the ways pathogens infect people, plants, and animals. As climate change accelerates, it is likely to work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (Harmon 2010).

Additional Data and Next Steps

For future plan updates, Delaware County will work with stakeholders to identify the long-term impacts of pandemics and infectious disease outbreaks, and the long-term solutions that can be implemented to reduce vulnerability to these events. Delaware County will work with the healthcare coalition and other health sector stakeholders to increase participation by these groups in future plan updates.

4.3.15 Radon Exposure

Radon is a natural gas that cannot be seen, smelled, or tasted. It is a noble gas that originates from natural radioactive decay of uranium and thorium. It is a large component of the natural radiation to which humans are exposed and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupation settings. According to the U.S. Environmental Protection Agency (EPA) (EPA 402-R-03-003: EPA Assessment), radon is estimated to cause more than 20,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer (EPA 2022). An estimated 40 percent of the homes in Pennsylvania are believed to have elevated radon levels (PADEP 2022). This section provides a profile and vulnerability assessment of the radon exposure hazard.

Location and Extent

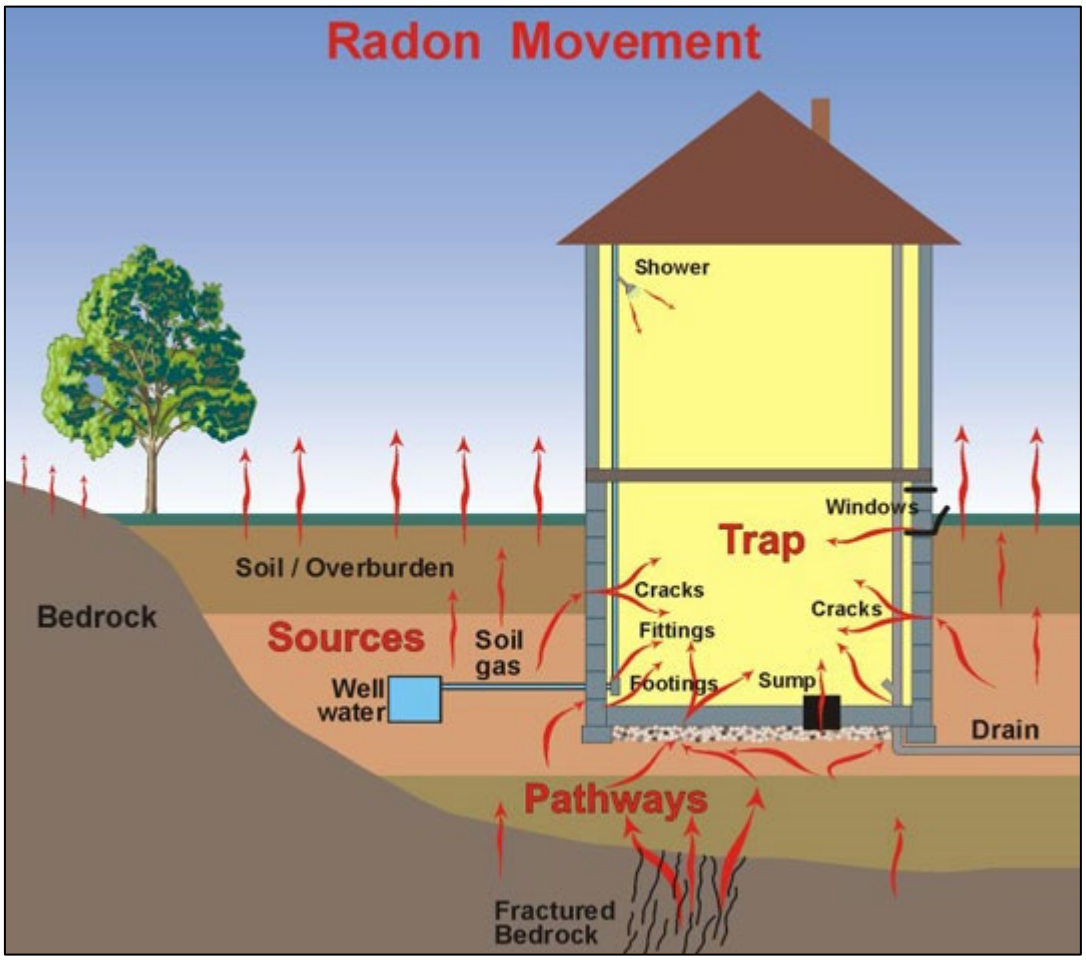
Radioactivity caused by airborne radon has been recognized for many years as an important component in the natural background radioactivity exposure of humans. However, it was not until the 1980s that the wide geographic distribution of elevated radon levels in houses and the possibility of extremely high radon concentrations in houses were recognized. In 1984, routine monitoring of employees leaving the Limerick nuclear power plant near Reading, PA, showed that readings from one employee frequently exceeded expected radiation levels, yet only natural, non-fission-product radioactivity was detected on him. Radon levels in his home were detected around 2,500 picoCuries per liter (pCi/L), much higher than the 4 pCi/L guideline set by EPA or even the 67 pCi/L limit for uranium miners. As a result of this event, the Reading Prong section of Pennsylvania where this person lived became the focus of the first large-scale radon scare in the world (PEMA 2019).

Radon (Rn-222), which has a half-life of 3.8 days, is a widespread hazard. The distribution of radon correlates with the distribution of radium (Ra-226), its immediate radioactive parent, and with uranium, its original ancestor. Because of the short half-life of radon, the distance radon atoms travel from their parent before they decay is generally limited to extents of feet or tens of feet (PEMA 2019). The following three sources of radon in residences are now recognized:

- Radon in soil air flows into the house.
- Radon dissolved in water from private wells and exsolved during water usage; this source is rarely a problem in Pennsylvania.
- Radon emanates from uranium-rich building materials (such as concrete blocks or gypsum wallboard); this source also is not known to be a problem in Pennsylvania (PEMA 2019).

Figure 4.3.15-1 illustrates radon entry points into a home.

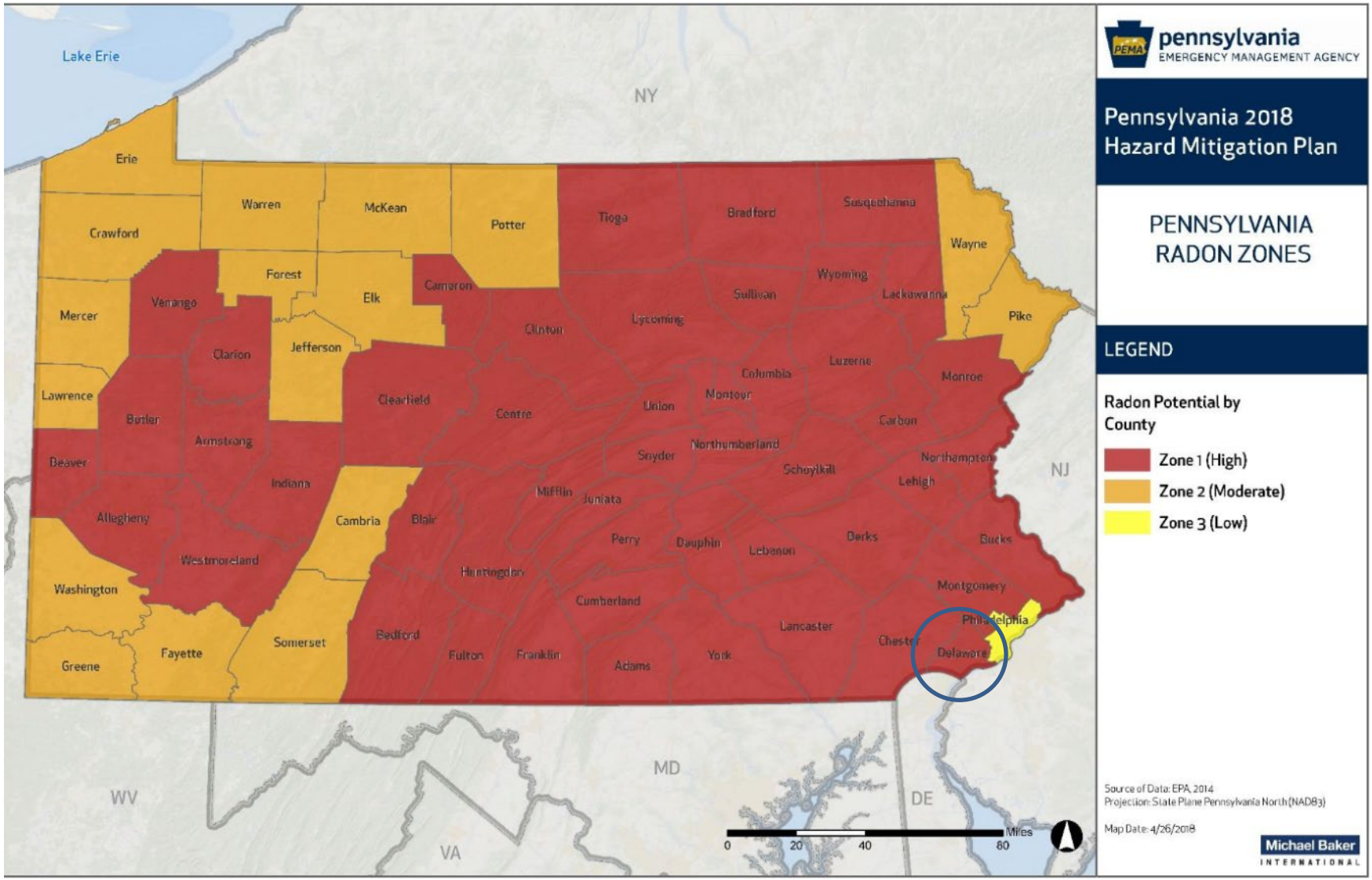
Figure 4.3.15-1. Sketch of Radon Entry Points into a House



Source: PEMA 2013

Each county in Pennsylvania is classified as having a low, moderate, or high radon hazard potential. Delaware County is classified as having a high hazard, meaning there is a predicted indoor radon level of 4 pCi/L or more (see Figure 4.3.15-2).

Figure 4.3.15-2. Radon Hazard Zones in Pennsylvania



Source: EPA 2014 (Delaware County is identified by the blue circle.)

High radon levels were initially thought to be exacerbated in tightly sealed houses, although it is now recognized that rates of airflow into and out of houses, plus the location of air inflow and the radon content of air in the surrounding soil, are key factors affecting radon concentrations. Air must be drawn into a house to compensate for outflows of air from the house caused by a furnace, fan, thermal "chimney" effect, or wind effects. If the upper part of the house is tight enough to impede influx of outdoor air (radon concentration generally below 0.1 pCi/L), an appreciable fraction of the air may be drawn in from the soil or fractured bedrock through the foundation and slab beneath the house, or through cracks and openings for pipes, sumps, and similar features. Soil gas typically contains from a few hundred to a few thousand pCi/L of radon; therefore, even a small rate of soil gas inflow can lead to elevated radon concentrations in a house (PEMA 2019).

Radon concentration in soil gas depends on a number of soil properties, the importance of which are still being evaluated. In general, 10 to 50 percent of newly formed radon atoms escape the host mineral of their parent radium and gain access to the air-filled pore space. The radon content of soil gas clearly tends to be higher in soils containing higher levels of radium and uranium, especially if the radium occupies a site on or near the surface of a grain from which the radon can easily escape. The amount of pore space in the soil and its permeability for airflow, including cracks and channels, are important factors determining radon concentration in soil gas and its rate of flow into a house. Soil depth and moisture content, mineral host and form for radium, and other soil properties may also be important. Fractured zones may supply air having radon concentrations similar to those in deep soil for houses built on bedrock (PEMA 2019).

Areas where houses have high levels of radon can be divided into the following three groups in terms of uranium content in rock and soil:

- Areas of very elevated uranium content (above 50 parts per million [ppm]) around uranium deposits and prospects: Although very high levels of radon can occur in these areas, the hazard normally is restricted to within a few hundred feet of the deposit. In Pennsylvania, these localities occupy an insignificant area.
- Areas of common rocks having higher than average uranium content (5 to 50 ppm): In Pennsylvania, these rock types include granitic and felsic alkali igneous rocks and black shales. High uranium values in rock or soil and high radon levels in houses in the Reading Prong are associated with Precambrian granitic gneisses commonly containing 10 to 20 ppm uranium, but locally containing more than 500 ppm uranium. Elevated uranium occurs in black shales of the Devonian Marcellus Formation and possibly the Ordovician Martinsburg Formation in Pennsylvania. High radon values are locally present in areas underlain by these formations.
- Areas of soil or bedrock that have normal uranium content but properties that promote high radon levels in houses: This group is not completely understood at present. Relatively high soil permeability can lead to high radon concentrations; the clearest examples of this scenario are houses built on glacial eskers. Limestone-dolomite soils also appear to be predisposed for high radon levels in houses, perhaps because of the presence of deep clay-rich residuum where radium is concentrated by weathering on iron oxide or clay surfaces, coupled with moderate porosity and permeability. The importance of carbonate soils is indicated by exceedance of 4 pCi/L in 93 percent of a sample of houses built on limestone-dolomite soils near State College, Centre County, and exceedance of 20 pCi/L in 21 percent of that sample of houses, even though uranium levels in the underlying bedrock are all within the normal radon range of 0.5 to 5 ppm (PEMA 2019).

According to the Pennsylvania State HMP, radon tends to exist as a gas or as a dissolved atomic component in groundwater. The most problematic source of radon in houses in Pennsylvania soil gas that flows into the house. Even a small rate of soil gas inflow can lead to elevated radon concentrations in a house. The State HMP indicates that current data on abundance and distribution of radon in Pennsylvania homes are incomplete and biased, but the plan identifies general patterns (PEMA 2019).

Several areas of Delaware County have had high radon level test results. The areas and test results are shown in more detail in Table 4.3.15-1.

Range of Magnitude

Exposure to radon is the second leading cause of lung cancer after smoking. Radon exposure is the number one cause of lung cancer among non-smokers. As stated earlier, radon is responsible for more than 20,000 lung cancer deaths every year. Lung cancer is the only known effect on human health from exposure to radon in air and, thus far, no evidence indicates that children are at greater risk of lung cancer than adults (EPA 2016). The main hazard is actually from the radon-daughter products (polonium-218, lead-214, bismuth-214), which may become attached to lung tissue and induce lung cancer by their radioactive decay (EPA 2022). Table 4.3.15-1 lists (1) cancer risks from exposure to radon at various levels for smokers and non-smokers, (2) lung cancer risks from radon exposure compared to cancer risks from other hazards for smokers and non-smokers, and (3) action thresholds.

Table 4.3.15-1. Radon Risk for Smokers and Non-Smokers

Radon Level (picoCuries per liter [pCi/L])	Cancer Rate per 1,000 People with Lifetime Exposure	Comparative Cancer Risk of Radon Exposure	ACTION THRESHOLD
SMOKERS			
20	About 260 people could get lung cancer	250 times the risk of drowning	Fix structure
10	About 150 people could get lung cancer	200 times the risk of dying in a home fire	
8	About 120 people could get lung cancer	30 times the risk of dying in a fall	
4	About 62 people could get lung cancer	5 times the risk of dying in a car crash	
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 20 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2 pCi/L is difficult
0.4	About 3 people could get lung cancer	(Average outdoor radon level)	
NON-SMOKERS			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix structure
10	About 18 people could get lung cancer	20 times the risk of dying in a home fire	
8	About 15 people could get lung cancer	4 times the risk of dying in a fall	
4	About 7 people could get lung cancer	The risk of dying in a car crash	
2	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 2 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	-	(Average outdoor radon level)	

Source: EPA 2022
Note: Risk may be lower for former smokers.
** Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).*
*** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.*

According to EPA, the average radon concentration in the indoor air in homes in the United States is about 1.3 pCi/L. EPA recommends that homes be repaired if the radon level is 4 pCi/L or more. However, EPA also recommends that Americans consider fixing their home if radon levels are between 2 and 4 pCi/L because there

is no known safe level of exposure to radon. As listed in Table 4.3.15-1, a smoker exposed to radon has a much higher risk of lung cancer.

The worst-case scenario for radon exposure would be caused by a large area of tightly sealed homes inducing high levels of exposure to residents over a prolonged period of time, without awareness of this by the residents. This worst-case scenario exposure then could lead to a large number of people contracting cancer attributed to the radon exposure (PEMA 2019). The most likely scenario is a single household exposed to a very low concentration of radon, with no adverse health effects.

Past Occurrence

Current data on abundance and distribution of radon as it affects individual houses in the Commonwealth of Pennsylvania in general is considered incomplete and potentially biased (PEMA 2019). Westmoreland County is not an exception. The EPA has estimated that the national average indoor radon concentration is 1.3 pCi/L and the level for action is 4.0 pCi/L; however they have estimated that the average indoor concentration in Pennsylvania basements is about 7.1 pCi/L and 3.6 pCi/L on the first floor (PADEP 2022).

PADEP Bureau of Radiation Protection (Bureau) provides homeowners with information on how to test for radon in their houses. If results of a test reported to the Bureau exceed 4 pCi/L, the Bureau works to help the homeowner repair the house so as to mitigate high radon levels. The total number of tests reported to the Bureau since 1990 and test results by zip code are accessible on the Bureau's website. However, to best approximate the average for an area, this information is provided only if more than 30 tests within that area were reported (PADEP 2022).

The Bureau collected the sufficient number of radon results from residences in 40 zip codes within Delaware County to allow them to report the findings (summarized in Table 4.3.15-2). PADEP does not publish results unless a zip code has had at least 30 tests conducted. PADEP only publishes the average and maximum results for a zip code; it does not offer a range of results for a zip code, municipality, or region. The PADEP Radon Division recommends that ***all*** homeowners test for radon, regardless of test results within their respective zip codes. Despite a low average text result within a zip code, many homes in that zip code may have elevated radon levels.

Table 4.3.15-2. Radon Level Tests and Results by Zip Codes in Delaware County

ZIP Code	Location	Area in Home	Number of Tests	Maximum Result (pCi/L)	Average Result (pCi/L)
19003	Ardmore	Basement	2566	49.4	2.6
		First Floor	700	8.4	1.3
19008	Broomall	Basement	3149	75.5	3.4
		First Floor	684	28.0	2.0
19010	Bryn Mawr	Basement	4089	199.0	3.3
		First Floor	1090	20.2	1.7
19013	Chester	Basement	703	25.1	1.8
		First Floor	101	5.3	1.0
19014	Aston	Basement	2357	40.9	2.4
		First Floor	352	8.1	1.2
19015	Brookhaven	Basement	1025	23.3	1.6
		First Floor	219	4.0	1.0
19018	Clifton Heights	Basement	1808	32.6	2.4
		First Floor	371	15.0	1.4
19022	Crum Lynne	Basement	102	5.4	1.3
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data
19023	Darby	Basement	750	12.6	1.6
		First Floor	178	6.5	1.0
19026	Drexel Hill	Basement	4473	87.0	2.8
		First Floor	968	31.5	1.7

ZIP Code	Location	Area in Home	Number of Tests	Maximum Result (pCi/L)	Average Result (pCi/L)
19029	Essington	Basement	115	8.0	1.4
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data
19032	Folcroft	Basement	344	10.9	1.4
		First Floor	48	5.6	1.0
19033	Folsom	Basement	579	36.9	2.4
		First Floor	88	3.9	1.1
19036	Glenolden	Basement	777	29.7	1.8
		First Floor	159	6.6	1.1
19041	Haverford	Basement	1369	96.2	4.0
		First Floor	343	39.0	1.9
19043	Holmes	Basement	155	8.5	1.5
		First Floor	46	3.2	1.0
19050	Lansdowne	Basement	3059	57.0	2.9
		First Floor	827	47.7	1.5
19060	Garnet Valley	Basement	348	34.1	2.4
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data
19061	Marcus Hook	Basement	2030	148.1	2.7
		First Floor	309	21.1	1.5
19063	Media	Basement	6810	284.8	4.3
		First Floor	1181	66.4	2.4
19064	Springfield	Basement	4290	111.0	3.8
		First Floor	770	28.6	2.2
19070	Morton	Basement	614	48.8	3.0
		First Floor	106	17.7	2.3
19073	Newtown Square	Basement	3903	482.4	3.1
		First Floor	837	21.0	1.8
19074	Norwood	Basement	315	12.2	1.9
		First Floor	76	6.7	1.2
19076	Prospect Park	Basement	363	24.0	2.1
		First Floor	86	3.8	1.0
19078	Ridley Park	Basement	881	18.9	2.2
		First Floor	177	7.0	1.1
19079	Sharon Hill	Basement	378	105.7	2.3
		First Floor	82	3.6	0.9
19081	Swarthmore	Basement	1384	35.3	2.8
		First Floor	290	11.9	1.5
19082	Upper Darby	Basement	2478	72.5	2.4
		First Floor	627	49.8	1.2
19083	Havertown	Basement	6833	142.1	3.1
		First Floor	1271	155.0	1.8
19085	Villanova	Basement	1678	29.1	2.4
		First Floor	456	10.5	1.4
19086	Wallingford	Basement	2373	32.5	3.0
		First Floor	495	18.1	1.6
19087	Wayne	Basement	10783	372.3	5.8
		First Floor	2537	164.1	3.6
19094	Woodlyn	Basement	314	15.0	2.1
		First Floor	51	8.4	1.1
19113	Philadelphia	Basement	Insufficient Data	Insufficient Data	Insufficient Data
		First Floor	NA	NA	NA
19153	Philadelphia	Basement	203	3.8	0.9
		First Floor	56	1.6	0.6
19317	Chadds Ford	Basement	2383	60.4	2.5
		First Floor	404	25.0	1.5
19319	Cheyney	Basement	40	14.6	4.1
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data

ZIP Code	Location	Area in Home	Number of Tests	Maximum Result (pCi/L)	Average Result (pCi/L)
19342	Glen Mills	Basement	2525	99.8	2.7
		First Floor	463	43.6	1.7
19373	Thorton	Basement	531	42.9	3.5
		First Floor	104	8.8	1.8

Source: PADEP 2021

Probability of Future Occurrence

Radon exposure is inevitable given present soil, geologic, and geomorphic factors across Pennsylvania. Residents who live in housing developments within areas where radon levels previously have been found to be significantly high will continue to be more susceptible to exposure. However, new incidents of concentrated exposure may occur with future development or deterioration of older structures. Exposure can be limited by conducting proper testing within both existing and future developments and implementing appropriate mitigation measures (PEMA 2019).

As part of a 2014 initiative to raise awareness, EPA implemented the "Test, Fix, Save a Life" radon action campaign to highlight radon testing and mitigation as a simple and affordable step to significantly reduce the risk of lung cancer. Through this initiative, the "Test, Fix, Save a Life" mantra specifies activities and facts for the public regarding radon poisoning, as indicated below:

- Test: All homes with or without basements should be tested for radon. Affordable, do-it-yourself radon test kits are available online and at home improvement and hardware stores, or you can hire a qualified radon tester.
- Fix: EPA recommends taking corrective action to fix radon levels at or above 4 pCi/L and contacting a qualified radon-reduction contractor. In most cases, a system with a vent pipe and fan is used to reduce radon. Addressing high radon levels often costs the same as other minor home repairs.
- Save a Life: More than 20,000 Americans die from radon-related lung cancer each year. By decreasing elevated levels in the home, residents can help prevent lung cancer while creating a healthier home (EPA 2022).

Future occurrences of radon exposure can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (discussed in Section 4.4).

Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. This section evaluates and estimates the potential impact of the radon exposure hazard on Delaware County in the following sections:

- Impacts on (1) life, health, and safety; (2) general building stock and critical facilities; (3) the economy; (4) the environment; (5) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will increase understanding of this hazard over time

Impact on Life, Health, and Safety

For the purposes of this plan, the entire population of the county is assumed to be at risk of radon exposure. Radon is responsible for more than 20,000 of lung cancer deaths every year. Lung cancer is the only known effect on human health from exposure to radon in air, and thus far, no evidence indicates that children are at greater risk of lung cancer than adults (EPA 2016).

As shown in Table 4.3.15-2 above, houses in a number of Delaware County municipalities or cities could be susceptible to high levels of radon. The average pCi/L testing result in the Haverford and Wayne zip codes was

over 4 and a number of other zip codes had testing results over 3. Furthermore, the maximum result in each zip code, with the exception of one (Philadelphia), was well above 4 pCi/L. Excess human cancer risk posed by radon exposure at this elevated level is identified in Table 4.3.15-2.

Impact on General Building Stock and Critical Facilities

While the entire general building stock and critical facility inventory in Delaware County is exposed to radon, radon does not result in direct damage to structures and facilities. Rather, engineering methods installed to mitigate human exposure to radon in structures results in economic costs described in the following subsection.

Impact on the Economy

EPA has concluded that an average radon mitigation system costs $1,200. EPA also states that current state surveys indicate that one home in five has elevated radon levels. Based on this information, radon loss estimation is factored by assuming that 20 percent of the residential buildings within high potential (Level 1) counties have elevated radon levels, and each would require a radon mitigation system installed at the EPA estimated average of $1,200 (EPA, 2016). Therefore, estimated radon mitigation costs for residential structures in Delaware County could exceed $46 million. However, more than 60 of households in the county have measured average radon levels exceeding 4 pCi/L.

Impact on the Environment

Radon exposure exerts minimal environmental impacts. Because of the relatively short half-life of radon, it tends to affect only living and breathing organisms such as humans or pets that are routinely within contained areas (basement or house) near the source from which the gas is released (PEMA 2019).

Effect of Climate Change on Vulnerability

According to the EPA's *Climate Change and Indoor Air* Quality contractor report, the primary factors that influence radon entry into a home include: radon content of the soil; pressure differential between the interior of the home and the soil; the air exchange rate for the home; the moisture content surrounding the home; and the presence and size of entry pathways. These factors can be affected by climate change to different degrees. Climate change may also affect the depositional environment within the home resulting in changes to the delivered dose by radon decay products. Additionally, the EPA stated that the relative concentration of radon to its decay products, and the ability to deliver dose, is impacted by numerous factors including building ventilation rate, decay product attachment to aerosols, and particle deposition rate on surface. All these factors could be impacted by housing as well as behavioral changes driven directly or indirectly by climate change. For example, the increased use of ceiling fans could increase deposition of radon decay products and reduce the delivered radon-related doses to the lungs (EPA 2010).

Future Growth and Development

Because the entirety of Delaware County has been determined at risk for the radon exposure hazard, any new construction development will be exposed to this risk. Measures to reduce human exposure to radon in structures are readily available and can be incorporated during new construction at significantly lower cost and greater effectiveness than retrofitting existing structures to implement these measures.

Additional Data and Next Steps

The assessment above identifies human health and economic losses associated with this hazard of concern; however, these estimates are based on national epidemiological statistics and generalized estimates of costs to mitigate structures in Delaware County. Because specific structural conditions affect human exposure to radon, direct radon measurements within facilities are necessary to properly assess the level of health risk and indicate the need for mitigation measures. Furthermore, EPA recommends that new construction projects consider radon exposure risk and installation of mitigation measures as appropriate.

4.3.16 Subsidence and Sinkholes

Subsidence is the sinking of ground due to underground movement. It is most often caused by the removal, oil, natural gas, or mineral resources out of the ground by pumping, fracking, or mining activities. Subsidence can also be caused by earthquakes, soil compaction, erosion, and sinkholes (NOAA 2022). In Pennsylvania, mine subsidence is a concern due to the number of underground coal and clay mines. Mind subsidence is the movement of the ground surface as a result of the collapse of the roof, floor, or pillars of underground mines (DCNR, Mind Subsidence, Loss & Coverage 2022).

A sinkhole is a subsidence feature that results from the downward movement of surface material resulting in a hole or cavity (DCNR, Sinkholes 2022). Sinkholes are generally found in areas underlain by carbonate bedrock (such as limestone and dolomite), found in large areas of central and eastern Pennsylvania. They occur naturally due to the physical and chemical weathering of the bedrock. Water passing through naturally occurring fractures and bedding planes dissolve the bedrock leaving voids below the surface. Eventually, overburden on top of the voids collapse, leaving surface depressions resulting in karst topography. Characteristics structures associated with karst topography include sinkholes, linear depressions, and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features (USGS 2022).

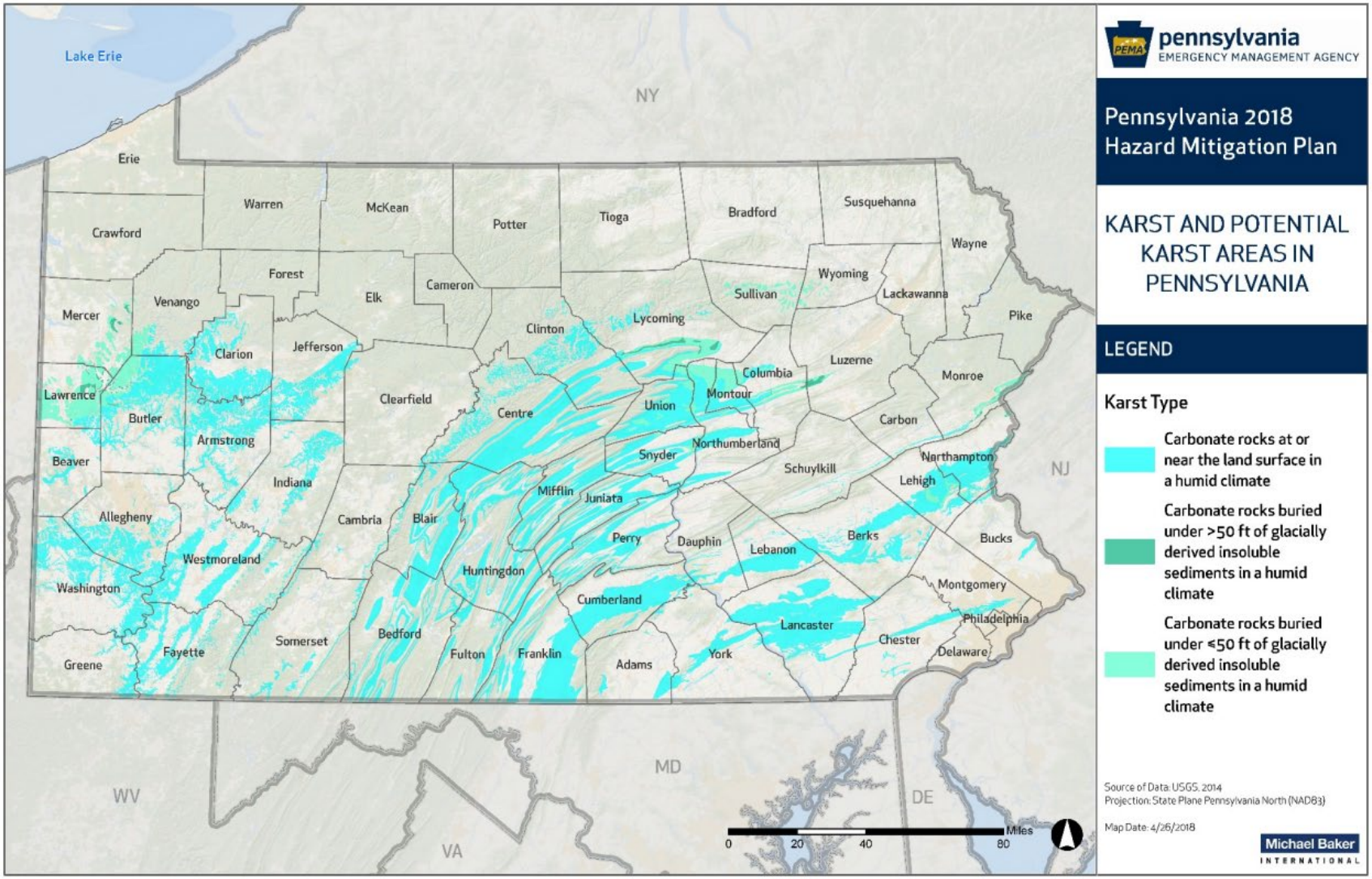
As stated in the 2019 Pennsylvania State Hazard Mitigation Plan, there are two common causes of subsidence in the State: 1) dissolution of carbonate rock such as limestone or dolomite and 2) mining activity. In the first case, water passing through naturally occurring fractures and bedding planes dissolves bedrock leaving voids below the surface. Eventually, overburden on top of the voids collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material (PEMA 2019).

The following sections discuss the location and extent, range of magnitude, previous occurrence, future occurrence, and vulnerability assessment associated with the subsidence/sinkhole hazard for Delaware County.

Location and Extent

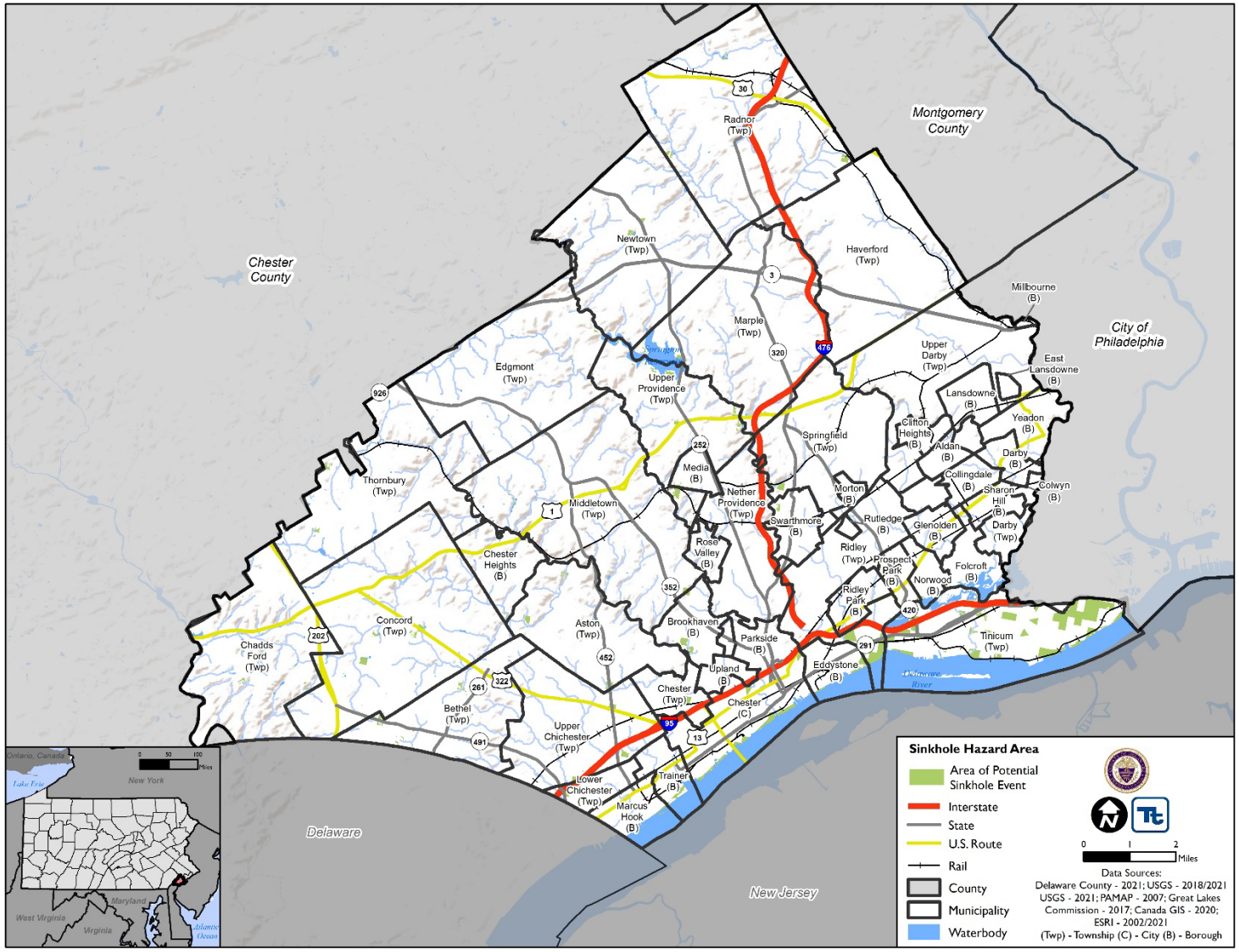
According to Pennsylvania Department of Conservation and Natural Resources (DCNR), Delaware County does not have the carbonate geology that results in sinkholes. This is displayed in Figure 4.3.16-1. Figure 4.3.16-2 displays the sinkhole hazard areas, as defined by the USGS, for Delaware County. This maps shows where sinkholes are a problem or may be a problem in the future (USGS 2019).

Figure 4.3.16-1. Areas in Pennsylvania with Karst or Potential for Karst Development



Source: (PEMA 2019)

Figure 4.3.16-2. Sinkhole Hazard Area



Range of Magnitude

Subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result (Delaware County Planning Department 2016).

A worst case scenario for subsidence and sinkholes would be if a sinkhole occurred under a critical facility such as a hospital. Not only could structural damage occur to the building, but there could be injuries to people as well. In addition, part of the facility would have to be closed in order to repair the structural damage and this would reduce the hospital's capacity and ability to treat people with other illnesses and injuries (Delaware County Planning Department 2016).

Past Occurrence

According to the 2019 Pennsylvania State HMP and DCNR Pennsylvania Geologic Data Exploration mapper, there have been no recorded sinkholes in Delaware County (PEMA 2019) (PA DCNR 2022). However, there have been unofficial reports of sinkholes at several locations in Delaware County, which are believed to be caused by flooding, poor fill, and construction over streams (Delaware County Planning Department 2016). This includes:

- April 26, 2019 - A sinkhole was discovered along the route of the Mariner East 2 pipeline along Baltimore Pike near the state police barracks in Middletown Township, according to county and township officials (Rettew 2021).
- November 19, 2019 - A sinkhole opened up adjacent to Sleighton Park, a major recreational facility in Delaware County. Sunoco has been doing horizontal directional drilling there, and that work has triggered at least three other sinkholes along the pipeline right-of-way at the park in recent weeks (Dragonpipe Diary 2019).

Probability of Future Occurrence

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of subsidence and sinkhole events for Delaware County. Information from NOAA-NCEI storm events database, 2019 Pennsylvania State HMP, and the PaGEODE interactive map were used to identify the number of events between 1950 and 2021.

Table 4.3.16-1. Probability of Future Sinkhole and Subsidence Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Percent Chance of Occurrence in Any Given Year
Subsidence and Sinkholes	2	2.8%

Sources: NOAA-NCEI, 2019 State HMP, Rettew 2021; Dragonpipe Diary 2019

Based on the lack of karst geology, but presence of filled ground and utilities, the future occurrence of subsidence and sinkholes can be considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the identified hazard area. The following section includes an evaluation and estimation of potential sinkhole and subsidence impacts on the county, including:

- Data and methodology used for the evaluation
- Impacts on life, health, and safety; general building stock; critical facilities; economy; environment; and future growth and development
- Effect of climate change on vulnerability
- Further data collections that will increase understanding of this hazard over time

Impact on Life, Health, and Safety

Impacts of land subsidence depends on several factors, including the scale and time of land collapse. Sinkhole events caused by karst terrain or abandoned mines are typically isolated and impact the population within the immediate area of the incident. However, there are no abandoned mines or karst terrain in Delaware County. In addition to causing damages to residential buildings and displacing residents, sinkholes can block off or damage major roadways and inhibit travel for emergency responders or populations trying to evacuate the area. Approximately 0.4 percent of Delaware County's population is located in a subsidence hazard area. Table 4.3.16-2 below summarizes the risk to the population located in the subsidence hazard area.

Table 4.3.16-2. Estimated Population Located in the Subsidence Hazard Area

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Subsidence Hazard Area	
		Number of People	Percent of Total
Aldan (B)	85,681	0	0.0%
Aston (Twp)	50,431	49	0.1%
Bethel (Twp)	33,228	108	0.3%
Brookhaven (B)	32,605	491	1.5%
Chadds Ford (Twp)	31,053	16	0.1%
Chester City (C)	25,070	198	0.8%
Chester (Twp)	24,214	11	0.0%
Chester Heights (B)	18,295	8	0.0%
Clifton Heights (B)	16,898	0	0.0%
Collingdale (B)	16,791	0	0.0%
Colwyn (B)	16,373	0	0.0%
Concord (Twp)	15,002	110	0.7%
Darby (B)	14,525	0	0.0%
Darby (Twp)	12,054	0	0.0%
East Lansdowne (B)	11,107	0	0.0%
Eddystone (B)	10,852	3	0.0%
Edgmont (Twp)	10,715	13	0.1%
Folcroft (B)	9,574	12	0.1%
Glenolden (B)	9,219	0	0.0%
Haverford (Twp)	8,908	5	0.1%
Lansdowne (B)	8,300	0	0.0%
Lower Chichester (Twp)	7,223	6	0.1%
Marcus Hook (B)	7,186	0	0.0%
Marple (Twp)	6,904	27	0.4%
Media (B)	6,863	140	2.0%
Middletown (Twp)	6,792	35	0.5%
Millbourne (B)	6,543	0	0.0%

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Subsidence Hazard Area	
		Number of People	Percent of Total
Morton (B)	6,427	0	0.0%
Nether Providence (Twp)	6,014	2	0.0%
Newtown (Twp)	5,943	28	0.5%
Norwood (B)	5,901	14	0.2%
Parkside (B)	4,283	0	0.0%
Prospect Park (B)	4,244	107	2.5%
Radnor (Twp)	4,080	132	3.2%
Ridley (Twp)	3,983	0	0.0%
Ridley Park (B)	3,972	12	0.3%
Rose Valley (B)	3,425	0	0.0%
Rutledge (B)	3,068	0	0.0%
Sharon Hill (B)	2,897	0	0.0%
Springfield (Twp)	2,778	3	0.1%
Swarthmore (B)	2,714	7	0.3%
Thornbury (Twp)	2,474	22	0.9%
Tinicum (Twp)	2,459	190	7.7%
Trainer (B)	2,454	0	0.0%
Upland (B)	2,321	0	0.0%
Upper Chichester (Twp)	1,976	57	2.9%
Upper Darby (Twp)	1,212	0	0.0%
Upper Providence (Twp)	1,017	491	48.2%
Yeadon (B)	782	0	0.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**2,300**	**0.4%**

Source: Census 2010/2020
Notes: Census 2020 decennial population data was used to update the Census 2010 daysmetric block population estimates. Census 2010 dasymetric blocks were used to estimate the areas where development exists in each municipality. These boundaries may over or underestimate the density location of population within each municipality, impacting the exposure results.
% - Percent; B = Borough; C = City; Twp. = Township

Impact on General Building Stock

Standard loss estimation models do not exist for the subsidence/sinkhole hazard. In general, the built environment located on limestone (carbonate) and abandoned mines is exposed to this hazard. Approximately 0.4 percent of Delaware County's population is located in a subsidence hazard area. Table 4.3.16-3 below summarizes the risk to the building stock located in the subsidence hazard area.

Table 4.3.16-3. Estimated Building Stock Located in the Subsidence Hazard Area

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located in the Subsidence Hazard Area	
		Number of Buildings	Percent of Total
Aldan (B)	1,673	0	0.0%
Aston (Twp)	6,202	24	0.4%
Bethel (Twp)	3,164	36	1.1%
Brookhaven (B)	3,185	169	5.3%
Chadds Ford (Twp)	1,402	6	0.4%
Chester City (C)	11,646	84	0.7%
Chester (Twp)	1,596	5	0.3%
Chester Heights (B)	1,022	6	0.5%
Clifton Heights (B)	2,324	0	0.0%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located in the Subsidence Hazard Area	
		Number of Buildings	Percent of Total
Collingdale (B)	3,130	0	0.0%
Colwyn (B)	839	0	0.0%
Concord (Twp)	5,400	26	0.5%
Darby (B)	3,569	0	0.0%
Darby (Twp)	3,763	0	0.0%
East Lansdowne (B)	906	0	0.0%
Eddystone (B)	876	3	0.3%
Edgmont (Twp)	1,579	5	0.3%
Folcroft (B)	2,500	5	0.2%
Glenolden (B)	2,453	0	0.0%
Haverford (Twp)	17,876	2	0.0%
Lansdowne (B)	3,838	0	0.0%
Lower Chichester (Twp)	1,266	2	0.2%
Marcus Hook (B)	831	0	0.0%
Marple (Twp)	8,652	10	0.1%
Media (B)	2,076	31	1.5%
Middletown (Twp)	5,161	13	0.3%
Millbourne (B)	243	0	0.0%
Morton (B)	927	0	0.0%
Nether Providence (Twp)	5,153	1	0.0%
Newtown (Twp)	4,691	9	0.2%
Norwood (B)	2,092	6	0.3%
Parkside (B)	851	0	0.0%
Prospect Park (B)	2,086	39	1.9%
Radnor (Twp)	8,992	26	0.3%
Ridley (Twp)	11,070	3	0.0%
Ridley Park (B)	2,403	4	0.2%
Rose Valley (B)	402	0	0.0%
Rutledge (B)	287	0	0.0%
Sharon Hill (B)	2,024	0	0.0%
Springfield (Twp)	9,233	8	0.1%
Swarthmore (B)	1,721	4	0.2%
Thornbury (Twp)	2,361	7	0.3%
Tinicum (Twp)	1,917	138	7.2%
Trainer (B)	678	0	0.0%
Upland (B)	1,297	0	0.0%
Upper Chichester (Twp)	6,005	25	0.4%
Upper Darby (Twp)	27,681	0	0.0%
Upper Providence (Twp)	3,636	146	4.0%
Yeadon (B)	3,741	0	0.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A
Delaware County (Total)	**196,420**	**844**	**0.4%**

Source: Census 2010

Notes: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 data may over or underestimate the number of buildings found in each municipality.

% - Percent; B = Borough; C = City; Twp. = Township

Impact on Critical Facilities

There are 15 critical facilities located in a subsidence hazard area (Table 4.3.16-4). Furthermore, Table 4.3.16-5 show the number of lifelines exposed to the subsidence hazard area in the county. Overall, 13 of the critical facilities in the subsidence hazard area are considered lifelines.

Table 4.3.16-4. Number of Critical Facilities and Lifeline Facilities Located in the Subsidence Hazard Area

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Subsidence Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	1	2.6%	1	2.7%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	1	6.3%	1	6.7%
Chadds Ford (Twp)	17	16	0	0.0%	0	0.0%
Chester City (C)	88	83	2	2.3%	2	2.4%
Chester (Twp)	21	20	1	4.8%	0	0.0%
Chester Heights (B)	5	5	1	20.0%	1	20.0%
Clifton Heights (B)	14	12	0	0.0%	0	0.0%
Collingdale (B)	16	13	0	0.0%	0	0.0%
Colwyn (B)	7	6	0	0.0%	0	0.0%
Concord (Twp)	49	45	0	0.0%	0	0.0%
Darby (B)	31	27	0	0.0%	0	0.0%
Darby (Twp)	22	21	0	0.0%	0	0.0%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	0	0.0%	0	0.0%
Edgmont (Twp)	16	16	0	0.0%	0	0.0%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	0	0.0%	0	0.0%
Haverford (Twp)	87	83	0	0.0%	0	0.0%
Lansdowne (B)	26	24	0	0.0%	0	0.0%
Lower Chichester (Twp)	13	12	0	0.0%	0	0.0%
Marcus Hook (B)	21	20	0	0.0%	0	0.0%
Marple (Twp)	64	57	0	0.0%	0	0.0%
Media (B)	26	21	0	0.0%	0	0.0%
Middletown (Twp)	62	59	0	0.0%	0	0.0%
Millbourne (B)	4	4	0	0.0%	0	0.0%
Morton (B)	6	5	0	0.0%	0	0.0%
Nether Providence (Twp)	34	33	0	0.0%	0	0.0%
Newtown (Twp)	44	39	0	0.0%	0	0.0%
Norwood (B)	15	13	0	0.0%	0	0.0%
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	1	5.0%	1	5.3%
Radnor (Twp)	78	74	0	0.0%	0	0.0%
Ridley (Twp)	66	62	4	6.1%	4	6.5%
Ridley Park (B)	23	22	0	0.0%	0	0.0%
Rose Valley (B)	4	4	0	0.0%	0	0.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Subsidence Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Sharon Hill (B)	18	16	0	0.0%	0	0.0%
Springfield (Twp)	63	61	0	0.0%	0	0.0%
Swarthmore (B)	16	13	0	0.0%	0	0.0%
Thornbury (Twp)	22	21	0	0.0%	0	0.0%
Tinicum (Twp)	24	23	3	12.5%	3	13.0%
Trainer (B)	13	13	0	0.0%	0	0.0%
Upland (B)	14	14	0	0.0%	0	0.0%
Upper Chichester (Twp)	31	28	0	0.0%	0	0.0%
Upper Darby (Twp)	153	138	0	0.0%	0	0.0%
Upper Providence (Twp)	27	25	1	3.7%	0	0.0%
Yeadon (B)	23	22	0	0.0%	0	0.0%
Brandywine Conservancy and Museum of Art Special District	0	0	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**15**	**1.0%**	**13**	**1.0%**

Source: Delaware County 2021/2022; HIFLD 2018/2022; USGS 2018/2021; Tetra Tech 2022

Table 4.3.16-5. Number of Lifeline Facilities Located in the Subsidence Hazard Area

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Subsidence Hazard Area
Communications	10	0
Energy	55	1
Food, Water, Shelter	45	1
Hazardous Materials	160	8
Health and Medical	50	0
Safety and Security	968	1
Transportation	42	2
Delaware County (Total)	**1,330**	**13**

Source: Delaware County 2021/2022; HIFLD 2018/2022; USGS 2018/2021; Tetra Tech 2022

Impact on the Economy

Since there have no previous occurrences of sinkholes in Delaware County, there has been no economic impact of this hazard. However, sinkholes have caused damages to buildings and roadways in other parts of the State, therefore, the possibility of incurring future costs remains. Subsidence and sinkholes can severely impact roads and infrastructure. While there is no clear way to track subsidence costs in Pennsylvania, USGS estimates that sinkhole damages cost $300 million each year. However, because there is no national tracking system for sinkholes, the total cost is likely less (USGS n.d.).

Impact on the Environment

The presence of sinkholes can result in increased potential for groundwater contamination. Due to their porous nature, sinkholes are sometimes used as instruments for enhancing groundwater recharge. However, if hazardous materials are spilled at a recharge point, groundwater can quickly be contaminated due to the lack of soil substrate which normally would slow migrating contaminants. Vegetation is usually damaged during abrupt subsidence events. However, re-growth takes place over time. Land subsidence can also result in more frequent and expansive flooding and changes in river canal and drain flow systems.

Future Growth and Development

An increase in development and population can increase likelihood of a sinkhole incident. Future migration to larger jurisdictions may also increase the likelihood of an incident.

Effect of Climate Change on Vulnerability

Climate is defined not simply as average temperature and precipitation but also by the type, frequency, and intensity of weather events. Both globally and at the local level, climate change has the potential to alter the prevalence and severity of weather extremes (EPA 2022).

Climate change factors such as an extended growing season, higher temperatures, and the possibility of more intense and less frequent summer rainfall may lead to changes in water resource availability. As stated earlier in this profile, changes to the water balance of an area (including over-withdrawal of groundwater, diverting surface water from a large area and concentrating it in a single point, artificially creating ponds of surface water, and drilling new water wells) will cause sinkholes. These actions can also serve to accelerate the natural processes of bedrock degradation, which can have a direct impact on sinkhole creation. The potential effects of climate change on Delaware County's vulnerability to subsidence/sinkhole events will need to be considered as more information develops regarding regional climate change impacts.

Additional Data and Next Steps

Delaware County does not have an official record of a significant subsistence-based disaster. However, there have been unofficial reports of sinkholes at several locations in the County, which are believed to be caused by flooding, poor fill, and construction over streams. More data is needed to identify these past events and possible locations to properly mitigate this hazard.

4.3.17 Terrorism

Terrorism is defined in the Code of Federal Regulations (CFR) as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (Title 28 CFR §0.85 2015). Acts of terrorism include threats of terrorism, assassinations, kidnappings, hijackings, bomb scares and bombings, cyber-attacks (computer-based attacks), and use of chemical, biological, nuclear, and radiological weapons (Federal Emergency Management Agency [FEMA] 2009).

- Agroterrorism is the intentional use of plant or animal pathogens to cause devastating disease in the agricultural sector. Acts of agroterrorism share similarities with bioterrorism, but the aim of agroterrorism is to specifically target crops and livestock to cause a significant economic impact or to damage food supplies.
- Armed attacks include raids and ambushes. An assassination is the killing of a selected victim, usually by bombings or small arms. A drive-by shooting is a common technique employed by unsophisticated or loosely organized terrorist groups. Historically, terrorists have assassinated specific individuals for psychological effect.
- Incendiary devices are inexpensive and easy to hide. Arson and fire-bombings are easily conducted by terrorist groups that may not be as well organized, equipped, or trained as a major terrorist organization. An act of arson or firebombing against a utility, hotel, government building, or industrial center portrays an image to the public that the ruling government is incapable of maintaining order.
- Bioterrorism refers to intentional release of toxic biological agents to harm and terrorize civilians, in the name of a political or other cause. The U.S. Centers for Disease Control and Prevention (CDC) has classified the viruses, bacteria, and toxins that could be used in an attack. Category A Biological Diseases are most likely to cause the greatest harm. They include:
    - Anthrax (*Bacillus anthracis*)
    - Botulism (*Clostridium botulinum toxin*)
    - Plague (*Yersinia pestis*)
    - Smallpox (*Variola major*)
    - Tularemia (*Francisella tularensis*)
    - Hemorrhagic fever caused by Ebola virus or Marburg virus
- Bombings are the most common type of terrorist act. Typically, improvised explosive devices (IED) are inexpensive and easy to make. Bombs can range from smaller packages to vehicle-borne bombs that are capable of catastrophic damage. Modern devices are smaller and harder to detect and have destructive capabilities. Terrorists responsible for this bombing can use materials readily available to the average consumer to construct a bomb (DHS 2022).
- Cyber terrorism are unlawful attacks and threats of attack against computers, networks, and the information stored within those systems with the intention to cause harm or further social, ideological, religious, political, or similar objectives (Farleigh Dickinson University 2022).
- Hijacking is seizure by force of a surface vehicle, its passengers, or its cargo. Skyjacking is the overtaking of an aircraft, which creates a mobile, hostage barricade situation. A skyjacked aircraft has the potential to provide terrorists with hostages from many nations and draws heavy media attention. Skyjacking also provides mobility for the terrorists to relocate the aircraft to a country that supports their cause and provides them with a human shield, making retaliation difficult.
- Intentional hazardous materials release is intentional leak, spillage, discharge, or disposal of hazardous materials or substances (such as explosives, toxic chemicals, and radioactive materials) (DHS 2022). This could include the intentional release of chemicals commonly used in industry, or the release of chemical agents as a weapon. This might involve attacking hazardous material storage facilities or

attacking storage containers in transit. Intentional hazardous materials releases can have a significant impact on human health and the environment.

- Terrorists use kidnapping and hostage-taking to establish a bargaining position and to elicit publicity. Kidnapping is one of the most difficult acts for a terrorist group to accomplish, but a successful kidnapping can gain terrorists money, release of jailed comrades, and publicity for an extended period. Hostage-taking involves seizure of a facility or location and taking hostages present in that facility. Unlike a kidnapping, hostage-taking provokes a confrontation with authorities. It forces authorities to make dramatic decisions or to comply with the terrorist's demands. It is overt and designed to attract and hold media attention. The intended target is the audience affected by the hostage's confinement, not the hostage.
- Nuclear and radiological terrorism refers to a number of different ways nuclear materials might be exploited as a terrorist tactic. These methods include attacking nuclear facilities, purchasing nuclear weapons, or building nuclear weapons or otherwise finding ways to disperse radioactive materials (FEMA 2020).

This section provides a profile and vulnerability assessment of the terrorism hazard for the Delaware County Hazard Mitigation Plan (HMP) update.

Location and Extent

Terrorism can occur anywhere and at any time within Delaware County depending on an individual's or organization's agenda. Any facility or structure is vulnerable to a terrorist attack, as terrorists have historically sent chemical or biological agents through the mail. High-risk targets include local, county, state, or federal government facilities; major venues and gathering places; sites with historical, cultural, or other significance; and critical infrastructure. Damage to or disruption of operations at government facilities could profoundly impact Delaware County's population, even if the terrorism event is relatively small scale.

An important consideration in evaluating terrorism hazards is the existence of facilities, landmarks, or other buildings of international, national, or regional importance. While Delaware County has many notable landmarks from a local historical perspective, no sites within the county are considered significant landmarks in terms of national or international importance. Nonetheless, terrorism can take many forms, and terrorists have a wide range of personal, political, or cultural agendas. Therefore, no location within Delaware County is immune from being a potential terrorist target.

Although Delaware County does not have a large number of facilities that could be considered nationally important targets, it does have critical infrastructure that, if attacked, could have significant effects at the local or regional level. Critical infrastructure can include financial center, government buildings, media outlets, transportation authorities, power/utilities companies, and telecommunications networks. Several major transportation routes and gas transmission pipelines traverse Delaware County, making intentional hazard material releases a potential threat to citizens and the environment. This hazard is addressed in this HMP in Section 4.3.5 (Environmental Hazards Hazardous Materials Release). In addition, several bridges and railways (discussed in Section 4.3.19, Transportation Accidents) connect Delaware County to the Philadelphia metropolitan area that could be considered potential targets. A complete list of critical facilities is included in Appendix I.

Range of Magnitude

The magnitude of a terrorism event depends on the scale of the attack, population involved, equipment and other key assets affected, and duration of the incident or exposure to the agent used. The effect of a terrorism event can vary depending on the type of attack and the magnitude of the event or events. Terrorism events can cause public fear regarding the use of mass transportation or leaving their homes in the event of a biological or nuclear

attack. Communication systems, both public and private, can fail because of an overwhelming amount of usage or damage to its infrastructure. Healthcare facilities can become quickly inundated and must be prepared to triage injured patients, handle mass casualties, and conduct decontamination operations. The secondary hazards resulting from a terrorist attack depend on the size and scope of the incident. Some possible secondary hazards include widespread utility failure, health effects such as epidemics or pandemics, flooding (if a dam was destroyed), and environmental contamination (FEMA 2002).

Additionally, the threat of a nuclear attack is rare but should not be eliminated. Numerous countries in the world have nuclear warfare capability, and other nations continue to try to obtain that capability. Areas such as cities or buildings that are identified as high-risk areas or target areas would experience the direct effects of the weapon, including blast, radiation, extreme temperatures, wind, and light that is brighter than the sun. Depending on its size, a device could cause total destruction within a 4-mile radius of the blast. Any survivors within a 20-mile radius can expect residual effects including fires, flooding, loss of power, and fuel and water shortages, with addition risk of a release of other hazardous materials that may be in the area. People close to the blast would be killed. As the distance increases, more people will survive; however, people who do survive the initial blast may die due to an increase in exposure to gamma rays (FEMA 2012).

Because of its location within the Philadelphia metropolitan area, Delaware County should expect to receive some exposure from radioactive fallout should a major attack occur. Delaware County should also expect to see a surge of people from the Philadelphia metropolitan area seeking safety.

Past Occurrence

While Delaware County has never suffered an international terrorist attack, the County has experienced domestic terrorism incidents. Table 4.3.17-1 displays terrorism incidents reported by local news outlets. The most common terroristic threat was bomb threats.

Table 4.3.17-1. Terrorism Incidents/Suspicious Activity in Delaware County, 2012 to 2022

Date	Location	Type
September 11, 2012	Ridley Park	Bomb Threat at Boeing Plant
December 22, 2015	Upper Chichester	Bomb threats at Walmart, Rite Aid, and Family Dollar
December 17, 2021	Havertown	Shooting threat
February 28, 2022	Marple	Terroristic threats at an MMA tournament

Sources: NBC 2012; Phillyvoice 2015; Philadelphia CBS 2021; Patch 2022

Future Occurrence

Based on historical events, Delaware County can expect to experience several terrorist threats or suspicious activities each year; however, few will result in an actual terrorist incident. Previous events in the County have not resulted in what are considered significant terrorist attacks; the severity of a future incident cannot be predicted with a sufficient level of certainty. Based on the recent incident events, the future occurrence of terrorism in Delaware County can be considered *possible* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the area identified. The following sections discuss the potential impact of the terrorism hazard on Delaware County, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; (5) the environment; and (6) Future growth and development
- Effect of climate change on vulnerability

- Additional data and next steps

Impact on Life, Health, and Safety

For the purposes of this HMP, the entire population in Delaware County is exposed to terrorism events. However, because terrorists typically prefer to impact the greatest number of individuals in a given location, it can be inferred that individuals living in highly populated areas, or mass transit systems with a large number of commuters will have a greater exposure to terrorist incidents than those living in rural areas. Refer to Section 2 for a summary of population statistics for the County. Large-scale incidents have the potential to kill or injury many residents in the immediate vicinity of the attack, and they may also affect people located a distance from the initial event.

Impact on General Building Stock and Critical Facilities

All of the building stock in the County is exposed to the terrorism hazard. Accessibility, design, availability to roof access, driveways underneath buildings, unmonitored areas, and the proximity of structures to transportation routes, underground pipelines, and the potential for a terrorist to strike any structure randomly, makes all buildings in the County exposed and vulnerable to this hazard. Terrorist groups would be likely target structures of significant cultural or financial value (CISA 2019).

All critical facilities in the County are exposed to the terrorism hazard. Critical facilities are exposed to terrorist attacks, particularly because of the impact that an attack has on these types of facilities. Dams, power stations, and tunnels are all examples of critical infrastructure and facilities that are vulnerable. Additionally, communications systems, first-responder stations, and emergency operations centers are all vulnerable to terrorist attacks (FEMA 2002) (CISA 2019). Disrupting one of these facilities or destroying critical infrastructure would have devastating, cascading impacts on Delaware County.

Impact on the Economy

Measuring the economic impact of a terrorist attack on Delaware County is difficult. The initial impact can be measured in immediate costs such as costs related to responding to the event, and those associated with the immediate loss of productivity due to closed businesses. Should a terrorist event be of a significant magnitude, there could be ramifications in the financial markets which could affect a greater geographic extent compared to Delaware County. The fuller economic impact includes long-term costs such as terrorism mitigation activities and likely heightened anti-terrorism activities.

Impact on the Environment

The impacts of terrorism can vary in severity from nominal to catastrophic and are contingent upon the method of the attack, the volume of force applied, and the population density of the attack site. A terrorist event may cause significant loss of life for humans and animals as well as economic losses. Additionally, the impact of the attack itself may be exacerbated by the fact that human services agencies like community support programs, health and medical services, public assistance programs, and social services organizations can experience physical damage to facilities, supplies, and equipment as well as disruption of emergency communications. Ancillary effects of terrorism may also occur, such as urban fires or, in the case of a radiological device, radioactive fallout that can multiply the impact of a terrorist event (PEMA 2019).

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Delaware County (further discussed in Section 2.4 of this HMP). Any areas of growth could be potentially impacted by the terrorism hazard because Delaware County is exposed and potentially vulnerable.

Effects of Climate Change on Vulnerability

Because terrorism is a human-caused hazard, climate change is not anticipated to affect vulnerability associated with terrorism.

Additional Data and Next Steps

Any additional information regarding localized concerns and past impacts will be collected and analyzed for the HMP update. These data will be developed to support future revisions to the plan.

4.3.18 Tornado, Windstorm

This section provides a profile and vulnerability assessment of the tornado and windstorm hazard. The wind hazard includes various types of wind events, including windstorms and tornadoes, which are defined below.

A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with whirling winds that can reach 250 miles per hour (mph). Damage paths can be greater than 1 mile wide and 50 miles long. Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm air. Tornadoes typically move at speeds between 30 and 125 mph and can generate combined wind speeds (forward motion and speed of the whirling winds) exceeding 300 mph. The lifespan of a tornado rarely is longer than 30 minutes (FEMA 1997). Tornadoes can occur at any time of the year, with peak seasons at different times for different states (NSSL 2013). In Pennsylvania, peak occurrence of tornadoes is May through July (NWS 2019).

Wind is air moving from high to low pressure. It is the rough horizontal movement of air (as opposed to an air current) caused by uneven heating of the Earth's surface. It occurs at all scales, from local breezes generated by heating of land surfaces and lasting tens of minutes to global winds resulting from solar heating of the Earth (Federal Emergency Management Agency [FEMA] 1997). Types of damaging winds include straight-line winds, downdrafts, downbursts, microbursts, gust fronts, derecho, bow echoes, and hook echoes, described as follows:

- **Straight-line Wind** is any thunderstorm wind not associated with rotation (e.g., tornadic winds). Straight-line winds are movements of air from areas of higher pressure to areas of lower pressure—the greater the difference in pressure, the stronger the winds.
- A **Downdraft** is a small-scale column of air that rapidly sinks toward the ground and usually results in a downburst.
- A **Downburst** is a strong downdraft with horizontal dimensions larger than 2.5 miles, resulting in an outward burst or damaging winds on or near the ground. It is usually associated with thunderstorms but can occur with rainstorms too weak to produce thunder.
- A **Microburst** is a small, concentrated downburst that produces an outward burst of damaging winds near the surface. It is typically short-lived, lasting only 5 to 10 minutes, with maximum wind speeds of up to 168 miles per hour (mph).
- A **Gust Front** is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. It is characterized by a wind shift, temperature drop, and gusty winds ahead of a thunderstorm (National Severe Storms Laboratory [NSSL] Date Unknown).
- A **Derecho** is a widespread and long-lived windstorm associated with thunderstorms that are often curved (Johns and others 2011). The two major influences on the atmospheric circulation are differential heating between the equator and the poles, and rotation of the planet (Federal Emergency Management Agency [FEMA] 1997).
- A **Bow Echo** is a radar echo that is linear but bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo (crest). Bow echoes can be more than 300 kilometers long, last for several hours, and produce extensive swaths of wind damage at the ground (NSSL Date Unknown).
- A **Hook Echo** is a radar echo that is the most recognized and well-known radar signature for a tornadic supercell. This "hook-like" feature occurs when the strong counter-clockwise winds circling the mesocyclone (rotating updraft) are strong enough to wrap precipitation around the rain-free updraft area of the storm (NSSL 2016).

High winds other than tornados occur in all parts of the United States. Wind begins with differences in air pressures and occurs through rough horizontal movement of air caused by uneven heating of the earth's surface. Wind occurs at all scales, from local breezes lasting a few minutes to global winds resulting from solar heating

of the earth. High winds are often associated with other severe weather events such as thunderstorms, tornadoes, nor'easters, hurricanes, and tropical storms. Table 4.3.18-1 lists wind classifications used by the National Weather Service (NWS).

Table 4.3.18-1. NWS Wind Descriptions

Descriptive Term	Sustained Wind Speed (mph)
Strong, dangerous, or damaging	≥40
Very windy	30-40
Windy	20-30
Breezy, brisk, or blustery	15-25
Light, or light and variable wind	5-15 or 10-20
None	0-5

Source: NWS 2011
Notes:
mph Miles per hour
NWS National Weather Service

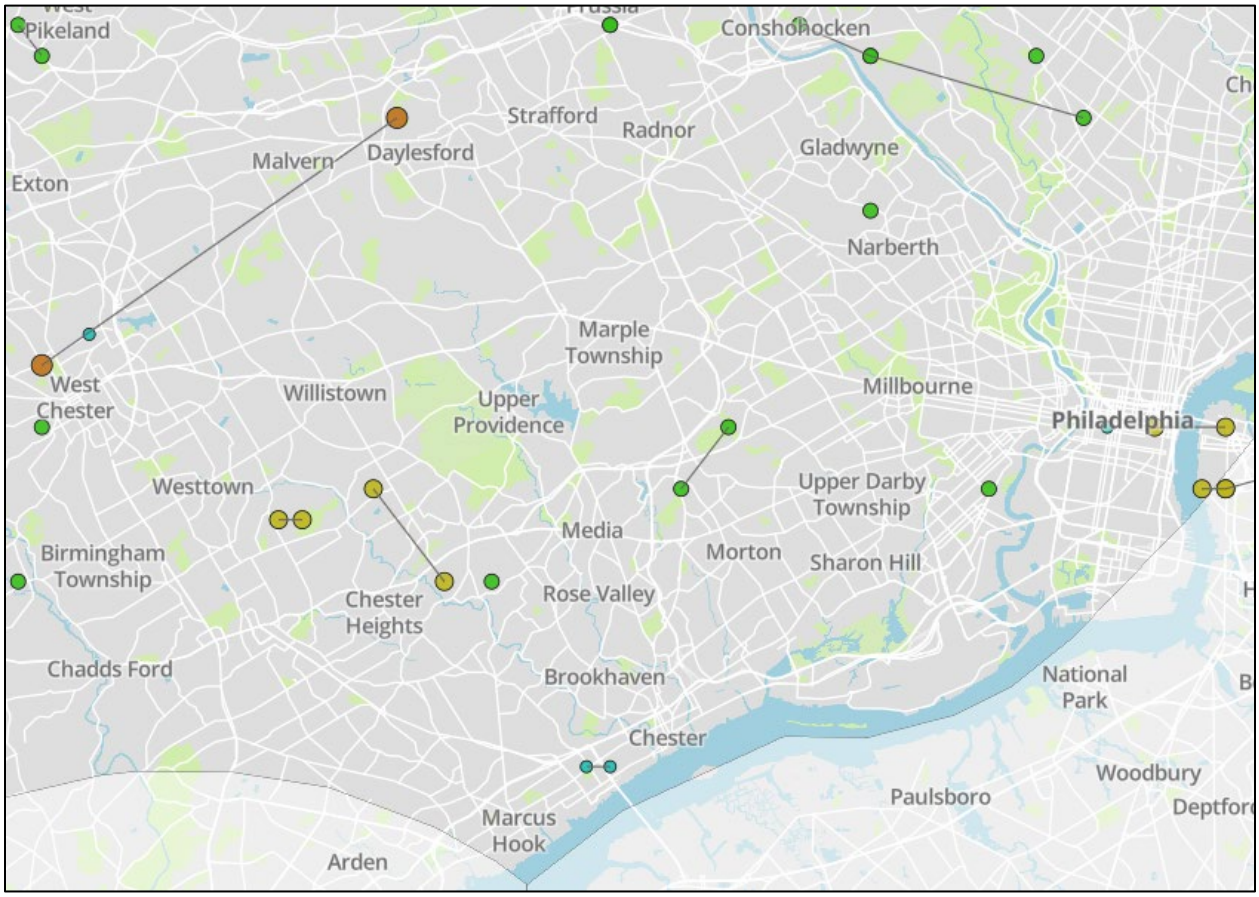
The following sections discuss location and extent, range of magnitude, past occurrences, future occurrences, and vulnerability assessment associated with the wind and tornado hazard within Delaware County.

Location and Extent

Tornadoes and windstorms can occur throughout Delaware County, though events are usually localized. Tornadoes can occur at any time during the day or night but are most frequent during late afternoon into early evening, the warmest hours of the day, and most likely to occur during the spring and early summer months of March through June. Tornado movement is characterized in two ways: direction and speed of spinning winds, and forward movement of the tornado, also known as the storm track. The forward motion of the tornado path can be a few hundred yards or several hundred miles in length. The width of tornadoes can vary greatly, but generally range in size from less than 100 feet to over a mile in width. Some tornadoes never touch the ground and are short-lived, while others may touch the ground several times (PEMA 2019). Between 1950 and 2020, six tornadoes have been recorded in Delaware County. Figure 4.3.18-1 shows the tornadoes in and around Delaware County.

All of Delaware County experiences straight-line winds and windstorms. Straight-line winds and windstorms occur on a region-wide scale. While such winds usually accompany tornadoes, straight-lined winds are caused by the movement of air from areas of higher pressure to areas of lower pressure. Stronger winds are the result of greater differences in pressure. Windstorms are generally defined with sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. Wind events can vary in spatial size from small microscale events which take place over only a few hundred meters to large-scale synoptic wind events often associated with warm or cold fronts (PEMA 2019).

Figure 4.3.18-1. Tornadoes in Delaware County, 1950 to 2020



Source: (York Daily Record 2021)
*Note: *** Enhanced Fujita Scale describes the strength of the tornado based on the amount and type of damage caused by the tornado. The F-scale of damage will vary in the destruction area; therefore, the highest value of the F-scale is recorded for each event. EF0 – Light Damage (40 – 72 mph), EF1 – Moderate Damage (73 – 112 mph), EF2 – Significant damage (113 – 157 mph), EF3 – Severe Damage (158 – 206 mph), EF4 – Devastating Damage (207 – 260 mph), EF5 – Incredible Damage (261 – 318 mph)*

Range of Magnitude

Windstorms are generally defined as sustained wind speeds of 40 mph or greater, lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. A tornado's magnitude is classified according to the Enhanced Fujita Scale (EF Scale), further discussed below.

Magnitude or severity of a tornado was originally categorized according to the Fujita Scale (F Scale) or the Pearson Fujita Scale introduced in 1971, based on a relationship between the Beaufort Wind Scales (B-Scales) (measure of wind intensity) and the Mach number scale (measure of relative speed). The F Scale is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure (Tornado Project Date Unknown). The F Scale categorizes each tornado by intensity and area, and is divided into six categories—F0 (Gale) to F5 (Incredible) (Edwards 2013).

Although the F Scale has been in use for more than 30 years, it has limitations. The primary limitations are lack of Damage Indicators (DI), no account of construction quality and variability, and no definitive correlation between damage and wind speed. These limitations have led to inconsistent rating of tornados and, in some cases, overestimates of tornado wind speeds. The limitations encouraged and induced development of the Enhanced Fujita Scale (EF Scale). The Texas Tech University Wind Science and Engineering (WISE) Center,

along with a forum of nationally renowned meteorologists and wind engineers from across the country, developed the EF Scale (NWS 2016).

The EF Scale became operational on February 1, 2007. It is used to assign tornados a rating based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of DIs and Degrees of Damage (DOD), which help better estimate the range of wind speeds produced by the tornado. From that, a rating is assigned, similar to that of the F Scale, with six categories from EF0 to EF5, representing increasing degrees of damage. The EF Scale was revised from the original F Scale to reflect better examinations of tornado damage surveys. This scale was developed with consideration to the designs of most structures (NWS 2022). Table 4.3.18-2 details each of the six categories of the EF Scale.

Table 4.3.18-2. Enhanced Fujita Damage Scale

EF Scale Number	Intensity Phrase	Wind Speed (mph)	Type of Damage Done
EF0	Light tornado	65–85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	Moderate tornado	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	Significant tornado	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	Severe tornado	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	Devastating tornado	166-200	Devastating damage. Well-constructed houses and whole-frame houses completely leveled; cars thrown, and small missiles generated.
EF5	Incredible tornado	>200	Incredible damage. Strong-frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air over distances exceeding 100 meters (109 yards); high-rise buildings undergo significant structural deformation; incredible phenomena occur.

Source: NWS 2022
Note: mph = Miles per hour

The EF Scale takes into account more variables than the original F Scale in assigning a wind speed rating to a tornado. The EF Scale incorporates 28 DIs, such as building type, structures, and trees. There are eight DODs for each DI, ranging from the beginning of visible damage to complete destruction of the DI. Table 4.3.18-3 lists the 28 DIs, with a description of construction typical for each DI. Each DOD in every category is assigned an estimated expected wind speed, a lower boundary of wind speed, and an upper boundary of wind speed.

Table 4.3.18-3. EF Scale Damage Indicators

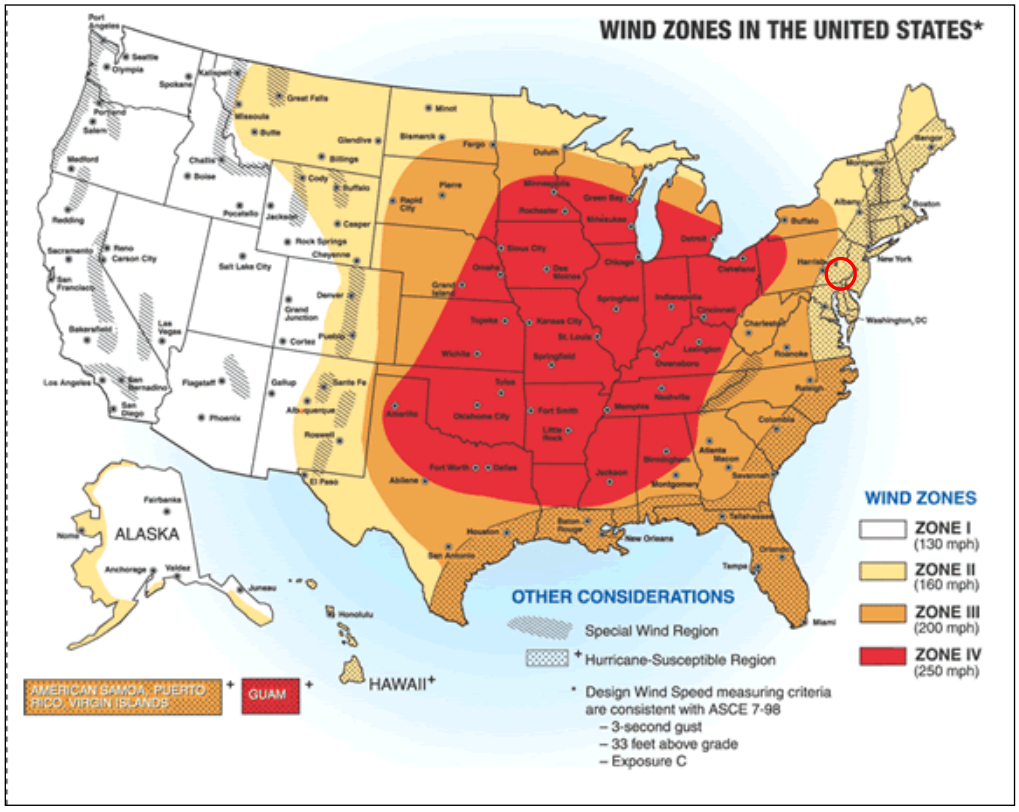
Number	Damage Indicator	Abbreviation	Number	Damage Indicator	Abbreviation
1	Small barns, farm outbuildings	SBO	15	School – 1-story elementary (interior or exterior halls)	ES
2	One- or two-family residences	FR12	16	School – junior or senior high school	JHSH
3	Single-wide mobile home	MHSW	17	Low-rise (1-4 story) building	LRB
4	Double-wide mobile home	MHDW	18	Mid-rise (5-20 story) building	MRB
5	Apartment, condominium,	ACT	19	High-rise (over 20 stories)	HRB

Number	Damage Indicator	Abbreviation	Number	Damage Indicator	Abbreviation
	townhouse (3 stories or less)				
6	Motel	M	20	Institutional building (hospital, government. or university)	IB
7	Masonry apartment or motel	MAM	21	Metal building system	MBS
8	Small retail building (fast food)	SRB	22	Service station canopy	SSC
9	Small professional (doctor office, branch bank)	SPB	23	Warehouse (tilt-up walls or heavy timber)	WHB
10	Strip mall	SM	24	Transmission line tower	TLT
11	Large shopping mall	LSM	25	Free-standing tower	FST
12	Large, isolated ("big box") retail building	LIRB	26	Free-standing pole (light, flag, luminary)	FSP
13	Automobile showroom	ASR	27	Tree – hardwood	TH
14	Automotive service building	ASB	28	Tree – softwood	TS

Source: Storm Prediction Center (SPC) 2006

Events after February 2007 are classified based on the EF Scale. Previous occurrences and losses associated with historical tornado events, described in the Past Occurrences section of this hazard profile, are classified based on the F Scale.

Figure 4.3.18-2. Wind Zones in the United States



Source: FEMA 2012
Note: The red circle indicates the approximate location of Delaware County.

Figure 4.3.18-2, above, shows wind speed zones developed by the American Society of Civil Engineers based on information including 40 years of tornado history and over 100 years of hurricane history. It identifies wind speeds that could occur across the United States to be used as the basis for design and evaluation of the structural integrity of shelters and critical facilities. According to the figure, Delaware County falls within Zone II, meaning design wind speeds for shelters and critical facilities should be able to withstand a 3-second gust up to 160 mph, regardless of whether the gust is the result of a tornado, hurricane, tropical storm, or windstorm event. Therefore, these structures should be able to withstand speeds experienced in an EF3 tornado.

Since tornado events are typically localized, environmental impacts are rarely widespread. However, where these events occur, severe damage to plant species is likely. This includes loss of trees and an increased threat of wildfire in areas where dead trees are not removed. Hazardous material facilities should meet design requirements for the wind zones identified in Figure 4.3.18-2 in order to prevent release of hazardous materials into the environment.

Past Occurrence

Between 1954 and 2020, Pennsylvania was included in two FEMA declared tornado- and windstorm-related major disaster declarations (DR) or emergencies (EM). Generally, disasters cover a wide region of the Commonwealth; therefore, many counties could have experienced various types of impacts. Of those declarations, Delaware County was not included in either (FEMA 2021).

The NOAA-NCEI Storm Events database records tornado and windstorm events. According to the database, five tornadoes were recorded in Delaware County between 1950 and 2021. These tornadoes include two with an intensity of F/EF2, two with an intensity of F/EF1, and 1 with an intensity of F/EF0. Between 1950 and December 2021, there have been 101 strong wind events, 34 high wind events, and 165 thunderstorm wind events, according to the NOAA-NCEI Storm Events database.

For this HMP update, known tornado and major windstorm events that have impacted Delaware County between 1950 and December 2021 are identified in Table 4.3.18-4. Tornadoes, and wind events that resulted in a disaster declaration or caused injuries, fatalities, or over $10,000 in damage, are listed in the table. With documentation for Pennsylvania and Delaware County being extensive, not all sources have been identified or researched. Table 4.3.18-4 documents events listed in the NOAA-NCEI database and the Storm Prediction Center severe weather database. In addition to the events listed in Table 4.3.18-4.

Table 4.3.18-4. Tornado and Windstorm Events, 1950 to 2021

Date	Event	Magnitude	Total Fatalities	Total Injuries	Total Property Damage	Description
June 29, 1973	Tornado	F2	0	0	$25,000	-
July 15, 1992	Tornado	F1	0	0	$250,000	-
September 27, 1993	Tornado	F1	0	0	$5 million	-
April 16, 1994	Tornado	F1	0	0	-	-
May 6, 1997	Thunderstorm Wind	60 kts	0	0	$200,000	A severe thunderstorm with wind gusts estimated as strong as 70 mph caused damage in and around Chester City. Debris blown onto the railroad tracks severely caused a major disruption of Amtrak service along its Northeast Corridor. The first wind damage occurred in Upper Chichester Township when the roof and shingles of an auto repair shop were lifted off. The debris was rammed into several cars and several hoods and fenders were strewn. A house across the street from the repair shop suffered damage also to its deck, shingles, and fencing. Within Chester City the thunderstorm knocked over a tree that crushed the front deck of a house, the roof was peeled from another house and shingles and sidings came off a third house. On Keystone Road, 8 roofs and 2 by 10 rafters were torn and scattered from Pastuszek. The worst damage occurred at a building supply company near the railroad tracks. The thunderstorm ripped the roof from two buildings. The tar roof of its large warehouse was twisted into a heap in its front parking lot. The wind tore the second 50 foot by 75 foot roof from an empty lumber shed and sent it into the power lines and landed intact on SEPTA's Marcus Hook regional rail line that are also used by Amtrak along its Northeast Corridor. Amtrak service between Philadelphia and Wilmington was suspended and stranded thousands of passengers.
August 17, 1997	Thunderstorm Wind	N/A	0	0	$300,000	A compact, but severe thunderstorm, caused considerable wind damage in Haverford, Marple and Springfield Townships in Delaware County. Springfield Township suffered the most damage. In residential areas the worst damage occurred on Leamy Avenue, Powell Road and Saxer Avenue where numerous trees were either snapped or uprooted. About 20 trees were also damaged on the Springfield Golf Course. In Marple Township, the worst damage occurred around Berkley Road. Every utility pole on that block was snapped in two. Trees fell on two houses; one fell through the roof of one house and punched a hole in the bedroom wall. The roof was partially torn off another home, In Haverford Township trees and wires blocked one road.
September 23, 2003	Thunderstorm Wind	61 kts	0	1	$1 million	A powerful line of severe thunderstorms uprooted whole trees in Thornbury, Radnor, Concord and Haverford Townships. The worst wind damage was reported in Haverford Township. In Haverford Township, the damaging straight-line winds

Date	Event	Magnitude	Total Fatalities	Total Injuries	Total Property Damage	Description
						traveled southwest to northeast centered along Eagle Road. In Concord Township, a large number of trees were knocked down in a residential area near the intersection of U.S. Routes 1 and 202. In Thornbury Township, downed trees fell into or smashed swimming pools.
November 13, 2003	High Wind	50 kts	0	0	$100,000	In Delaware County, homes were damaged by fallen trees in Collingdale, Secane and Marple. Springfield Township opened a shelter because of lost power. A downed tree damaged the township's radio tower and forced the police to operate on emergency power. Downed poles forced the closure of U.S. 202 and 1 in Chadds Ford.
December 1, 2004	Strong Wind	40 kts	0	0	$20,000	In Delaware County, downed trees caused road closures in Chester Heights Borough and Newtown Township. In Newtown, a downed wire ignited a fire in the front yard of one home. A couple of schools dismissed children early because they lost power.
January 14-15, 2006	High Wind	50 kts	0	0	$100,000	In Delaware County, in Marple Township, a seven year old boy narrowly escaped serious injury when an uprooted 125 foot oak tree fell into his bedroom. In Ridley Township, the roof of Our Lady Queen of Peace Elementary School was pushed upward to form a peak. Debris was scattered on the playground. In Upper Providence Township, the Media bypass was closed by a downed tree.
September 18-19, 2009	High Wind from Tropical Storm Isabel	50 kts	0	0	$5.2 million	Tropical Storm Isabel produced strong power outage producing winds, moderate tidal flooding along the Delaware River. Winds gusted up to 60 mph in Eastern Pennsylvania and downed countless numbers of trees, tree limbs and power lines. It was the worst outage on record for PECO Energy in southeastern Pennsylvania.
August 22, 2010	Tornado	F0	0	0	$25,000	-
February 2, 2015	Strong Wind	43 kts	1	0	$20,000	Strong, gusty northwest winds occurred in the wake of a departing and intensifying low pressure system during the late afternoon and early evening on the 2nd in Eastern Pennsylvania. One motorist was killed by a downed tree in Delaware County. Peak wind gusts average around 50 mph and knocked down weak trees, tree limbs and wires. Power outages occurred. This was further exacerbated by snow and ice on tree limbs.
February 15, 2015	High Wind	53 kts	0	1	$200,000	The increasing pressure difference (gradient) between a rapidly intensifying low pressure system offshore and an arctic high pressure system moving east from the Great Lakes caused strong northwest winds to occur in Eastern Pennsylvania on the 15th through the early afternoon. In Delaware County, the high winds knocked down a huge tree that destroyed one home on Spruce Road in Newtown Square. It narrowly missed severely harming the family of four inside of the home. SEPTA Regional Rail Service had delays and service was completely suspended between Lansdale (Montgomery) and Doylestown (Bucks County) because of downed wires. PECO Energy reported that most of the power outages in its service area were in Philadelphia and Delaware Counties. Wind gusts reached up to 61mph in Delaware County.

Date	Event	Magnitude	Total Fatalities	Total Injuries	Total Property Damage	Description
June 23, 2015	Thunderstorm Wind	74 kts	0	5	$4.85M	The combination of an unseasonably hot and humid air mass, an approaching cold front and strong winds aloft caused a squall line of severe thunderstorms to move through southeast Pennsylvania during the late afternoon and early evening of the 23rd. Estimated wind gusts as high as around 85 mph knocked down hundreds and hundreds of trees and caused some structural damage to homes and vehicles, mainly from fallen trees. Delaware County declared a state of emergency and suffered an estimated five million dollars in property damage. Five people were injured. While there were multiple reports of funnel clouds, no confirmed tornadoes occurred. Numerous homes and vehicles were damaged, mainly by fallen trees. Many roads were impassable through the next day because of downed trees.
July 9, 2015	Thunderstorm Wind	52 kts	0	0	$50,000	A line of severe thunderstorms tore down trees and wires in several locations throughout Delaware County. This included one downed tree that snapped a utility pole in Media.
November 5, 2017	Tornado	N/A	0	0	$500,000	N/A
March 2, 2018	High Wind	50 kts	0	1	$0	Strong northwest winds with gusts to near 60 mph occurred on March 2nd and 3rd. This led to widespread damage to trees and power lines, which in turn induced extensive power outages across the region. At one point 52,000 customers were without power in Delaware County. A tree limb fell and struck a pedestrian in Upper Darby near the intersection of Garrett Road and Shadeland Avenue seriously injuring the 28 year old male.
October 31, 2019	Thunderstorm wind	60 kts	0	1	N/A	Two trees fell onto a house along Sawmill Rd, resulting in one injury to an occupant.
October 31, 2019	Tornado	EF2	0	2	N/A	A tornado embedded in a larger area of straight line winds touched down just southwest of the Cobblestone at Thornbury subdivision in the town of Glen Mills, Delaware County at 11:25 pm EDT, Thursday, October 31, 2019. Damage near the beginning of the tornado path along Cheney Road consisted of a few sporadic uprooted trees and associated collateral damage of adjacent homes. However, as the tornado reached its maximum EF2 strength, the number and size of uprooted trees increased with significant associated damage to nearby homes. Three houses sustained significant damage from the wind itself, which, based on this survey, peaked around 120 mph. As the EF2 tornado continued to move northeast, at least two greenhouses were destroyed before it lifted near the intersection of Orchard and Broomall Lanes. However, significant straight line wind damage continued beyond this intersection with dozens of snapped and uprooted trees, especially within the Golf Course at Glen Mills, before the strong winds gradually weakened below severe limits.

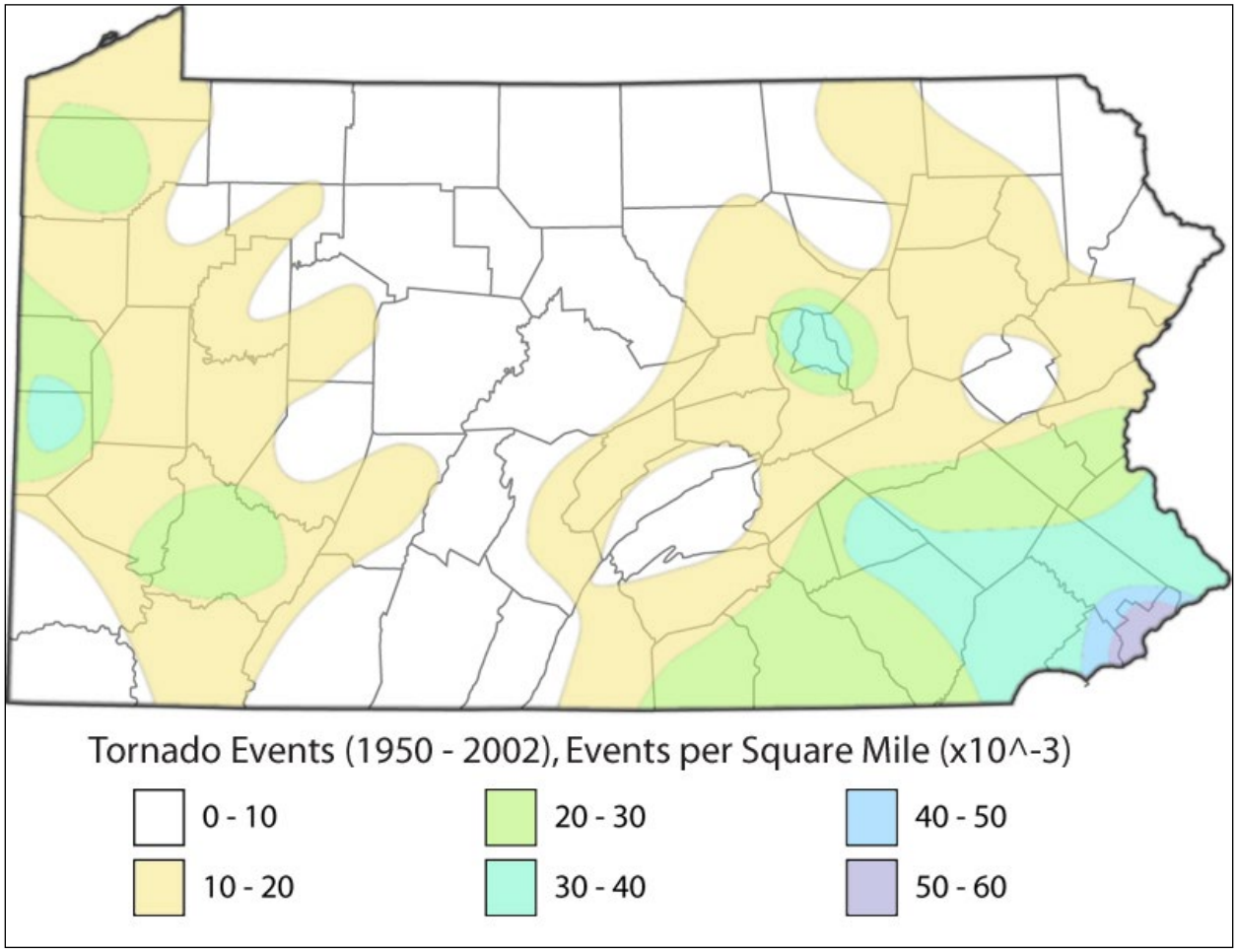
Source: SPC 2021, NOAA-NCEI 2021
mph Miles per hour Kts Knots
M million (dollars)

Probability of Future Occurrence

According to the National Weather Service, the Commonwealth of Pennsylvania has an annual average of 10 tornadoes with two related deaths. While the chance of being hit by a tornado is small, the damage that results when the tornado arrives is devastating. An F4 tornado can carry wind velocities of 200 mph, resulting in a force of more than 100 pounds per square foot of surface area. This is a "wind load" that exceeds the design limits of most buildings.

Using data collected on events between 1950 and 2002, Figure 4.3.18-3 shows the number of total tornado events per square mile across Pennsylvania from the State Climatologist. The figure shows that a majority of Delaware County experienced a higher frequency of tornado events than the central and northern portions of the Commonwealth.

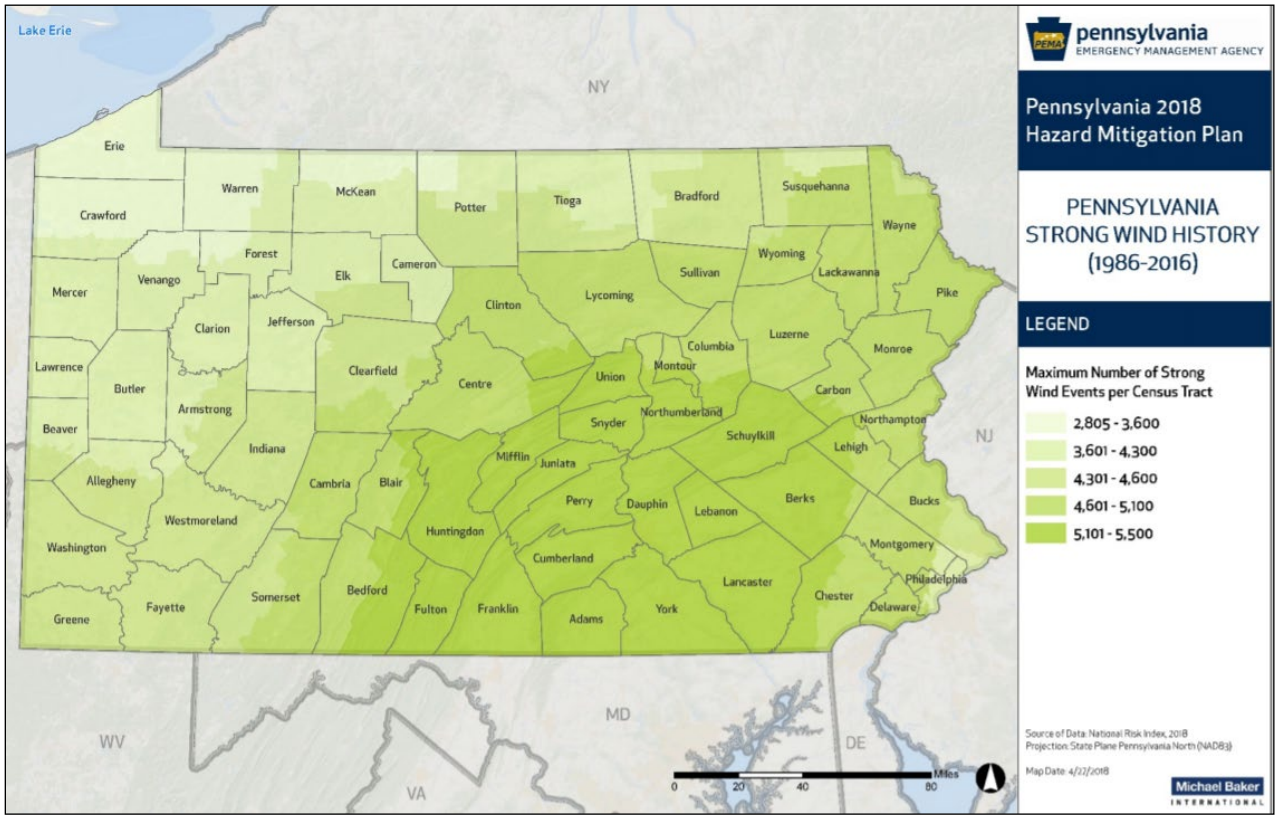
Figure 4.3.18-3. Total Tornado Events Per Square Mile in Pennsylvania



Source: Pennsylvania State Climatologist 2016

Similar to tornadoes, the Pennsylvania State Climatologist used historical data between 1950 and 2002 to show the number of wind events per square mile in the Commonwealth. The figure shows that Delaware County experienced a higher frequency of events than the northwestern parts of the State.

Figure 4.3.18-4. Maximum number of strong wind events per census tract in Pennsylvania from 1986-2016



Source: Pennsylvania State HMP 2018

For the 2022 HMP update, the most up-to-date historic data was collected to calculate the probability of future occurrence of tornado and windstorm events for Delaware County. Information and data from NOAA-NCEI Storm Events database was used to identify the number of tornado and wind events that occurred between 1950 and 2022. Table 4.3.18-5 presents the probability of future occurrence of tornado events in Delaware County. Based on these statistics, there is an estimated nearly 100-percent chance of a windstorm event occurring in any given year in Delaware County.

Table 4.3.18-5. Probability of Future Tornado and Windstorm Events

Hazard Type	Number of Occurrences Between 1950 and 2022	Percent chance of occurrence in any given year
High Wind	36	50%
Strong Wind	101	100%
Thunderstorm Wind	288	100%
Funnel Cloud	5	6.9%
Tornado	6	8.3%
TOTAL	**436**	**100%**

Sources: NOAA-NCEI 2021

In Section 4.4, the hazards of concern identified for Delaware County are ranked according to relative risk. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. The probability of occurrence for severe tornado and windstorm events in Delaware County is considered *highly likely* (greater than 90% annual probability) as defined by the Risk Factor Methodology probability criteria (Section 4.4).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. The following section discusses potential impacts of the tornado hazard on Delaware County, including:

- Impacts on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; and (5) the environment
- Future growth and development
- Effect of climate change on vulnerability
- Additional data and next steps

Impact on Life, Health, and Safety

Impacts of a tornado or windstorm on life, health, and safety depend on several factors, including severity of the event and whether adequate warning time was provided to residents. All residents in Delaware County are exposed to the tornado hazard.

Residents may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life. Similar to other natural hazards, socially vulnerable populations are most susceptible based on a number of factors, including their physical and financial ability to react or respond during a hazard, and locations and construction quality of their housing.

Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions based on the major economic impact on their family and may not have funds to evacuate. The population over the age of 65 is also more vulnerable and, physically, they may have more difficulty evacuating. The elderly is considered most vulnerable because they may require extra time or outside assistance during evacuations and are more likely to seek or need medical attention that may not be available due to isolation during a storm event. Section 2 (County Profile) presents the statistical information regarding these populations in the county. First responders' safety is also at risk during on-scene operations and they may have limited access to roads to respond to incidents. First responders may experience a higher than normal call volume and demand and have additional duties such as traffic control.

Impact on General Building Stock and Critical Facilities

The entire county's building stock and critical facilities are exposed to the tornado hazard. Manufactured housing (i.e., mobiles homes) is particularly vulnerable to high winds and tornadoes. The U.S. Census Bureau defines manufactured homes as "movable dwellings, 8 feet or wider and 40 feet or more long, designed to be towed on its own chassis, with transportation gear integral to the unit when it leaves the factory, and without need of a permanent foundation (US Census 2010)." They can include multi-wide types and expandable manufactured homes but exclude travel trailers, motor homes, and modular housing. Because of their lightweight and often unanchored design, manufactured housing is extremely vulnerable to high winds and will generally sustain the most damage.

Table 4.3.18-6 displays the number of manufactured housing units per municipality in Delaware County.

Table 4.3.18-6. Manufactured Housing Units per Municipality in Delaware County

Jurisdiction	Number of Manufactured Homes	Jurisdiction	Number of Manufactured Homes
Aldan (B)	0	Middletown (T)	15
Aston (T)	213	Millbourne (B)	0
Bethel (T)	39	Morton (B)	0
Brookhaven (B)	0	Nether Providence (T)	16

Jurisdiction	Number of Manufactured Homes	Jurisdiction	Number of Manufactured Homes
Chadds Ford (T)	0	Newtown (T)	0
Chester (C)	8	Norwood (B)	5
Chester (T)	83	Parkside (B)	0
Chester Heights (B)	0	Prospect Park (B)	0
Clifton Heights (B)	10	Radnor (T)	11
Collingdale (B)	0	Ridley (T)	44
Colwyn (B)	0	Ridley Park (B)	11
Concord (T)	12	Rose Valley (B)	0
Darby (B)	0	Rutledge (B)	0
Darby (T)	0	Sharon Hill (B)	0
East Landsdowne (B)	0	Springfield (T)	0
Eddystone (B)	0	Swarthmore (B)	0
Edgmont (T)	0	Thornbury (T)	0
Folcroft (B)	9	Tinicum (T)	0
Glenolden (B)	0	Trainer (B)	30
Haverford (T)	20	Upland (B)	0
Landsdowne (B)	0	Upper Chichester (T)	23
Lower Chichester (T)	0	Upper Darby (T)	30
Marcus Hook (B)	5	Upper Providence (T)	0
Marple (T)	13	Yeadon (B)	0
Media (B)	36	Brandywine Conservancy and Museum of Art Special District	N/A
Delaware County		**633**	

Source: Delaware County 2016 HMP

Impact on Economy

Tornadoes also impact the economy, including loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, and wage loss and rental loss due to repair/replacement of buildings. Impacts on transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could sustain damage and impacts could result in loss of power, which could also affect business operations and provision of heating or cooling to the population.

Impact on the Environment

Tornado events are typically localized; therefore, environmental impacts are rarely widespread. Impacts of windstorms on the environment usually occur over a larger area. Severe damage to plant species is likely from both tornado and windstorm events. This includes uprooting or total destruction of trees, and increased threat to wildfire in areas of tree debris.

Future Growth and Development

As discussed in Section 4.4 (Hazard Vulnerability Summary), areas targeted for future growth, development and re-development have been identified across Delaware County. Any areas of growth could be affected by the tornado and windstorm hazard because the entire county is exposed and potentially vulnerable to the wind hazard. Residential development, specifically manufactured homes, may be considered more vulnerable to the tornado hazard.

Effect of Climate Change on Vulnerability

An increase in storms will produce more wind events and may increase tornado activity. Additionally, an increase in temperature will provide more energy to produce storms that generate tornadoes (Climate Central 2016). With an increased likelihood of strong winds and tornado events, all of the county's assets are at risk for losses as a result of extreme wind events.

Additional Data and Next Steps

In time, HAZUS versions will be released with modules that address straight-line wind and tornado events. As updated versions of are released, the county will be able to run analyses for an overall picture of the wind damages and debris generated from tornado events. Over time, Delaware County can obtain additional data to support the analysis of this hazard. This additional data would include details on past hazard events and impacts, and an updated building inventory that would provide specific building information, such as type of construction and details on protective features (for example, shutters and safe rooms).

4.3.19 Transportation Accident

Transportation hazards include hazardous materials (HazMat) in transit, vehicular accidents, aviation accidents, at-grade railroad crossings, and roadways vulnerable to floods. In 2020, the National Transportation Safety Board (NTSB) reported 40,732 transportation-related fatalities across the United States. Of those 40,732 fatalities, 38,680 were highway incidents, 752 were rail incidents, 349 were aviation incidents, 15 were pipeline incidents, and 851 were marine incidents (U.S. Department of Transportation 2021). For the purpose of this plan update, transportation accidents are defined as incidents involving highway, air, and rail travel, resulting in death, serious injury, extensive property loss or damage or situations that cause delay or closure.

A transportation hazard may be defined as a condition created by movement of anything by common carrier. Transportation hazards can be divided into two categories: hazards created by the material being transported, and hazards created by the transportation medium. Transportation systems available in Delaware County include roadways, rail lines, maritime, and airports. Major road accidents in the County are probable, and major rail and aviation accidents are possible. All County systems and supporting transportation resources provide services locally, regionally, and nationally. Vehicular, aviation, maritime, and railway, accidents are defined below:

- Vehicular Accidents: A vehicular accident is a road traffic incident that usually involves one vehicle colliding with another vehicle or other road user, such as an animal or a stationary roadside object. A vehicular accident may result in injury, property damage, or possible fatalities. Many factors contribute to vehicular accidents, including equipment failure, poor road conditions, weather, traffic volume, and driver behavior.
    - Hazardous Materials (HazMat) in Transit: A HazMat is defined as a substance or material determined capable of posing an unreasonable risk to health, safety, or property when transported. "Unreasonable risk" covers a broad range of health, fire, and environmental considerations. HazMats come in various forms, some of which can cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property. HazMat substances include explosives, flammable solids, substances that become dangerous when wet, oxidizing substances, and toxic liquids. An accident involving a vehicle carrying HazMats becomes a HazMat incident if the HazMat leaks; is involved in a fire; or if the potential for release, fire, or other hazard exists. Hazards can occur during production, storage, transportation, use, or disposal of HazMats (Illinois Emergency Management Agency 2012).
- Aviation Accidents: According to the International Civil Aviation Organization, an aviation accident occurs during operation of an aircraft between the time a person boards the aircraft with intent to fly to a destination, to the time the person has disembarked the aircraft. Three different situations qualify as an aviation accident: (1) a person is fatally or seriously injured; (2) the aircraft sustains damage or structural failure; or (3) the aircraft is missing or inaccessible. An aviation incident is an occurrence, other than an accident, associated with operation of an aircraft that affects or could affect the safety of operation (International Civil Aviation Organization 1994). Airport accidents and incidents have the potential to occur while the plane is over County airspace; not only directly on airport property.
- Maritime Accidents:
- Railway Accidents: Railway accidents involve one or more trains. They can involve a train derailment or one train impacting another train, vehicle, or pedestrian.

This section provides a profile and vulnerability assessment of the transportation accident hazard for Delaware County.

Location and Extent

Vehicular Accidents

The County has 29 miles of interstates and expressways (Media Bypass), 79 miles of National Highway System (NHS) roads, 3 NHS connectors, 15 interstate highway interchanges, and 1 truck rest area (Delaware County Planning Department 2017). Accidents can occur at any point along the roadways in Delaware County. Figure 4.3.19-1 shows the location of the major roadways in the County.

Structurally deficient bridges also pose a risk for transportation accidents. In response to the collapse of the I-35W Bridge in Minneapolis in August 2007, PennDOT assessed the structural integrity of all bridges in the Commonwealth. Table 4.3.19-1 lists the total number of bridges in Delaware County, as well as the number of those that are in poor condition, or structurally deficient (in parentheses).

Table 4.3.19-1. Bridges in Delaware County

On State Roads	On Local Roads
378 (36)	94 (20)

Source: PennDOT 2018

There is no warning time for vehicular accidents. Factors contributing to these accidents are typically associated with the driver, vehicle, and environment. Factors associated with the driver include error, speeding, experience, and blood-alcohol level. Factors associated with the vehicle include type, condition, and center of gravity. Environmental factors include quality of the infrastructure, weather, and obstacles. The majority of vehicular accidents are attributed to the driver. Vehicular accidents can severely affect those directly involved, as well as others not directly involved. Other effects of vehicular accidents may include severe traffic delays, lost sales to businesses, delayed commodity shipments, and increased insurance costs (Cova and Conger 2003).

Aviation Accidents

Philadelphia International Airport (PHL) is Delaware County's sole airport and is owned and operated by the City of Philadelphia. The majority of PHL property, the main runways, some of the terminals (including the International Terminal), Cargo City, and the United Parcel Service facility are located in Tinicum Township (Delaware County Planning Department 2017).

Philadelphia International Airport Cargo City is located in Tinicum Township, Delaware County. Cargo City includes freight facilities for the Fed Ex Ship Center, Delta Cargo, American Airlines Cargo, Lufthansa Cargo, Alaska Air Cargo, United Airlines Cargo, American Airlines Cargo, and Southwest Airlines Cargo. UPS has a large facility in Tinicum Township as well. It is an intermodal facility; freight is moved into and out of this facility via airplane, large trucks, and smaller delivery vehicles (Delaware County Planning Department 2017).

In addition, the public airports listed above, there are several privately owned airports and heliports include the following:

- Crozer-Chester Heliport
- Piac Heliport
- Linville Airport
- Riddle Memorial Hospital Heliport
- Acro Newtown Heliport
- Foxcatcher Farm Heliport
- Sun Company-Radnor Heliport
- Boeing Helicopters Center 3 South Heliport

Maritime Accidents

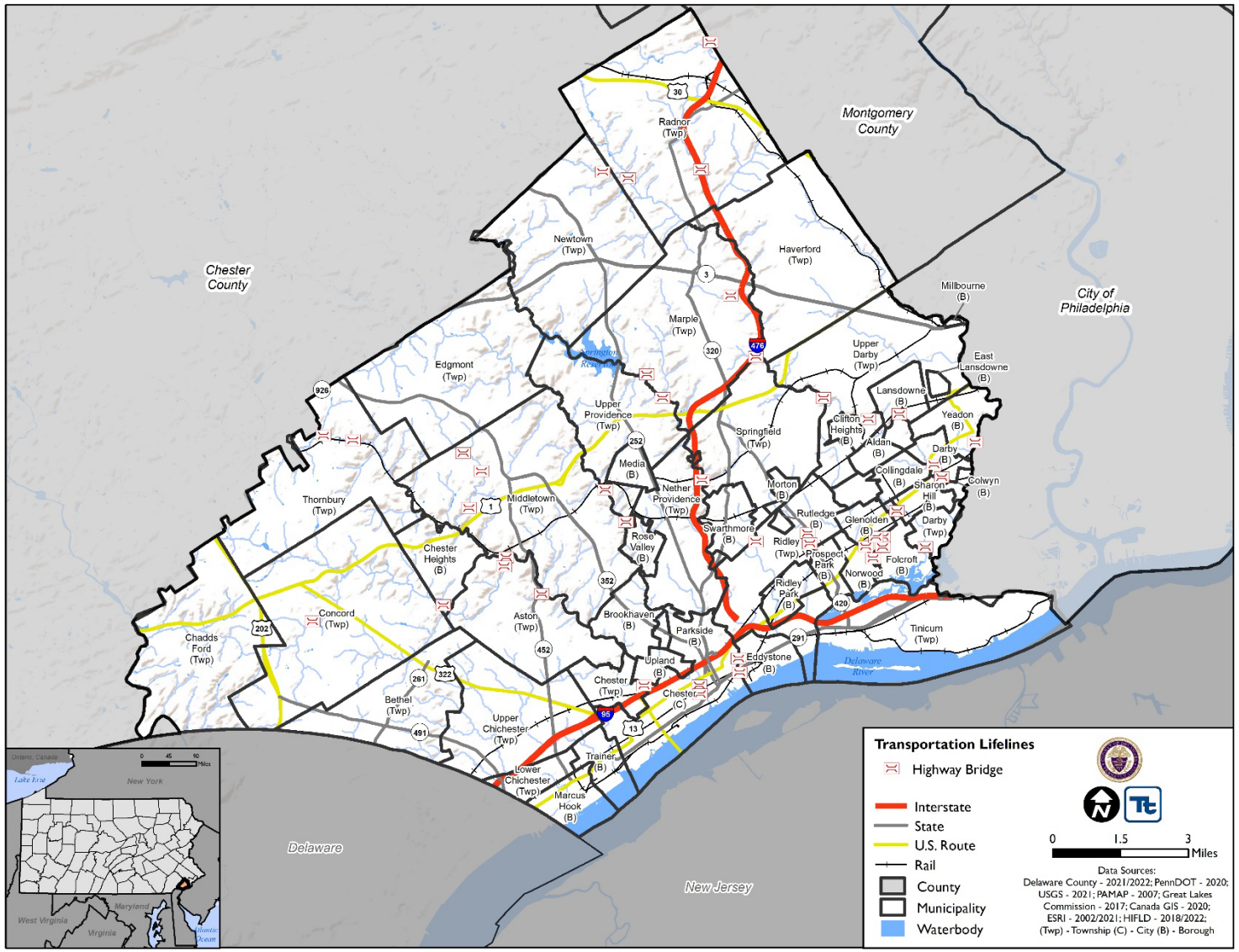
The Delaware River is one of the County's greatest assets from an environmental, economic, and social standpoint. The municipalities of Marcus Hook, Trainer, and Eddystone Boroughs, Chester City, and Ridley and Tinicum Townships front the Delaware River. Delaware County has six ports along the Delaware River from west to east: Marcus Hook, Trainer, Penn Terminals, Eddystone, Hog Island, and Fort Mifflin. All are bulk terminals, with the exception of Penn Terminals, which is a general cargo terminal (Delaware County Planning Department 2017).

Railway Accidents

Delaware County's rail line includes SEPTA regional rails, AMTRAK passenger lines, and multiple freight lines (PA DOT 2019). There are four main railroad lines used to transport inbound and outbound commodities through Delaware County: CSX's Philadelphia Subdivision line, Conrail's Chester Secondary line, Amtrak's Northeast Corridor line, and Amtrak's Keystone/Main line. The two Amtrak lines are used primarily for passenger service, but Norfolk Southern and Conrail freight trains occasionally use them. The CSX and Conrail lines in Delaware County are used solely for freight (Delaware County Planning Department 2017).

The County's freight rail network is ample and includes 51 miles of freight tracks and six yards and intermodal terminals. Three major freight rail companies dominate the Delaware County landscape: Conrail (Consolidated Rail Corporation), CSX, and Norfolk Southern. Conrail is owned by CSX and Norfolk Southern; the company provides local rail service. Its service areas are shared assets of the two parent companies, which operate long distance freight trains on the freight railroad tracks in Delaware County (Delaware County Planning Department 2017).

Figure 4.3.19-1. Transportation Routes in Delaware County



Range of Magnitude

Significant passenger vehicle, air, and rail transportation accidents can result in a wide range of outcomes from damage solely to property to serious injury or death. Most air incidents are nonfatal and cause minor injuries or property damage. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour ten people are injured in a car crash, and every seven hours someone dies as a result of a car crash. Most fatal crashes occur in the summer months of July, and August, and September (PEMA 2019).

Roadway accidents in Delaware County range from minor crashes to more serious incidents that involve injuries or fatalities, or result in a release of hazardous materials. Information for this plan regarding fatalities associated with automobile crashes (Table 4.3.19-2) and fatalities of pedestrians involved in transportation incidents (Table 4.3.19-3) was drawn from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS) 2020 data.

Table 4.3.19-2. Fatalities from Automobile Crashes

Year	Pennsylvania	Delaware County
2016	1,088	28
2017	1,083	24
2018	1,103	18
2019	990	30
2020	1,060	28
Total	**5,324**	**128**

Source: NHTSA 2021

Table 4.3.19-3. Fatalities of Pedestrians

Year	Pennsylvania	Delaware County
2016	170	7
2017	147	7
2018	197	6
2019	147	9
2020	143	2
Total	**803**	**31**

Source: NHTSA 2021

Rail accidents can vary widely in terms of injuries, fatalities, property damage, and interruption of service, depending on the nature and severity of the accident. Local residents may also be involved in rail accidents while traveling outside the County.

Aircraft accidents can vary from a single-engine aircraft having a "hard landing" causing damage to the aircraft, to a crash of a small turboprop or jet aircraft, to a crash of a large jet (such as a Boeing 727). Other aircraft accidents could include helicopter or experimental aircraft crashes. Aviation accidents can also involve radio-controlled or drone aircraft devices, many of which are experimental and not subject to defined regulatory oversight, potentially complicating issues that could arise if one of these devices crash.

Past Occurrence

Major roadway accidents (such as multi-vehicle accidents, those that close roads or bridges, or those involving school buses) are reported by Delaware County to PennDOT. Table 4.3.19-4 summarizes these accidents from 2015 to 2020. While this table lists accidents reported to the counties and Commonwealth, significantly more minor accidents are not reported.

Table 4.3.19-4. Summary of Major Roadway Accidents in Delaware County, 2004 to 2020

Year	Vehicle Accidents (fatalities)	Railroad Accidents (fatalities)	Aircraft Accidents
2004	4,810 (34)	36 (0)	1
2005	4,870 (31)	33 (0)	3
2006	4,920 (29)	22 (1)	2
2007	4,613 (22)	26 (1)	4
2008	4,532 (21)	27 (3)	0
2009	4,344 (20)	28 (0)	0
2010	4,349 (23)	36 (1)	2
2011	4,588 (20)	29 (0)	0
2012	4,561 (28)	27 (2)	1
2013	4,582 (27)	18 (1)	1
2014	4,546 (26)	20 (2)	0
2015	4,865 (19)	27 (1)	2
2016	5,001 (28)	18 (2)	3
2017	5,022 (24)	18 (1)	1
2018	4,944 (18)	24 (1)	4
2019	4,926 (30)	25 (4)	2
2020	4292 (28)	14 (9)	1
Total	**29,050 (147)**	**428 (29)**	**13**

Source: PennDOT 2021; Federal Railroad Association 2021; Aviation Data Base 2021

Future Occurrence

Considering the current transportation network within the County and the steady increase in traffic volume, it is safe to assume that the number of vehicle accidents will continue to increase. Incidents involving air or rail should remain low. The County's population has increased over the last decade, meaning it is likely that traffic volumes have also risen. New residents have limited knowledge of detour routes and alternate routes around accidents which contributes to the accident-related congestion experienced recently in the County. The trucking industry is expected to continue, maintaining and possibly increasing the number of tractor-trailers on the County's road system. Transportation accidents may increase slightly over the next five years without proper mitigation strategies in place.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of transportation accident events for Delaware County. Information from PennDOT, NTSB, and FRA were used to identify the number of transportation accident events that occurred between 2004 and 2020. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a transportation accident (any type) event occurring in any given year in Delaware County.

Table 4.3.19-5. Probability of Future Transportation Accident Events

Hazard Type	Number of Occurrences Between 2004 and 2020	Percent Chance of Occurrence in any Given Year
Vehicular	29,050	100%

Hazard Type	Number of Occurrences Between 2004 and 2020	Percent Chance of Occurrence in any Given Year
Railway	428	100%
Aviation	13	61.9%
TOTAL	**29,491**	**100%**

Sources: NTSB 2021; PennDOT 2021

Based on the Risk Factor Methodology Probability Criteria, the probability of a transportation accident is considered to be *highly likely* (see Table 4.4-1). However, the low number of rail and air traffic accidents in the County indicates that the bulk of future transportation accidents will be roadway accidents.

Vulnerability Assessment

The entire county has been identified as the hazard area for transportation accidents. This section evaluates and estimates the potential impact of transportation hazards on Delaware County in the following sections:

- Impacts on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; (5) the environment; and (6) future growth and development
- Effect of climate change on vulnerability
- Additional data and next steps

A qualitative assessment on potential impacts to life, health, and safety; buildings and critical facilities; and the economy are summarized below.

Impact on Life, Health, and Safety

Transportation hazards could lead to potential losses in categories of human health and life, property, and natural resources. Vehicular accidents, flooded roadways, and other roadway impairments may result in injury or death to drivers and passengers on the road, the public in the immediate vicinity, and emergency services personnel. The number of people exposed to a hazard depends on population density, whether exposure occurs during day or night, and percentage of the population in the accident area located indoors and outdoors.

The county and its municipalities are prepared to manage and respond to transportation hazards. However, the risk to first responders increases when they respond to transportation accidents near trafficked areas. First responders may also have to take on the additional duty of controlling traffic.

Impact on General Building Stock, Critical Facilities, and Economy

Because of insufficient data, a full loss estimate was not completed for the transportation hazard. Loss of roadway use, and public transportation services would affect thousands of commuters, employment, day-to-day operations within the county, and delivery of critical municipal and emergency services. Disruption of one or more of these modes of transportation can lead to congestion of another and affect both the county and the region as a whole.

Impact on the Environment

Like the range of magnitude, the environmental impacts of transportation accidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation accident, the environmental impact is minimal. However, if the accident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material (PEMA 2019).

Future Growth and Development

As discussed in Section 2.4 of this HMP, areas targeted for future growth and development have been identified across Delaware County. Increased development in the county and region will lead to increased road traffic, which could lead to increased transportation accidents.

Effect of Climate Change on Vulnerability

Since the transportation accident hazard is human-caused, climate change will not have an effect on future vulnerability of Delaware County to this hazard.

Additional Data and Next Steps

Based on limited data regarding the probability and potential impact of this hazard, a quantitative loss estimate was not completed for this HMP. Over time, the county can work with appropriate agencies to collect additional data to support mitigation planning, consideration of potential risks, and prioritization of mitigation measures for this hazard.

Delaware County recognizes it must compile and maintain data regarding specific concerns and past losses from this hazard. These data should include specific information regarding damage or loss of life, property, or infrastructure; and any reports pertaining to potential or actual cost and logistics of responding to an event caused by this hazard (locations of road closures, map detours, traffic counts, durations of closures and detours; and costs to respond). These data will be included in future revisions of the HMP and can be used to support future mitigation grant efforts (benefit-cost analysis).

Studying traffic and potential transportation accident patterns could provide information on vulnerability of specific road segments and nearby populations. Increased understanding of the types of HazMats transported through the county will also support mitigation efforts. Maintaining a record of frequently transported materials can facilitate development of preparatory measures to respond to a release. Predicting costs needed to respond to a release, remediate the environment (see Section 4.3.5 for a discussion of environmental impacts due to transportation accidents), or repair damaged infrastructure would be useful in developing future mitigation options.

4.3.20 Urban Fire and Explosions

Structural and urban fire and explosion hazards incorporate vehicle and building/structure fires as well as overpressure rupture, overheat, or other explosions that do not ignite. This hazard occurs in denser, more urbanized areas statewide and most often occurs in residential structures. Structural fires and explosions often begin as a result of other hazards, particularly storms, lightning strikes, drought, transportation accidents, hazardous materials releases, criminal activity (arson), and terrorism (PEMA 2019).

This section provides a hazard profile and vulnerability assessment of the urban fire and explosions hazard for Delaware County.

Location and Extent

Structural and urban fires within Delaware County have had a detrimental impact on life, property, and the local economy over the past decade. The age of many residential structures within the region combined with changes in building construction and materials has increased the threat of fire loss that is occurring on a regular basis.

As defined by the National Fire Protection Agency (NFPA) in the *NFPA 901: Standard Classifications for Incident Reporting and Fire Protection Data*, a structure fire is defined as "Any fire inside, on, under, or touching a structure." This definition includes any mobile residential structure such as a mobile or modular home but does not include roadworthy vehicles such as recreation vehicles (NFPA 2021). Significant urban fires are limited to densely populated areas of the County that contain large and/or multiple buildings. Urban fires may start in single structure but may spread to nearby buildings or throughout a large building if adequate fire control measures are not in place.

Significant explosions are most common in densely populated areas and at industrial facilities that utilize combustible hazardous materials. Explosions can also occur in conjunction with automobile, boat, and rail accidents. All such explosions can turn into fires, spreading to nearby structures.

Range of Magnitude

In general, the extensive networks of roads and streets coupled with the number of local fire departments should provide swift access to fire events. It is anticipated that blockage by damage, debris, and operations will be localized and temporary. However, urban fires have the potential to cause extensive damage to residential, commercial, or public property. Damage ranges from minor smoke and/or water damage to the destruction of buildings. People are often displaced for several months to years depending on the magnitude of the event. Urban fires and explosions can also cause injuries and death (PEMA 2019). One of the worst fire incidents in Delaware County was the Corinthos Disaster in 1975, where 27 people lost their loves after a ship hit a docked Liberian tanker near a BP oil Refinery (Delaware County HMP 2016).

Past Occurrence

Delaware County experiences a number of urban fire and explosion events each year, most of which are small and affect a limited number of structures. PEIRS data indicates that from 2002-2007, there have been 16 urban fire events reported to PEMA (see Table 4.3.20-1). PEIRS data was not available at the time of the 2022 HMP update; therefore, the events in the table below do not represent all fires that occurred in Delaware County.

Table 4.3.20-1. Structural Fire Events in Delaware County, 2002 to 2022

Date(s) of Event	Event Type	Location	Description of Event
January 25, 2002	Structure Fire	Prospect Park	-
February 2, 2002	Structure Fire	Upland Borough	-
April 2, 2002	Structure Fire	City of Chester	-
January 27, 2003	Structure Fire	City of Chester	Five single family homes were impacted due to structure fire on East 7th St.
February 20, 2004	Structure Fire	City of Chester	Residential structure fire; no reported injuries
July 9, 2004	Structure Fire	Nether Providence Township	Residential structure fire; no reported injuries
April 18, 2005	Structure Fire	Upper Chichester Township	A trash truck had a small explosion and fire on it; cause of explosion is unknown, and incident is under investigation. One injury was reported
August 23, 2005	Structure Fire	City of Chester	Fire at the Atlantic Steel Company; no injuries reported
November 17, 2005	Structure Fire	Thornbury Township	Fire at Glenn Mills State School; no injuries reported but approximately 890 residents displaced from homes. American Red Cross provided temporary shelter for misplaced persons.
July 10, 2006	Explosion	Marple Township	Commercial structure fire; no injuries reported
August 18, 2006	Structure Fire	Trainer Borough	An explosion occurred due to equipment malfunction at the Congoleum plant, a tile and flooring manufacturing company.
March 1, 2007	Structure Fire	Haverford Township	Fire at the old Havertown PCP facility; building unoccupied
March 12, 2007	Structure Fire	Newtown Township	Residential structure fire; one fatality reported
March 12, 2007	Structure Fire	Ridley Park Borough	Residential structure fire; one fatality reported
March 19, 2007	Structure Fire	Chester Township	Commercial structure fire; two injuries reported
September 27, 2007	Structure Fire	Sharon Hill	Fire occurred in a detached garage; five firefighters were injured. One firefighter was critically injured and two were treated then released
March 7, 2022	Structure Fire	Lower Chichester	A fast-moving fire seriously damaged a house on the 100 block of West Ridge Road in Lower Chichester.
April 4, 2022	Structure Fire	Thornton	Firefighters were called to the house on Diamond Drive in Thornton, around 10:30 p.m. The fire caused heavy damage to the roof of the home.
April 28, 2022	Structure Fire	Clifton Heights	Clifton Heights firefighters were called to a two-alarm fire at a duplex on South Diamond Street.
May 17, 2022	Structure Fire	Chester	Two structure fires occurred in Chester within an hour of each other. The first fire broke out at 6:00 pm on West 9th Street, between Fulton and Barclay Streets. The second fire occurred in a building on Avenue of the States at 6th Street. No injuries were reported.

Sources: Delaware County HMP 2016; 6abc 2022; 3CBS Philly 2022; Daily Times 2022

Future Occurrence

Many factors contribute to the cause of structural fires and explosions. Due to the various factors, urban areas in Pennsylvania are considered at risk to one degree or another. Minor urban fires can be expected every day in Pennsylvania. Major fires will continue to occur several times a year, particularly in dense, urban areas with aging building stock. However, the probability of future occurrences may decrease with the construction of new buildings to building codes that address fire prevention, detection, and extinguishments. Also, continued efforts to increase public awareness of the dangers of urban fires will help to mitigate injury, death, and property loss. The probability of future occurrence may increase in communities whose populations are growing and where new areas are developed (PEMA 2019).

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of urban fire and explosion events for Delaware County. Information from the 2016 Delaware County HMP, PEIRS, input from Delaware County, and local newspapers were used to identify the number of structural fire and explosion events that occurred between 2002 and 2022. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 95.2-percent chance of an urban fire or explosion event occurring in any given year in Delaware County.

Table 4.3.20-2. Probability of Future Urban Fire and Explosion Events

Hazard Type	Number of Occurrences Between 2002 and 2022	Percent chance of occurrence in any given year
Urban Fires and Explosions	20	95.2%

Sources: Delaware County HMP 2016

Based on available historical data, the future occurrence of urban fire and explosion events can be considered *possible* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4) with minor events happening more frequently than major fires or explosions in the future.

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. The following section discusses potential impacts of the Urban Fire and Explosion hazard on Delaware County, including:

- Impacts on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; (5) the environment; and (6) future growth and development
- Effect of climate change on vulnerability
- Additional data and next steps

A qualitative assessment on potential impacts to life, health, and safety; buildings and critical facilities; and the economy are summarized below.

Impact on Life, Health, and Safety

The vulnerability of the citizens and property of Delaware County to fire and related incidents depends on many factors. A positive factor helping to mitigate the risk is the advanced fire services provided within the County. On the negative side, many homes and business have not been updated to current fire safety codes. The risk of loss caused by fire increases each year that these structures go without safety updates. In Pennsylvania, the most vulnerable population groups are the elderly, age 65 and over, and the low-income earners. The elderly had the

highest number of deaths resulting from fire and all population groups. The elderly represents around 16 percent of the population in Delaware County.

Impact on General Building Stock and Critical Facilities

The potential for urban fire and explosions is not limited to any one area of the County; however, structures most at risk include the aging building stock constructed prior to established building codes. Human error can play an important role in creating the potential for a major urban or forest fire. Although newer buildings are constructed with higher safety standards and with more fire-resistant material, large numbers of older, highly vulnerable buildings remain throughout Delaware County. Until these buildings are upgraded or replaced, the risk will continue.

Impact on the Economy

There are economic consequences related to this hazard. Structural fires and explosions may result in lost wages due to temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and lost investments in destroyed property (PEMA 2019).

Impact on the Environment

The impact of structural fires and explosions vary based on the size of the incident and the population and structure density where it occurs. There may be environmental impacts related to hazardous materials when a fire event or explosion releases dangerous materials (PEMA 2019).

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Delaware County (further discussed in Section 2.4 of this HMP). Any areas of growth probably will not be impacted by the urban fire and explosion hazard, unless located next to older buildings, as new structures have higher safety standards and are constructed with more fire-resistant material.

Effect of Climate Change on Vulnerabilities

Because urban fire and explosion is a human-caused hazard, climate change is not anticipated to affect vulnerability affiliated with urban fire and explosion. However, lightning, which is expected to increase under climate change, can cause some of these events. Therefore, it is expected the frequency of urban fires will increase. For more information on lightning and climate change, see Section 4.3.13 (Lightning).

Additional Data and Next Steps

As the data and resources become available, a custom building inventory can be generated to capture the construction of structures (such as roofing material, fire detection equipment, and structure age) to further refine the vulnerability analysis. As stated earlier, buildings constructed of wood or vinyl siding are generally more likely to be damaged by the fire hazard than buildings constructed of brick or concrete.

4.3.21 Utility Interruption

Utility interruption includes power failure, potable water service outage, telecommunications infrastructure failure, natural gas infrastructure failure, or sewer infrastructure failure. These interruptions or outages occur because of geomagnetic storms, fuel or resources shortage, electromagnetic pulses, information technology failures, transmission facility or linear utility accident, and major energy, power, or utility failure (PEMA 2019).

For the purpose of this plan, utility interruption focuses on power failure, because it is the major cause of utility failure and has had widespread impacts on Delaware County. A power failure is defined as any interruption or loss of electrical service from disruption of power transmission caused by accident, sabotage, natural hazards, or equipment failure. A significant power failure is defined as any incident of a long duration that would require the involvement of the local or state emergency management organizations to coordinate provision of food, water, heating, cooling, and shelter. Interruptions in other basic utilities (such as data/telecommunications, water, natural gas, or sewer) can have a detrimental impact on Delaware County. Utilities that employ aboveground wiring (power and data/telecommunications) are vulnerable to the effects of other hazards such as high wind, heavy snow, ice, rain, and vehicular accidents.

This section describes the location and extent, range of magnitude, past occurrence, future occurrence, and vulnerability assessment for the utility interruption hazard for the Delaware County Hazard Mitigation Plan (HMP).

Location and Extent

Utility interruptions occur throughout Delaware County and are often a secondary impact of another hazard. Severe thunderstorms, windstorms, tornados, and winter storms can also lead to more regional utility interruptions, while localized outages can be caused by traffic accidents or wind damage. Heat waves may also result in rolling blackouts where power may not be available for an extended period of time. Utility interruptions have the potential to take place throughout Delaware County (Department 2016).

Range of Magnitude

The most severe utility interruptions will be regional or widespread power and telecommunications outages. With the loss of power, electrical powered equipment and systems will not be operational. Regional loss of power affects lighting; heating, ventilation, and air conditioning (HVAC) and other support equipment; communications; fire and security systems; and refrigeration, which can in turn cause loss of water and sewer service, and food spoilage (PEMA 2019). At a minimum, utility interruptions can cause short term disruption in the orderly functioning of business, government, and private citizen functioning and activities like traffic signals, elevators, and retail sales (Department 2016).

However, loss of heating and cooling capability is more dangerous in the winter and summer months, when heat sensitive populations like the elderly count on utilities and fuel to maintain a safe temperature. A worst case scenario for utility interruption in Delaware County would be a fuel shortage or power outage in the winter months, especially during a severe winter weather event, which may leave many homes without a source of heat (Department 2016).

Past Occurrence

Every year, Delaware County is susceptible to minor utility interruptions either through technological failure or as the result of inclement weather. Table 4.3.21-1 below shows major utility interruptions in the county since 2015. In all, the county experienced over 21 incidents that included downed utility lines from 1996 to December 2021.

Table 4.3.21-1. Utility Interruptions from 1996–2022

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
February 24, 1996	High Wind	-	-	-	N/A	Countywide	Strong winds downed trees and powerlines causing power outages to approximately 45,000 PECO customers. Hardest hit areas were lower Bucks County, Upper Dublin area of Montgomery County, and Delaware County.
March 19, 1996	High Wind	-	-	-	N/A	Countywide	Strong winds led to power outages of 69,000 PECO customers, including 11,000 in Delaware County.
September 7, 1998	Thunderstorm Wind	-	-	-	N/A	Countywide	A squall line of severe thunderstorms knocked down some large limbs and a few trees in Thornbury Township. Frequent lightning also contributed to power outages in the county. About 50,000 PECO Energy customers lost power in Southeast Pennsylvania. There were 5,000 outages in Delaware County. All power was restored the night of the 7th.
August 26-27, 1999	Thunderstorms and Flooding	-	-	-	N/A	Countywide	Thunderstorms with torrential downpours and frequent lightning caused urban and poor drainage flooding, as well as flooding of smaller creeks and streams. The storms also caused power outages. 65,000 PECO customers were without power with the hardest hit areas being Chester and Delaware Counties.
August 25, 2006	Thunderstorm Wind	-	-	-	N/A	Radnor Township	A severe thunderstorm knocked down two trees into one pool in the Villanova area of Radnor Township. Downed tree limbs and wires caused some scattered power outages in the township. About 26,000 PECO Energy customers lost power throughout their southeastern Pennsylvania service area because of the downed trees including Delaware County.
February 2, 2015	Strong Wind	-	-	-	N/A	Countywide	Strong, gusty northwest winds occurred in the wake of a departing and intensifying low pressure system during the late afternoon and early evening on the 2nd in Eastern Pennsylvania. Peak wind gusts average around 50 mph and knocked down weak trees, tree limbs and wires. Power outages occurred. This was further exacerbated by snow and ice on tree limbs.
February 15, 2015	High Wind	-	-	-	N/A	Countywide	The increasing pressure difference (gradient) between a rapidly intensifying low pressure system offshore and an arctic high pressure system moving east from the Great Lakes caused strong northwest winds to occur in Eastern Pennsylvania on the 15th through the early afternoon. PECO Energy reported that 13,000 of its customers lost power.
March 1, 2015	Winter Storm	-	-	-	N/A	Countywide	Double barrel low pressure systems brought a winter storm to Eastern Pennsylvania on the 1st. All snow fell in the Poconos.

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
							Elsewhere a combination of snow, sleet and especially freezing rain in the Philadelphia metropolitan area affected Eastern Pennsylvania. Snowfall averaged one to four inches, but ice accumulations on exposed surfaces reached as high as around one-quarter of an inch in southeastern Pennsylvania. This caused widely scattered power outages
March 5, 2015	Heavy Snow	-	-	-	N/A	Countywide	Waves of low pressure that formed along a sinking cold front brought most of Eastern Pennsylvania (except the Poconos) heavy snow. PECO Energy reported 3,000 of its customers lost power
June 23, 2015	Thunderstorm Wind	-	-	-	N/A	Countywide	ECO Energy reported about 250,000 of its customers lost power in southeastern Pennsylvania due to a squall line of severe thunderstorms: close to 100,000 in Delaware County, close to 75,000 in Chester County and nearly 50,000 within Philadelphia.
June 5, 2016	Thunderstorm Winds	-	-	-	N/A	Countywide	10,000 PECO customers lost power during the storm
June 8, 2016	Thunderstorm Winds	-	-	-	N/A	Countywide	A trough of low pressure moving through the region produced a quick moving line of thunderstorms. These thunderstorms produced widespread wind damage across most of eastern PA with numerous power outages.
July 18, 2016	Thunderstorm Winds	-	-	-	N/A	Countywide	A cold front and associated pre-frontal trough lead to the development of thunderstorms in the afternoon and evening hours. Some of the thunderstorms became severe with damaging winds. The thunderstorms also knocked out power to thousands of people.
October 13, 2016	Thunderstorm Wind	-	-	-	N/A	-	Several reports of downed trees due to thunderstorm winds. The trees blocked area roads and knocked out power.
January 23, 2017	High Wind	-	-	-	N/A	Countywide	Over 10,000 people lost power due to a tight pressure gradient
February 12, 2017	Thunderstorm Wind	-	-	-	N/A	-	High winds blew through the area after a cold frontal passage. A band of thunderstorms moved through Southeastern portions of the state ahead of the front, these storms had a top gust of 55 mph in Chesterville. PECO had over 5,000 outages.
February 25, 2017	Thunderstorm Wind	-	-	-	N/A	-	Several days of record warmth came to an end with a frontal passage. Abnormally high moisture and instability was present ahead of the front. This led to a line of showers and thunderstorms ahead of the front that produced damaging winds and hail during the late afternoon hours. Thousands of people lost power.
March 2, 2017	High Wind	-	-	-	N/A	-	High winds occurred across Eastern Pennsylvania as the pressure gradient tightened behind a frontal system. Over-sized vehicles

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
							were banned on several roads. Several hundred power outages were reported.
July 22-24, 2017	Thunderstorm Wind	-	-	-	N/A	-	A stalled frontal boundary was the focus for several rounds of thunderstorms that produced damaging winds and flooding in spots. Over 8,000 people lost power.
October 24, 2017	Strong Wind	-	-	-	N/A	-	A strong low pressure system over the Great Lakes and a departing high pressure system to our east lead to a tight pressure gradient and a round of strong winds. Several thousand people lost power due to the strong winds.
March 2, 2018	Winter Storm	0	1	-	N/A	Countywide	Strong northwest winds with gusts to near 60 mph occurred on March 2nd and 3rd. This led to widespread damage to trees and power lines, which in turn induced extensive power outages across the region.
March 6, 2018	Winter Storm	-	-	-	N/A	-	Snow fell overnight, which contained large amounts of liquid, making it heavy and wet. This led to downed trees, limbs, and wires resulting in numerous power outages. A Declaration of Disaster Emergency was issued for Delaware County. All government offices were closed. Up to 8,000 customers lost power in Delaware County from the storm.
March 21, 2018	Winter Storm	-	-	-	N/A	-	Moderate to heavy snowfall developed, and gradually overspread Eastern Pennsylvania from Wednesday Morning into the evening. The weight of the heavy, wet snow brought down trees, limbs, and power lines across portions of far Southeast Pennsylvania, which lead to power outages.
February 25, 2019	High Wind	-	-	-	N/A	-	A departing very deep cyclone combined with strong high pressure to the west yielded a strong pressure gradient from the Plains eastward to the northern Mid-Atlantic and New England regions. High winds gusting 50-60 mph resulted in scattered power outages and trees down across the region. Some minor structural damage also occurred.
July 2, 2019	Thunderstorm Wind	-	-	-	N/A	Chelsea	Power outages reported due to thunderstorm winds in the area.
June 3-4, 2020	Thunderstorm Wind	-	-	-	N/A	-	An area of thunderstorms, some of them severe, moved from northwest to southeast across southeastern Pennsylvania during the mid-morning hours on Wednesday, June 3rd. Then a derecho, which developed just southeast of Lake Erie during the early morning hours, moved rapidly southeast across Pennsylvania before exiting off the New Jersey coast by early afternoon (130 PM). Over 208,000 power outages were reported in southeastern Pennsylvania as a result of fallen trees on power lines.

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
April 30, 2021	High Wind	-	-	-	N/A	-	Combined with strong dynamics associated with the secondary cold front, a lengthy period of windy conditions developed for much of the day on the 30th. Widespread wind gusts of 45 to 55 mph, with some gusts of 60 to 65 mph, occurred. This, combined with many trees across the region already bearing leaves, led to numerous instances of tree damage and power outages across the region.
June 14, 2021	Thunderstorm Wind	-	-	-	N/A	Newtown Square	Strong thunderstorms brought high winds that downed trees in Delaware County, causing power outages.

Source: NOAA NCEI 2022; Delaware County HMP 2016

Future Occurrence

Minor power failure (in other words, short outage events) may occur several times a year for any given area in the County, while major events (long, widespread outage events) take place once every few years. Power failures often occur during severe weather; therefore, they should be expected during those events.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of utility interruption events for Delaware County. Information from the 2016 Delaware County HMP, the NOAA NCEI Storm Events Database, and input from Delaware County were used to identify the number of utility interruption events that occurred between 1996 and 2022. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a utility interruption event occurring in any given year in Delaware County.

Table 4.3.21-2. Probability of Future Utility Interruption Events

Hazard Type	Number of Occurrences Between 1996 and 2022	Percent chance of occurrence in any given year
Utility Outage	104	100%

Sources: NOAA NCEI 2022; Delaware County HMP 2016

Note: Information on events for 1996 to 2022 was limited and based on NOAA NCEI Storm Events and newspaper coverage. Therefore, it can be assumed that the number of events listed for that time period is conservative.

Based on available historical data, the future occurrence of utility interruption events can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4) with minor events happening more frequently than major or long term interruptions in the future.

Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the identified hazard area. This section discusses the potential impact of the utility interruption hazard on Delaware County in the following subsections:

- Impact on (1) life, health, and safety; (2) general building stock and critical facilities; (3) the economy; (4) the environment; and (5) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will assist understanding of this hazard over time

Impact on Life, Health, and Safety

Utility interruptions most severely affect individuals with access and functional needs (such as children, the elderly, and individuals with special medical needs). Special medical equipment will not function without power. Likewise, a loss of air conditioning during periods of extreme heat or the loss of heating during extreme cold can be especially detrimental to those with medical needs, children, and the elderly. Table 4.3.21-3 shows the demographic change in the county for children and the elderly from 2010 through 2020. The population under the age of 5, under 18 years, population over the age of 65 have increased, as shown in Table 4.3.21-3. Data on individuals with special medical needs were not available. Additionally, first responders' safety may be at risk during on-scene operations and they may not be able to respond in a timely manner due to electrical or utility fires. First responders may need to take on additional duties due to a higher than normal call volume and demand, traffic control, and responding to transportation incidents.

Table 4.3.21-3. Demographic Trends for Vulnerable Populations

Vulnerable Population	2010 Census	2020 Census	2010 to 2020 Change
Under 5 years	33,388	33,734	346
18 years and over	425,141	439,657	14,516
65 years and over	79,574	90,402	10,828

Source: U.S. Census Bureau 2010, U.S Census Bureau 2020, and 2015 – 2019 American Community Survey 5-Year Estimates

Impact on General Building Stock and Critical Facilities

All facility infrastructure considered critical are vulnerable to utility interruptions, especially the loss of power. The establishment of reliable backup power at these facilities is extremely important to continue to provide for the health, safety, and well-being of Delaware County's population.

Impact on the Economy

During a utility interruption event, the County may experience losses because of an interruption of critical services. Further, increased costs such as providing shelters, and costs related to cooling and heating centers may be incurred. Extended power outages will require officials to shelter victims who require heat and power for activities of daily living.

Power interruptions can cause economic impacts stemming from lost income, spoiled food and other goods, costs to the owners/operators of the utility facilities, and costs to government and community service groups. FEMA's benefit-cost analysis methodology measures the loss of electrical service on a per-person-per-day-of-lost-service basis for the service area affected.

Interruption of utility gas or potable water distribution could also cause significant economic impacts such as: additional costs for bringing in water tenders to maintain fire suppression capabilities; opening additional warming centers should electric and utility gas utility be interrupted to residential areas; and distribution of potable water for public consumption. There could be significant costs associated with reimbursing fire departments from other counties to travel, staff, and maintain water tenders within Delaware County during the duration of a water outage event.

Potential modeling of economic impacts from utility interruption would be calculating interruption of service costs which is derived from a standard value per person per day multiplied out by the number of customers served. This would help to provide an estimate of the impact of the interrupted utility service but may not be representative of the complete economic impact of a prolonged utility interruption.

The FEMA Benefit-Cost Analysis (BCA) Toolkit v.5.3.0 has standard values based on the daily cost per rate-paying connection. The daily cost-per-connection value is shown in Table 4.3.21-4.

Table 4.3.21-4. FEMA BCA Toolkit v5.3.0 Daily Standard Values of Utility Services

Utility	Daily Value (per connection/per day)
Electric	$148.00
Potable Water	$105.00
Wastewater	$49.00

Source: FEMA 2009

Impact on the Environment

The most significant impact associated with utility interruptions is when the interruption involves a release of hazardous materials. This hazardous material may be released in a pipeline accident or when a material is in transit. Section 4.3.5 and 6, Environmental Hazards, includes a complete discussion on the impacts of a hazardous materials release. Pipelines carrying flammable materials also have the possibility of exploding or starting a fire (PEMA 2019).

A number of secondary impacts are associated with utility interruptions. First, interruptions could affect the ability of the government to function, especially if backup power generators or supply is inadequate or unavailable. Utility interruptions also can reduce the efficient and effective communication that is essential to first responders. Heating loss and severe cold can also impact the health and safety of at-risk populations like young children, the elderly, and individuals with disabilities (PEMA 2019).

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Delaware County (further discussed in Section 2.4 of this HMP). Any areas of growth could be potentially impacted by the utility interruption hazard because the entire county is exposed and potentially vulnerable. An increase in development and population will increase demand for power supply and has the ability to increase the likelihood of utility interruption incidents.

Effect of Climate Change on Vulnerability

According to the Fourth National Climate Assessment, two climate-change scenarios were modeled, and temperature change in the northeastern United States is estimated to increase between 3.98 - 5.09°F by 2036-2065, and between 5.27 - 9.11°F by 2071-2100. The annual mean temperature change in Pennsylvania is projected to increase between 5.9 - 6.3°F by 2041 - 2070. Some areas of the world may experience greater temperature changes than others. It is important to note that frequency estimates may not be an accurate representation of future conditions due to the unknown impacts of climate change (PEMA 2018).

Increased average temperatures as a result of climate change make the occurrence of extreme heat more likely. While increased average temperatures would make the occurrence of extreme cold less likely, some climatologists have suggested that warming in the Arctic could impact the position of the jet stream, allowing for more extreme cold weather events to occur. While some research supports this concept, others do not and the impact of climate change on cold weather events is not fully understood (Climate Central 2013). Extreme heat and cold result in greater strain on utilities, increasing the likelihood of utility interruption.

Climatologists expect an increase in the number and intensity of severe weather events. This will include wind events such as hurricanes, tornadoes, and wind associated with thunderstorms, among other phenomena. More storms with higher winds will increase the chance that the utility infrastructure will be impacted by these storms. Additionally, climatologists expect an increase in precipitation, which could come in the form of heavy downpours or winter weather thus causing additional utility interruptions. Increased risk of drought may also threaten water utilities.

Additional Data and Next Steps

For future plan updates, Delaware County can track data on power outage events and obtain additional information on past and future events, particularly in terms of any injuries, deaths, shelter needs, pipe-freeze incidents, and other impacts. These data will help to identify any concerns or trends for which mitigation measures should be developed or refined. In time, quantitative modeling of estimated power outage events may be feasible as data are gathered and improved.

4.3.22 Wildfire

This section provides a profile of and vulnerability assessment for the wildfire hazard. A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. A wildland fire is a wildfire in an area where development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. A wildland-urban interface (WUI) fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Location and Extent

Wildfires take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels. They can occur any time of the year, but mostly occur during long, dry, hot spells. Any small fire, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes, and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in open fields, grass, dense brush, and forests.

Wildfires can occur at any time of the year but are most likely in Delaware County during a drought, and can occur in fields, grass, and brush as well as in the forest itself. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands.

Figure 4.3.22-1 illustrates the land cover across Delaware County. As the figure shows, a small percentage of Delaware County is forested. Figure 4.3.22-2 shows the locations of wildfires throughout Pennsylvania that the Pennsylvania Department of Conservation and Natural Resources (PA DCNR), Bureau of Forestry (BOF) responded to from 1992 to 2015. Wildfires are known to be an underreported event. Many wildfires occur every year and are suppressed by volunteer fire departments without any response or assistance from BOF. Also, some smaller fires may not be identified or responded to at all. Therefore, these locally controlled blazes may not be represented in BOF records.

Figure 4.3.22-1. Land Cover in Delaware County

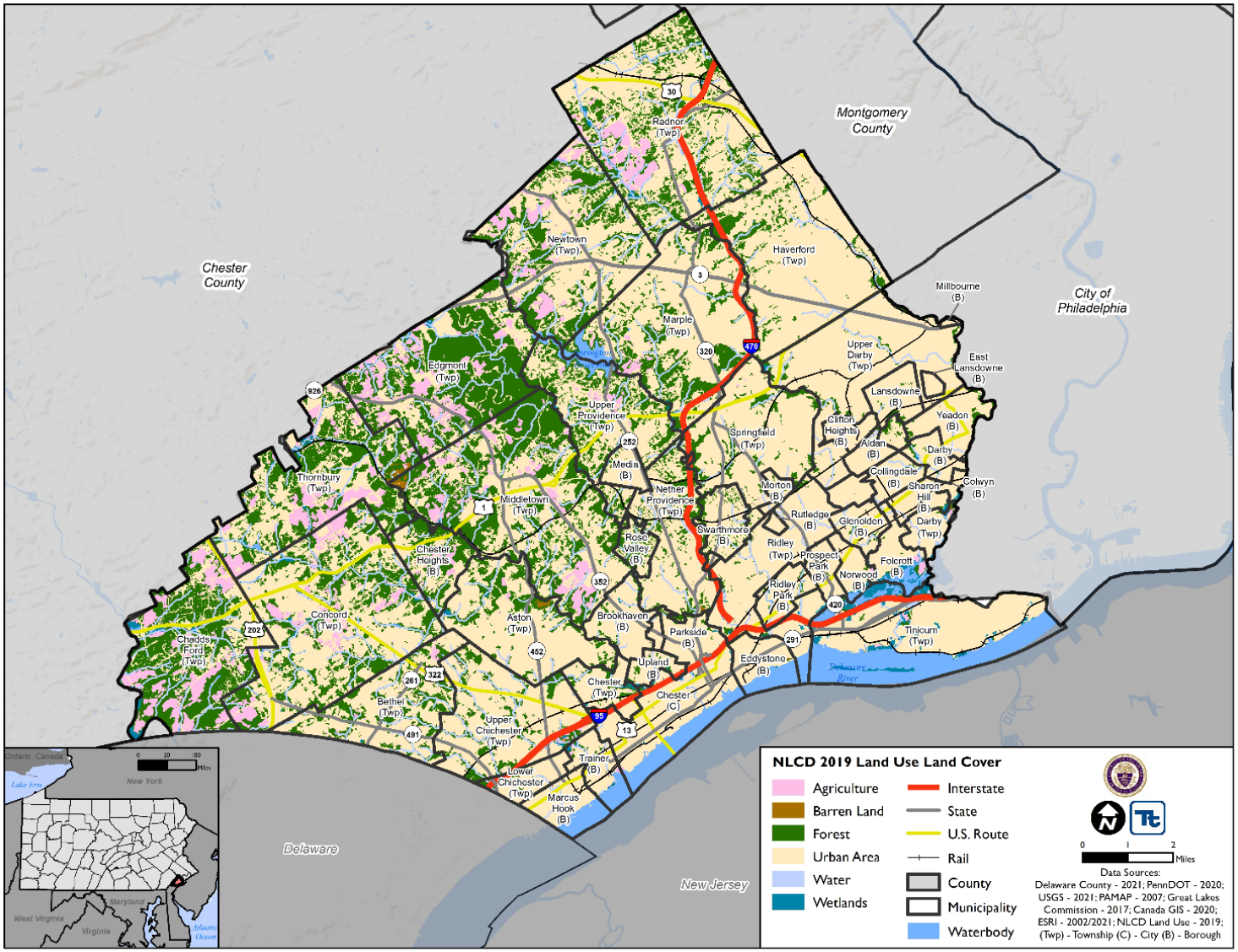
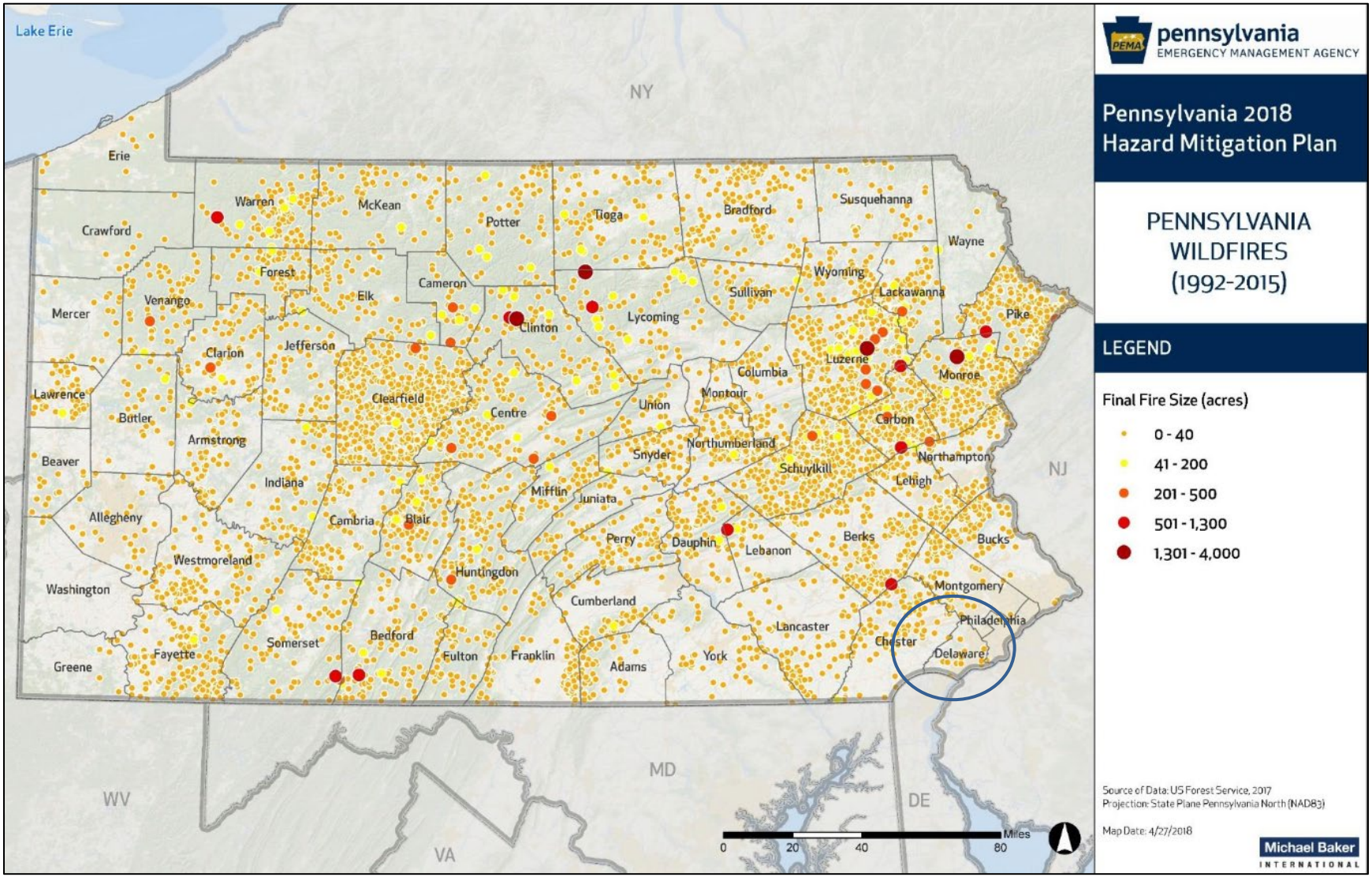


Figure 4.3.22-2. Location of Wildfire Events responded to by BOF from 1992–2015



Source: PEMA 2018

Note: Blue oval was added to highlight Delaware County's location within Pennsylvania.

According to the Commonwealth of Pennsylvania 2018 State Hazard Mitigation Plan, areas of the Commonwealth with large home developments built in volatile fuel types are at risk for catastrophic wildfires. Many areas of the state are at risk for large wildfires, but northeastern Pennsylvania is the most at risk for loss of life and/or property because of the number of homes at risk for wildfires. In southeastern Pennsylvania, communities are most susceptible to large fires accidentally started by people; fires of this type include those ignited by sparks from railroads cars that run parallel to and on the banks of the Susquehanna River (PEMA 2019).

Several tools are available to estimate fire potential location and extent, including (but not limited to) the WUI, Wildland Fire Assessment System, and PA DCNR Priority Landscape Analysis. These tools are discussed in further detail below.

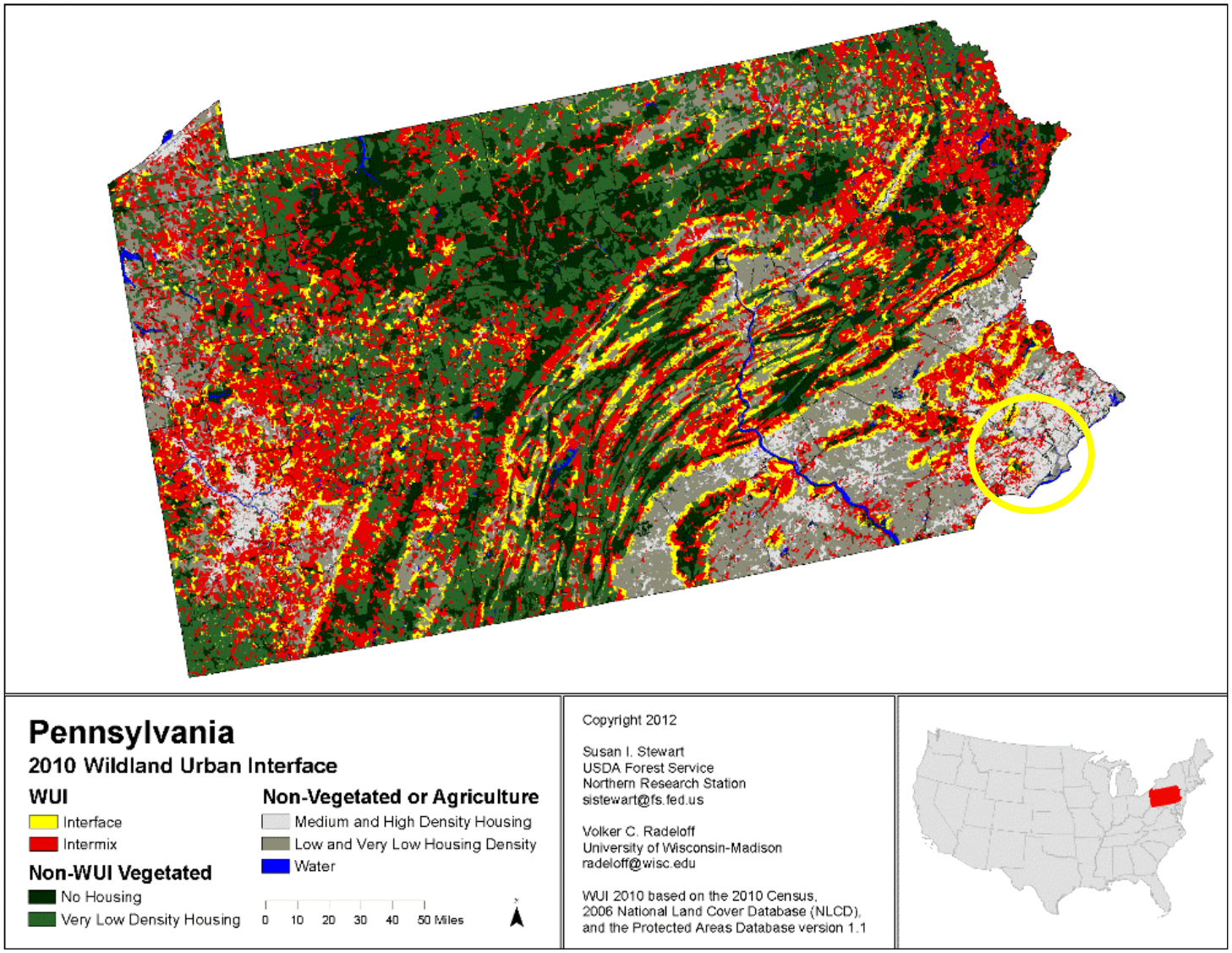
Wildland/Urban Interface (WUI)

The WUI is considered the area where houses and wildland vegetation coincide. The WUI is divided into two categories: intermix and interface. Intermix WUI are areas where housing and vegetation "intermingle." Intermix areas have more than one house per 40 acres and have more than 50 percent vegetation. Interface WUI are areas with housing in the vicinity of contiguous wildland vegetation. Interface areas have more than one house per 40 acres, have less than 50 percent vegetation, and are within 1.5 miles of an area larger than 1,235 acres that is more than 75 percent vegetated (Stewart 2015).

The California Fire Alliance determined that areas within 1.5 miles of wildland vegetation are the approximate distance that firebrands can be carried from a wildland fire to the roof of a house. Therefore, even structures not located within the forest are at risk from wildfire. This buffer distance, along with housing density and vegetation type, were used to define the WUI (Stewart 2015).

Concentrations of WUI can be seen along the east coast of the United States, including the area around Pittsburgh, Pennsylvania, and the eastern half of Pennsylvania. Delaware County is identified as having many areas of low-density housing or very low-density housing because of the large amount of agricultural area. Areas where recreation and tourism dominate are also places where WUI is common (Stewart 2015). Figure 4.3.22-3 depicts the WUI for Pennsylvania in 2010, and Figure 4.3.22-4 illustrates the WUI for Delaware County. Concentrations of WUI areas greater than 50 percent are classified as WUI (intermix or interface) in the county.

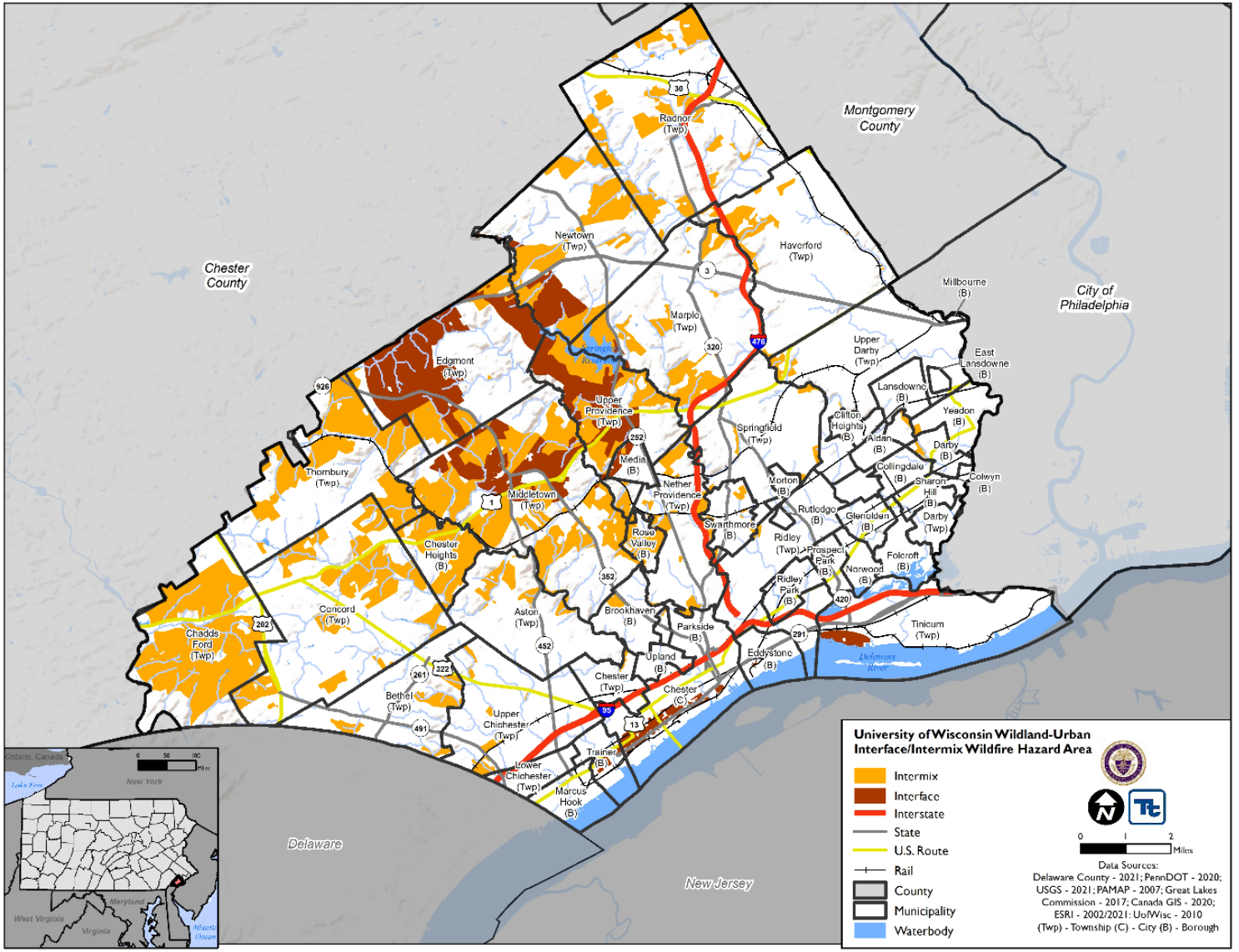
Figure 4.3.22-3. 2010 WUI for Pennsylvania



Source: *Stewart 2015*

Note: *Yellow oval highlights Delaware County's location within Pennsylvania.*

Figure 4.3.22-4. Wildfire Urban Intermix/Interface for Delaware County



Wildland Fire Assessment System (WFAS)

The WFAS is an Internet-based information system maintained at the National Interagency Fire Center (NIFC) in Boise, Idaho, that provides a national view of weather and fire potential, including national fire danger information, weather maps, and satellite-derived "Greenness" maps (USFS, Wildland Fire Assessment System 2022). Each day during the fire season, national maps of selected fire weather and fire danger components of the National Fire Danger Rating System (NFDRS) are produced by the WFAS (USFS, Fire Danger Rating 2022). The Fire Danger Rating level, described in Table 4.3.22-1 below, takes into account current and antecedent weather, fuel types, and both live and dead fuel moisture. The adjective class rating is a method of rating classes across different fuel models, indexes, and station locations. It is based primarily on a fuel model cataloged for the station, the fire danger index selected to reflect staffing levels, and climatological class breakpoints. Local station managers provide this information to USFS (USFS, Fire Danger Rating 2022).

Table 4.3.22-1. Fire Danger Rating and Color Code

Fire Danger Rating and Color Code	Description
Low (L) (Dark Green)	Fuels do not ignite readily from small firebrands, although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering and burning in irregular fingers. There is little danger of spotting.
Moderate (M) (Light Green or Blue)	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (H) (Yellow)	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly, and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while they are small.
Very High (VH) (Orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
Extreme (E) (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash (trunks, branches, and treetops) or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

Source: USFS 2012

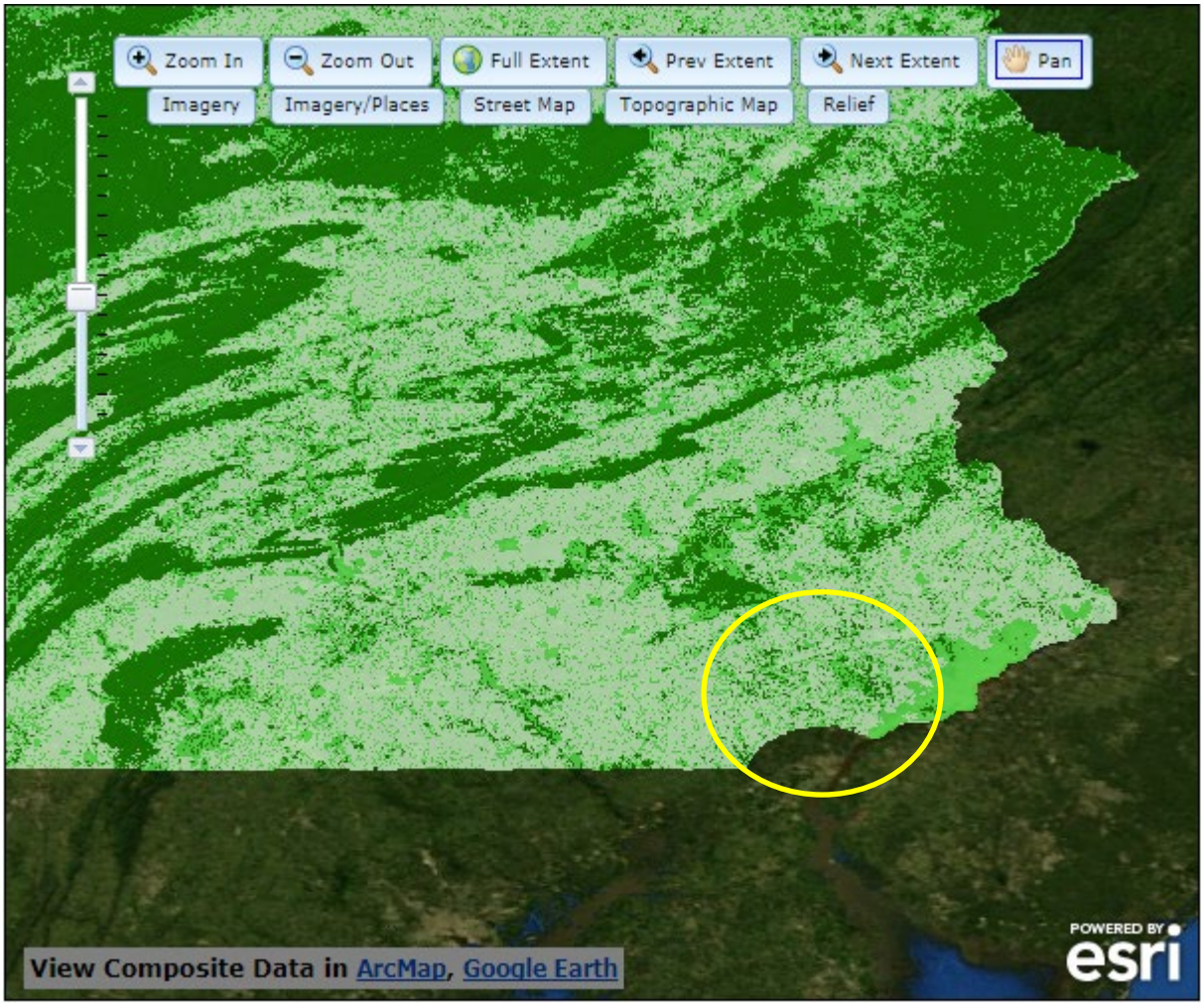
Pennsylvania Department of Conservation and Natural Resources (PA DCNR) Priority Landscape Analysis

The PA DCNR conducted a wildfire priority landscape analysis identifying areas where wildland fires are predicted to occur and become problematic. The areas are classified into high, medium, and low categories. The high classification is defined as an area prone to extreme fire behavior, with the potential to cause extensive property damage, or that could threaten the safety of the Commonwealth's citizens. Figure 4.3.22-5 illustrates

the output for the wildfire priority landscapes model for Delaware County. The following five datasets were used for this analysis:

- 2002 WUI
- 2006 LANDFIRE
- 2002–2008 Pennsylvania Wildfire Point Origin Occurrences
- Percent Slope
- 2009 Local Assessment of Values, Risks, Hazards

Figure 4.3.22-5. Wildfire Priority Landscapes in Delaware County



Source: *PA DCNR 2017*
Notes: *Low Priority = 0–0.21 (light green); Medium Priority = 0.21–0.35 (medium green); High Priority = 0.35–1 (dark green)*
Dauphin County location within yellow oval

Range of Magnitude

Wildfire events in Delaware County can range from small fires that can be managed by local firefighters to large fires burning many acres of land. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support. The impact of a severe wildfire can be devastating. A

wildfire has the potential to kill people, livestock, fish, and wildlife. They often destroy property, valuable timber, forage, and recreational and scenic resources.

In addition to the risk wildfires pose to the general public and property owners, the safety of firefighters is also a concern. Although loss of life among firefighters does not occur often in Pennsylvania, it is always a risk. More common firefighting injuries include falls, sprains, abrasions, or heat-related injuries, such as dehydration. Response to wildfires also exposes emergency responders to the risk of motor vehicle accidents and can place them in remote areas away from the communities that they are chartered to protect.

While some fires are not human-caused and are part of natural succession processes, a wildfire can kill people, livestock, fish, and wildlife. They often destroy property, valuable timber, forage, and recreational and scenic values. The most significant environmental impact is the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground-cover loss following a fire event. Wildfire can also have a positive environmental impact in that they burn dead trees, leaves, and grasses to allow more open spaces for new vegetation to grow and receive sunlight. Another positive effect is that it stimulates the growth of new shoots on trees and shrubs and its heat can open pinecones and other seed pods.

Past Occurrence

Many sources provided wildfire information regarding previous occurrences and losses associated with wildfire throughout Pennsylvania and Delaware County. With so many sources reviewed for the purpose of this HMP Update, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP update.

Between 1954 and 2022, Pennsylvania was not included in any FEMA fire management assistance (FMA) declarations. Generally, these disasters cover a wide range of the State; therefore, the disaster may have impacted many counties (FEMA 2022).

For this 2022 HMP update, known wildfire events that have impacted Delaware County between 2001 and 2020 are identified in Table 4.3.22-2. This includes events presented in the 2016 Delaware County HMP and events listed in the NOAA-NCEI storm events database. With wildfire documentation being limited during the planning process, not all events have been identified for researched. Therefore, Table 4.3.22-2 may not include all events that have occurred in the County.

Table 4.3.22-2. Wildfire Events in Delaware County, 2001 to 2022

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
November 11, 2001	Wildfire	-	-	-	N/A	Edgmont Township	A wildfire consumed dried leaves, grasses, and wood near Ridley Creek Park in Edgewater. Winds and dry conditions helped the fire spread quickly. Two other firefighting units assisted in extinguishing the fire.
2001	Wildfire	-	-	-	N/A	Folcroft Borough	0.2 acres burned
2001	Wildfire	-	-	-	N/A	Folcroft Borough	0.1 acres burned
2002	Wildfire	-	-	-	N/A	Chester Heights Borough	1 acre burned
2003	Wildfire	-	-	-	N/A	Upper Chichester Township	1.3 acres burned
2004	Wildfire	-	-	-	N/A	Upper Providence Township	0.1 acres burned
2004	Wildfire	-	-	-	N/A	Brookhaven Township	1 acre burned
2005	Wildfire	-	-	-	N/A	Tinicum Township	0.2 acres burned
2005	Wildfire	-	-	-	N/A	Newtown Township	0.17 acres burned
2005	Wildfire	-	-	-	N/A	Middletown Township	0.3 acres burned
2006	Wildfire	-	-	-	N/A	Concord Township	1.25 acres burned
2006	Wildfire	-	-	-	N/A	Yeadon Borough	0.1 acres burned
2006	Wildfire	-	-	-	N/A	Upper Providence Township	0.25 acres burned
2006	Wildfire	-	-	-	N/A	Aston Township	2.25 acres burned
April 9, 2012	Wildfire	-	-	$10,000	N/A	N/A	In Delaware County, a residential structure was destroyed by a nearby brush fire.
September 14, 2016	Wildfire	-	-	-	N/A	Springfield Township	A brush fire is Springfield Township caused a temporary closure of the Blue Route. The brush fire was reported along the southbound lanes near Macdade Boulevard.

Sources: FEMA 2022; NOAA-NCEI 2022; Delaware County HMP 2016

Note: Not all events that have occurred in Delaware County are included due to the extent of documentation and the fact that not all sources have been identified or researched.

Future Occurrence

In Pennsylvania, wildfire events will continue to occur each year. However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. Additionally, invasive forest insects can increase the likelihood of wildfires occurring; insects that attack and kill trees increase the total wildfire fuel available in wooded areas. Climate change is also likely to increase the probability of future wildfires. Prolonged periods of drought caused by climate change can potentially increase the length of the wildfire season and provide a more favorable climate for ignition (PEMA 2018).

For this 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of wildfire events for Delaware County. Information from PA DCNR was used to identify the number of wildfire events that occurred between 2002 and April 2022 to ensure the most accurate probability estimates possible. The table below shows these statistics as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year, using the PA DCNR's complete records from 2002 to 2020. Based on these statistics, there is an estimated 72.7% percent chance of a wildfire event occurring in any given year in Delaware County.

Table 4.3.22-3. Probability of Future Wildfire Events

Hazard Type	Number of Occurrences Between 2001 and 2022	Percent Chance of Occurrence in Any Given Year
Wildfires	16	72.7%

Source: NOAA-NCEI 2022; Delaware County HMP 2016

Based on available historical data, the future occurrence of wildfires in Delaware County can be considered *likely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4). However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, such as drought and wind, can increase the likelihood of wildfires occurring. Any fire, without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the wildfire hazard on the county, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

Wildfires have the potential to impact human health and life of residents and responders, structures, infrastructure, and natural resources. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. First

responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. Table 4.3.22-4 summarizes the estimated population exposed to the wildfire hazard by municipality.

Table 4.3.22-4. Estimated Population Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas in Delaware County

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Hazard Areas			
		Number of People in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of People in the WUI Intermix Wildfire Hazard Area	Percent of Total
Aldan (B)	4,244	0	0.0%	0	0.0%
Aston (Twp)	16,791	0	0.0%	822	4.9%
Bethel (Twp)	9,574	0	0.0%	818	8.5%
Brookhaven (B)	8,300	0	0.0%	61	0.7%
Chadds Ford (Twp)	3,972	0	0.0%	2,186	55.0%
Chester City (C)	32,605	3,835	11.8%	0	0.0%
Chester (Twp)	4,080	0	0.0%	382	9.4%
Chester Heights (B)	2,897	0	0.0%	1,540	53.2%
Clifton Heights (B)	6,863	0	0.0%	0	0.0%
Collingdale (B)	8,908	0	0.0%	0	0.0%
Colwyn (B)	2,474	0	0.0%	0	0.0%
Concord (Twp)	18,295	0	0.0%	3,150	17.2%
Darby (B)	10,715	0	0.0%	196	1.8%
Darby (Twp)	9,219	0	0.0%	0	0.0%
East Lansdowne (B)	2,714	0	0.0%	0	0.0%
Eddystone (B)	2,459	56	2.3%	0	0.0%
Edgmont (Twp)	4,283	3,602	84.1%	523	12.2%
Folcroft (B)	6,792	0	0.0%	0	0.0%
Glenolden (B)	7,223	0	0.0%	137	1.9%
Haverford (Twp)	50,431	0	0.0%	567	1.1%
Lansdowne (B)	11,107	0	0.0%	2	0.0%
Lower Chichester (Twp)	3,425	0	0.0%	0	0.0%
Marcus Hook (B)	2,454	0	0.0%	0	0.0%
Marple (Twp)	24,214	99	0.4%	1,420	5.9%
Media (B)	5,901	1,256	21.3%	43	0.7%
Middletown (Twp)	16,373	3,299	20.1%	5,760	35.2%
Millbourne (B)	1,212	0	0.0%	0	0.0%
Morton (B)	2,778	0	0.0%	0	0.0%
Nether Providence (Twp)	14,525	0	0.0%	1,186	8.2%
Newtown (Twp)	15,002	825	5.5%	2,513	16.8%
Norwood (B)	5,943	0	0.0%	0	0.0%
Parkside (B)	2,321	0	0.0%	85	3.6%
Prospect Park (B)	6,427	0	0.0%	0	0.0%
Radnor (Twp)	33,228	0	0.0%	4,749	14.3%
Ridley (Twp)	31,053	0	0.0%	72	0.2%
Ridley Park (B)	7,186	0	0.0%	0	0.0%
Rose Valley (B)	1,017	0	0.0%	605	59.5%
Rutledge (B)	782	0	0.0%	0	0.0%
Sharon Hill (B)	6,014	0	0.0%	0	0.0%
Springfield (Twp)	25,070	0	0.0%	496	2.0%
Swarthmore (B)	6,543	0	0.0%	450	6.9%
Thornbury (Twp)	6,904	20	0.3%	2,470	35.8%
Tinicum (Twp)	3,983	1,359	34.1%	0	0.0%
Trainer (B)	1,976	316	16.0%	0	0.0%
Upland (B)	3,068	0	0.0%	0	0.0%
Upper Chichester (Twp)	16,898	0	0.0%	465	2.8%
Upper Darby (Twp)	85,681	0	0.0%	669	0.8%
Upper Providence (Twp)	10,852	4,114	37.9%	2,133	19.7%
Yeadon (B)	12,054	0	0.0%	286	2.4%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**576,830**	**18,781**	**3.3%**	**33,786**	**5.9%**

Source: Census 2010/2020

Notes: Census 2020 decennial population data was used to update the Census 2010 daysmetric block population estimates. Census 2010 dasymetric blocks were used to estimate the areas where development exists in each municipality. These boundaries may over or underestimate the density location of population within each municipality, impacting the exposure results.

Impact on General Building Stock

The most vulnerable structures to wildfire events are those within the wildfire urban interface/intermix hazard area. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete. To estimate the buildings exposed to the wildfire hazard, the WUI was overlaid upon the updated building inventory. The replacement cost value of the structures with their center in the WUI were totaled (refer to Table 4.3.22-5).

Out of the general building stock (196,420 buildings), 3.4 percent sit in the wildfire interface area and 5.6 percent sit in the wildfire intermix area. The Township of Upper Providence has the greatest number of buildings within in the wildfire interface area (1,410 buildings). The Township of Middletown has the greatest number of buildings in the wildfire intermix area (1,701 buildings).

Table 4.3.22-5. Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas in Delaware County

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Number of Buildings in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of Buildings in the WUI Intermix Wildfire Hazard Area	Percent of Total
Aldan (B)	1,673	0	0.0%	0	0.0%
Aston (Twp)	6,202	0	0.0%	312	5.0%
Bethel (Twp)	3,164	0	0.0%	271	8.6%
Brookhaven (B)	3,185	0	0.0%	29	0.9%
Chadds Ford (Twp)	1,402	0	0.0%	756	53.9%
Chester City (C)	11,646	1,603	13.8%	0	0.0%
Chester (Twp)	1,596	0	0.0%	144	9.0%
Chester Heights (B)	1,022	0	0.0%	543	53.1%
Clifton Heights (B)	2,324	0	0.0%	0	0.0%
Collingdale (B)	3,130	0	0.0%	0	0.0%
Colwyn (B)	839	0	0.0%	0	0.0%
Concord (Twp)	5,400	0	0.0%	1,000	18.5%
Darby (B)	3,569	0	0.0%	61	1.7%
Darby (Twp)	3,763	0	0.0%	0	0.0%
East Lansdowne (B)	906	0	0.0%	0	0.0%
Eddystone (B)	876	23	2.6%	0	0.0%
Edgmont (Twp)	1,579	1,274	80.7%	220	13.9%
Folcroft (B)	2,500	0	0.0%	0	0.0%
Glenolden (B)	2,453	0	0.0%	41	1.7%
Haverford (Twp)	17,876	0	0.0%	184	1.0%
Lansdowne (B)	3,838	0	0.0%	1	0.0%
Lower Chichester (Twp)	1,266	0	0.0%	0	0.0%
Marcus Hook (B)	831	0	0.0%	0	0.0%
Marple (Twp)	8,652	34	0.4%	491	5.7%
Media (B)	2,076	438	21.1%	18	0.9%
Middletown (Twp)	5,161	858	16.6%	1,701	33.0%
Millbourne (B)	243	0	0.0%	0	0.0%
Morton (B)	927	0	0.0%	0	0.0%
Nether Providence (Twp)	5,153	0	0.0%	435	8.4%
Newtown (Twp)	4,691	288	6.1%	842	17.9%
Norwood (B)	2,092	0	0.0%	0	0.0%
Parkside (B)	851	0	0.0%	32	3.8%
Prospect Park (B)	2,086	0	0.0%	0	0.0%
Radnor (Twp)	8,992	0	0.0%	1,291	14.4%
Ridley (Twp)	11,070	0	0.0%	24	0.2%
Ridley Park (B)	2,403	0	0.0%	0	0.0%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Number of Buildings in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of Buildings in the WUI Intermix Wildfire Hazard Area	Percent of Total
Rose Valley (B)	402	0	0.0%	243	60.4%
Rutledge (B)	287	0	0.0%	0	0.0%
Sharon Hill (B)	2,024	0	0.0%	0	0.0%
Springfield (Twp)	9,233	0	0.0%	181	2.0%
Swarthmore (B)	1,721	0	0.0%	149	8.7%
Thornbury (Twp)	2,361	7	0.3%	863	36.6%
Tinicum (Twp)	1,917	552	28.8%	0	0.0%
Trainer (B)	678	99	14.6%	0	0.0%
Upland (B)	1,297	0	0.0%	0	0.0%
Upper Chichester (Twp)	6,005	0	0.0%	169	2.8%
Upper Darby (Twp)	27,681	0	0.0%	207	0.7%
Upper Providence (Twp)	3,636	1,410	38.8%	845	23.2%
Yeadon (B)	3,741	0	0.0%	59	1.6%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**196,420**	**6,587**	**3.4%**	**11,111**	**5.7%**

Source: Source: Census 2010

Notes: Census 2010 dasymetric block boundaries may not perfectly align with current jurisdictional boundaries. Census 2010 data may over or underestimate the number of buildings found in each municipality.

B – Borough; C – City; T – Township; % - Percent

Impact on Critical Facilities

It is recognized that a number of critical facilities are located in the wildfire hazard area. Facilities at risk of impact from a wildfire include locations for vulnerable populations (i.e., schools and senior facilities) and emergency response agencies (i.e., fire and police). Table 4.3.22-6 summarizes the distribution of the 79 critical facilities located within the wildfire hazard area by jurisdiction. Of this total, 54 of the critical facilities are considered lifelines. The Township of Concord has the greatest number of critical facilities built in the Wildland-Urban interface/intermix hazard areas (16). The exposed lifelines are categorized into FEMA lifelines, as presented in Table 4.3.22-7.

Table 4.3.22-6. Number Lifelines Exposed to the Wildfire Urban Interface/Intermix Hazard Area

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Wildland-Urban Interface/Intermix Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Aldan (B)	6	6	0	0.0%	0	0.0%
Aston (Twp)	39	37	1	2.6%	1	2.7%
Bethel (Twp)	15	15	0	0.0%	0	0.0%
Brookhaven (B)	16	15	1	6.3%	1	6.7%
Chadds Ford (Twp)	17	16	5	29.4%	5	31.3%
Chester City (C)	88	83	6	6.8%	5	6.0%
Chester (Twp)	21	20	0	0.0%	0	0.0%
Chester Heights (B)	5	5	1	20.0%	1	20.0%
Clifton Heights (B)	14	12	0	0.0%	0	0.0%
Collingdale (B)	16	13	0	0.0%	0	0.0%
Colwyn (B)	7	6	0	0.0%	0	0.0%
Concord (Twp)	49	45	15	30.6%	13	28.9%
Darby (B)	31	27	0	0.0%	0	0.0%
Darby (Twp)	22	21	0	0.0%	0	0.0%
East Lansdowne (B)	7	7	0	0.0%	0	0.0%
Eddystone (B)	18	18	0	0.0%	0	0.0%
Edgmont (Twp)	16	16	14	87.5%	14	87.5%
Folcroft (B)	18	16	0	0.0%	0	0.0%
Glenolden (B)	21	20	0	0.0%	0	0.0%
Haverford (Twp)	87	83	2	2.3%	2	2.4%
Lansdowne (B)	26	24	0	0.0%	0	0.0%
Lower Chichester (Twp)	13	12	0	0.0%	0	0.0%
Marcus Hook (B)	21	20	0	0.0%	0	0.0%
Marple (Twp)	64	57	4	6.3%	4	7.0%
Media (B)	26	21	2	7.7%	2	9.5%
Middletown (Twp)	62	59	34	54.8%	32	54.2%
Millbourne (B)	4	4	0	0.0%	0	0.0%
Morton (B)	6	5	0	0.0%	0	0.0%
Nether Providence (Twp)	34	33	0	0.0%	0	0.0%
Newtown (Twp)	44	39	12	27.3%	10	25.6%
Norwood (B)	15	13	0	0.0%	0	0.0%
Parkside (B)	6	6	0	0.0%	0	0.0%
Prospect Park (B)	20	19	0	0.0%	0	0.0%
Radnor (Twp)	78	74	9	11.5%	9	12.2%
Ridley (Twp)	66	62	0	0.0%	0	0.0%
Ridley Park (B)	23	22	0	0.0%	0	0.0%
Rose Valley (B)	4	4	3	75.0%	3	75.0%
Rutledge (B)	1	1	0	0.0%	0	0.0%
Sharon Hill (B)	18	16	0	0.0%	0	0.0%
Springfield (Twp)	63	61	1	1.6%	1	1.6%
Swarthmore (B)	16	13	0	0.0%	0	0.0%
Thornbury (Twp)	22	21	7	31.8%	7	33.3%
Tinicum (Twp)	24	23	1	4.2%	1	4.3%
Trainer (B)	13	13	1	7.7%	1	7.7%
Upland (B)	14	14	0	0.0%	0	0.0%

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Total Lifelines Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Wildland-Urban Interface/Intermix Hazard Area			
			Critical Facilities	Percent of Total Critical Facilities	Lifelines	Percent of Total Lifelines
Upper Chichester (Twp)	31	28	0	0.0%	0	0.0%
Upper Darby (Twp)	153	138	2	1.3%	2	1.4%
Upper Providence (Twp)	27	25	15	55.6%	13	52.0%
Yeadon (B)	23	22	0	0.0%	0	0.0%
Brandywine Conservancy and Museum of Art Special District	N/A	N/A	N/A	N/A	N/A	N/A
Delaware County (Total)	**1,430**	**1,330**	**136**	**9.5%**	**127**	**9.5%**

Source: Source: Delaware County 2021/2022; HIFLD 2018/2022; UofWisc 2010

Table 4.3.22-7. Number Lifelines Exposed to the Wildfire Urban Interface/Intermix Hazard Area

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Wildland-Urban Interface Wildfire Hazard Area	Number of Lifelines Located in the Wildland-Urban Intermix Wildfire Hazard Area
Communications	10	1	1
Energy	55	1	1
Food, Water, Shelter	45	7	7
Hazardous Materials	160	6	5
Health and Medical	50	6	4
Safety and Security	968	29	49
Transportation	42	1	9
Delaware County (Total)	**1,330**	**51**	**76**

Source: Source: Delaware County 2021/2022; HIFLD 2018/2022; UofWisc 2010

Impact on the Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed business. These events may cost thousands of taxpayer dollars to suppress and control and may involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that excuse volunteers from working to fight these fires.

Impact on the Environment

According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life (Tecle A., Neary D. 2015). Studies show that urban fires, in particular, are more harmful to the environment than forest fires (Radeloff et al..2018). The age and density of infrastructure within Delaware County can exacerbate consequences of fires on the environment because of the increased amount of chemicals and contaminants that would be released from burning infrastructure. These chemicals, such as iron, lead, and zinc, may leach into the storm water, contaminate nearby streams, and impair aquatic life.

Future Growth and Development

It is anticipated that any new development and new residents in the Wildfire Urban Intermix/Interface will be exposed to the wildfire hazard. Areas targeted for potential future growth and development in the next 5 years have been identified across the County at the municipal level.

Delaware County has experienced population increase since 2000. According to the U.S. Census Bureau, the County's population has increased 4.71 percent between 2000 and 2020 (U.S. Census Bureau 2020). If the population continues to increase, it is likely that number of exposed persons would as well.

Effect of Climate Change on Vulnerability

According to USFS, climate change will likely alter the atmospheric patterns that affect fire weather. Changes in fire patterns will, in turn, affect carbon cycling, forest structure, and species composition. Climate change associated with elevated greenhouse gas concentrations may create an atmospheric and fuel environment that is more conducive to large, severe fires (USFS 2012).

Fire interacts with climate and vegetation (fuel) in predictable ways. Understanding the interactions of climate, fire, and vegetation is essential for addressing issues associated with climate change that include:

- Effects on regional circulation and other atmospheric patterns that affect fire weather
- Effects of changing fire regimes on the carbon cycle, forest structure, and species composition, and
- Complications from land use change, invasive species, and an increasing WUI (USFS 2012)

It is projected that higher summer temperatures will likely increase the fire risk by 10 to 30-percent. Fire occurrence and areas burned could increase across the United States as a result of the increase of lightning activity; the frequency of surface pressure and associated circulation patterns conducive to surface drying; and fire weather conditions, in general, which are conducive to severe wildfires. Warmer temperatures will also increase the effects of drought and increase the number of days each year with flammable fuels, extending fire seasons and areas burned (USFS 2012).

Pennsylvania's Department of Environmental Protection (PADEP) was directed by the Climate Change Act (Act 70 of 2008) to initiate a study of the potential impacts of global climate change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment's main findings indicate Pennsylvania may be at increased risk for wildfires; however, the findings could not determine how large the increase in risk would be (Shortle and others 2009).

Future changes in fire frequency and severity are difficult to predict. Global and regional climate changes associated with elevated greenhouse gas concentrations could alter large weather patterns, thereby affecting fire weather conditions that are conducive to extreme fire behavior (USFS 2012).

Additional Data and Next Steps

As the data and resources become available, a custom building inventory can be generated to capture the construction of structures (such as roofing material, fire detection equipment, and structure age) to further refine the vulnerability analysis. As stated earlier, buildings constructed of wood or vinyl siding are generally more likely to be damaged by the fire hazard than buildings constructed of brick or concrete. The proximity of these building types to the WUI should be identified for further evaluation. Development and availability of these data would permit a more detailed estimate of potential vulnerabilities, including loss of life and potential structural damages.

In locations where homes are at risk for wildfires, the BOF's WUI Guidance Document is available to assist homeowners, community associations, local government, and developers to assess and mitigate the potential dangers of a wildfire. The guidance also provides information for developing an action plan in coordination with local emergency managers. Communities at risk for wildfires can adopt by local ordinance the "International Wildland-Urban Interface Code" of the Uniform Construction Code.

4.3.23 Winter Storm

This section provides a profile and vulnerability assessment of the winter storm hazard for the Delaware County Hazard Mitigation Plan (HMP). Winter storms consist of cold temperatures, snow, and ice. They occur, on average, approximately 35 times each year in Pennsylvania (Delaware County HMP 2016). From November through March, Pennsylvania is exposed to winter storms that move up the Atlantic coast or sweep in from the west. Every county in the Commonwealth is vulnerable to severe winter storms; however, the northern tier, western counties, and mountainous regions tend to experience winter weather more frequently and with greater severity.

Winter storms can produce more damage than any other severe weather event, including tornadoes. Complications caused by winter storms can lead to road closures (especially secondary and farm roads); business losses to commercial centers built in outlying areas because of supply interruption and loss of customers; property losses and roof damages from snow and ice loading and fallen trees; utility interruptions; and loss of water supplies. Flooding can result from winter storm events as well.

Most severe winter storm hazards include heavy snow (snowstorms), blizzards, sleet or freezing rain, ice storms, and mid-Atlantic cyclones locally known as Northeasters or Nor'easters. Because most Nor'easters generally occur during winter weather months, these hazards have also been grouped as a type of severe winter weather storm. Types of severe winter weather events or conditions are further defined as follows:

- **Heavy Snow:** According to the National Weather Service (NWS), heavy snow is generally considered snowfall accumulating to depth of 4 inches or more within 12 hours or less or snowfall accumulating to depth of 6 inches or more within 24 hours or less. A snow squall is an intense but limited-duration period of moderate to heavy snowfall, also known as a snowstorm, accompanied by strong, gusty surface winds and possibly lightning (generally moderate to heavy snow showers) (NWS, National Weather Service Glossary 2009).

- **Blizzard:** Blizzards are characterized by low temperatures, wind gusts of 35 miles per hour (mph) or more and falling and/or blowing snow that reduces visibility to 0.25 mile or less for an extended period (3 or more hours). A severe blizzard is defined as having a wind velocity of 45 mph, temperatures of 10 °F or lower, and a high density of blowing snow with visibility frequently measured in feet over an extended period (NWS, National Weather Service Glossary 2009).

- **Sleet or Freezing Rain:** Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen, partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground. Both types of precipitation, even in small accumulations, can cause significant hazards to a community (NWS, National Weather Service Glossary 2009).

- **Ice Storm:** An ice storm is described as an occasion when damaging volumes of ice are expected to accumulate during freezing rain situations. Significant accumulations of ice pull down trees and utility lines, resulting in loss of power and means of communication. These accumulations of ice render walking and driving extremely dangerous and can create extreme hazards to motorists and pedestrians (NWS, National Weather Service Glossary 2009).

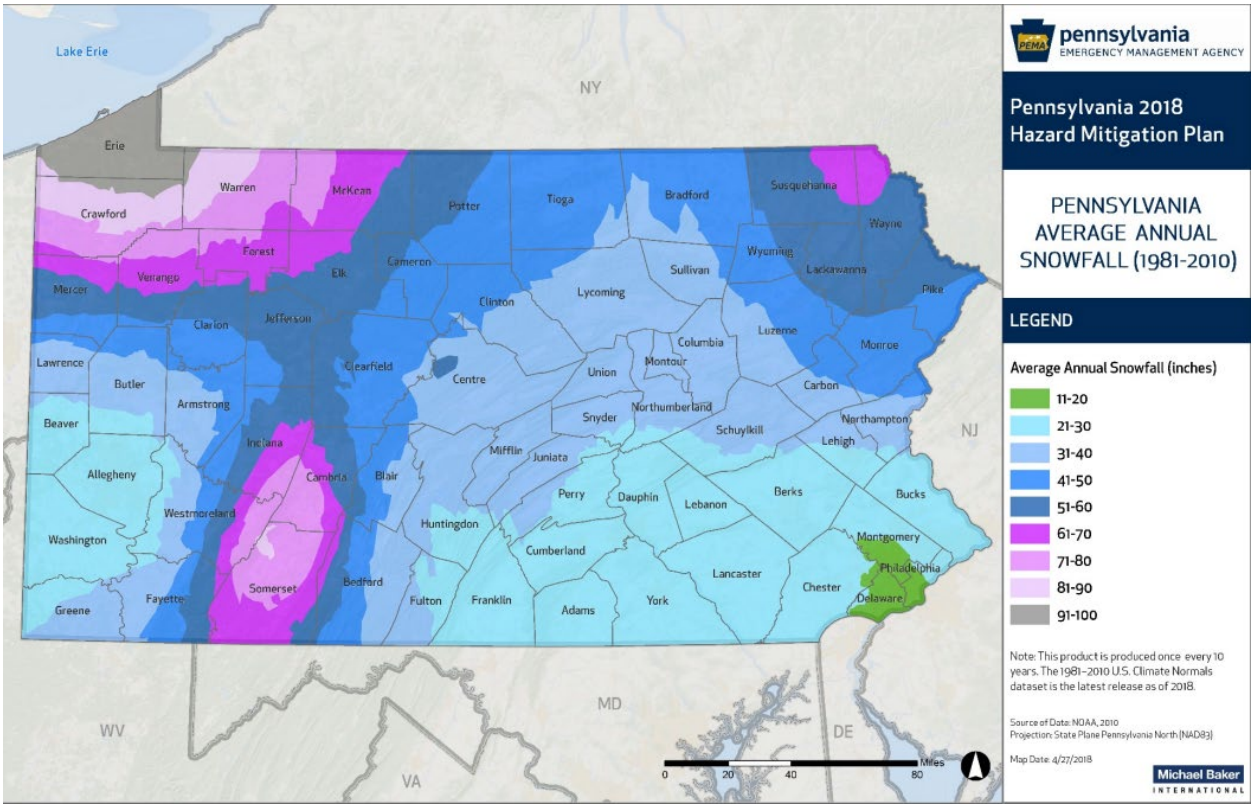
- **Nor'easter:** Nor'easters usually develop in the latitudes between Georgia and New Jersey, within 100 miles east or west of the East Coast. These storms progress generally northeastward and typically attain maximum intensity near New England and the Maritime Provinces of Canada. They nearly always bring precipitation in the form of heavy rain or snow, as well as winds of gale force, rough seas, and,

occasionally, coastal flooding to the affected regions. These storms may occur at any time of year but are most frequent and most violent between September and April (NWS, What is a Nor'Easter? 2022). While some of the most devastating effects of Nor'easters occur in coastal areas (e.g., beach erosion, coastal flooding), effects on inland areas, like Delaware County, may include heavy snow, strong winds, and blizzards.

Location

Winter storms can consist of cold temperatures and heavy snow or ice. Major winter storms occur in Pennsylvania several times annually and are regional events. Every county in the Commonwealth, including Delaware County, is subject to severe winter storms. According to Figure 4.3.23-1, between 1981 and 2010, Delaware County experiences between 11 and 30 inches of snow each year (PEMA 2019).

Figure 4.3.23-1. Average Annual Snowfall (1981-2010) for Pennsylvania



Source: PEMA 2019

The magnitude or severity of a severe winter storm depends on several factors including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day (e.g., weekday versus weekend), and time of season.

The extent of a severe winter storm can be classified by meteorological measurements and by evaluating its societal impacts. National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) produces the Regional Snowfall Index (RSI) for significant snowstorms that affect the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5. It is based on the spatial extent of the storm, the amount of snowfall, and the interaction of the extent and snowfall

totals with population based on the 2010 Census. The NCEI has analyzed and assigned RSI values to over 500 storms since 1900 (NCEI 2022).

Table 4.3.23-1. RSI Ranking Categories

Category	Description	RSI Value
1	Notable	1-3
2	Significant	3-6
3	Major	6-10
4	Crippling	10-18
5	Extreme	18+

Source: NCEI 2022

Range of Magnitude

Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania following the jet stream. Being located in the southeast portion of Pennsylvania, Delaware County often experiences the effects of Nor'easter storms – low pressure fronts that move northward along the Atlantic coastline, pulling large amounts of moisture off the Atlantic Ocean.

Due to their regular occurrence, these storms are considered hazards only when they result in damage to communications networks, impact vegetation, cause structural collapse, and/or cause very serious transportation problems and utility interruptions. Winter storms have also been known to contribute to severe flooding. A winter storm can adversely affect roadways, utilities, business activities, and can cause frostbite or loss of life. These storms may include one or more of the following weather events:

- **Heavy Snowstorm:** Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
- **Sleet Storm:** Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
- **Ice Storm:** Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.) as it strikes them, causing slippery surfaces and damage from the sheer weight of ice accumulation.
- **Blizzard:** Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.
- **Severe Blizzard:** Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

Any of the above events can result in the closing of major or secondary roads, particularly in rural locations, stranded motorists, transportation accidents, loss of utility services, and depletion of heating supplies. Environmental impacts often include damage to shrubbery and trees due to heavy snow loading, ice build-up and/or high winds which can break limbs or even bring down large trees. Gradual melting of snow and ice provides excellent groundwater recharge. However, high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

The worst-case scenario of a winter storm in Delaware County occurred on December 19, 2009. A major winter storm hit central and southeast Pennsylvania. Snowfall averaged 12 to 23 inches in and around the local Philadelphia area. The 23.2 inches of snow that fell at Philadelphia International Airport was the second heaviest single event snowfall on record and the heaviest ever for the month of December. A 51-year-old man died of a

stroke while he was shoveling the snow in Havertown. Approximately 70 percent of flights were cancelled on the 19th at Philadelphia International Airport (Delaware County 2016 HMP).

Past Occurrence

Many sources provided historical information regarding previous occurrences and losses associated with winter storm events throughout the Commonwealth of Pennsylvania and Delaware County. With so many sources reviewed for the purpose of this plan, loss and impact information for many events varied depending on the source. Therefore, accuracy of monetary figures discussed is based only on available information identified during research for this plan. Monetary figures may also have been calculated for the region, based on entire storm damage, and include damage from other counties.

Between 1954 and 2022, the Federal Emergency Management Agency (FEMA) declared that the Commonwealth of Pennsylvania experienced eight winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: severe winter storms, snowstorms, blizzards, winter storms, severe storms, and snowfalls. Generally, these disasters covered a wide region of the Commonwealth, and therefore may have impacted many counties. However, not all counties were included in the disaster declarations. Delaware County has been declared a disaster area as a result of six winter storm events (FEMA 2022).

Table 4.3.23-2. FEMA DR and EM Declarations for Winter Storm Events in Delaware County

FEMA Declaration Number	Date(s) of Event	Incident Type	Title
EM-3105	March 13-17, 1993	Snow	Severe Snowfall and Winter Storm
DR-1015	January 4-February 25, 1994	Severe Storm	Severe Winter Storms
DR-1085	January 6-12, 1996	Snow	Blizzard of '96
EM-3180	February 14-19, 2003	Severe Storm	Snow
DR-1898	February 5-11, 2010	Snow	Severe Winter Storms and Snowstorms
EM-3367	January 4-20, 2014	Severe Ice Storm	Severe Winter Storm

Source: FEMA 2022

For this 2022 HMP update, known severe winter weather events that have impacted Delaware County between 1993 and 2022 are identified in Table 4.3.23-3. This includes events presented in the 2016 Delaware County HMP and events listed in the NOAA-NCEI storm events database. Only events that resulted in a disaster declaration or caused injuries, fatalities, or over $10,000 in damage are included in the table. With winter weather documentation being so extensive for Pennsylvania and Delaware County, not all sources have been identified or researched. Therefore, the table below may not include all events that have occurred in the County.

Table 4.3.23-3. Major Winter Storm Events in Delaware County between 1993 and 2022

Dates of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Number	Description
March 13-17, 1993	Winter Storm	-	-	-	EM-3105	-
January 4 – February 25, 1994	Winter Storms	-	-	-	DR-1015	-
January 7, 1996	Blizzard	1	0	$1,450,000.00	DR-1085	-
January 13, 1999	Winter Storm	0	12	$0.00	-	-
February 16, 2003	Winter Storm	0	0	$1,000,000.00	EM-3180	-
February 5-11, 2010	Winter Storm	0	0	$2,500,000.00	DR-1898	-
February 4-20, 2014	Winter Storms	0	0	$0.00	EM-3367	-
January 22-24, 2016	Winter Storm	0	5	N/A	DR-2467-PA	A major snowfall from an incoming low-pressure system resulted in downed trees, minor power outages, stranded vehicles, and cancelled schools. Pennsylvania Governor Tom Wolf declared a State of Emergency. A total of 22.4 inches of snow fell at the Philadelphia International Airport.
March 2, 2018	Winter Storm	0	1	$0	N/A	A heavy, wet snow accumulated to a depth of up to 10 inches under a deformation zone that established itself over the area during the storm. Strong northwest winds with gusts to 60 mph occurred, leading to widespread damage to trees and power lines, which induced extensive power outages throughout the region. There was one fatality in Montgomery County, when a tree fell on a vehicle. On March 2, Governor Tom Wolf activated the Pennsylvania National Guard to support local response to the storm.

Source: NOAA-NCEI 2022; FEMA 2022

* *Many sources were consulted to provide an update of previous occurrences and losses; event details and loss/impact information may vary and has been summarized in the above table. No property damage or crop loss was reported by NOAA and USDA.*

DR *Major Disaster Declaration (FEMA)*

FEMA *Federal Emergency Management Agency*

Mph *Miles per Hour*

NCEI *National Centers for Environmental Information*

NOAA *National Oceanic and Atmospheric Administration*

N/A *Not Applicable*

Probability of Future Occurrence

Given the history of winter storm events that have impacted Delaware County, future winter storm events of varying degrees will occur every year, and thus many people and properties are at risk from the winter storm hazard in the future.

For the 2022 HMP update, update, the most up-to-date data was collected to calculate the probability of future occurrence of winter storm (heavy snow, blizzard, sleet/freezing rain, winter weather, and winter storm) events for Delaware County. Information from the NOAA-NCEI storm events database was used to identify the number of winter storm events that occurred between 1950 and 2022. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a winter storm event occurring in any given year in Delaware County.

Table 4.3.23-4. Probability of Future Winter Storm Events

Hazard Type	Number of Occurrences Between 1950 and 2022	Percent Chance of Occurrence in Any Given Year
Blizzard	1	1.39%
Heavy Snow	30	41.67%
Ice Storm	2	2.78%
Winter Storm	38	52.78%
Winter Weather	120	100%
TOTAL:	**191**	**100%**

Sources: NOAA-NCEI 2022; FEMA 2022

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected storm events since 1950. Due to limitations in data, not all severe winter weather events occurring between 1950 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

Based on available historical data, future occurrences of winter storm events are considered *highly likely*, according to Risk Factor Methodology probability criteria further discussed in Section 4.4.

Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. Regarding winter storm events, all of Delaware County has been identified as the hazard area. Therefore, all assets (population, structures, critical facilities, and lifelines), as described in the Section 4.4, Hazard Vulnerability Summary, are potentially vulnerable. The following text evaluates and estimates the potential impact of the winter storm hazard on the county, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

According to the NOAA National Severe Storms Laboratory (NSSL), winter weather indirectly and deceptively kills hundreds of people in the United States every year, primarily from automobile accidents, overexertion, and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, drifting snow, extreme cold temperatures, and dangerous wind chill. Winter storms are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm.

People can die in traffic accidents on icy roads, of heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold.

Heavy snow can immobilize a region and paralyze a city, shutting down air and rail transportation, stopping flow of supplies, and disrupting medical and emergency services. First responders will have to take on additionally responsibilities during winter storm events such as controlling traffic, debris removal from roads, answering to a higher than normal call volume and demand, and responding to weather related traffic accidents. First responders' safety may be at risk during on scene operations and limited access to roads due to damaged infrastructure and debris may hinder their ability to respond to accidents in a timely manner. Accumulations of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. In the mountains, heavy snow can lead to avalanches (NSSL 2015c).

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces (NSSL 2015c).

For the purposes of this HMP, the entire population of Delaware County is considered exposed to winter storm events (U.S. Census 2010). The elderly is considered most susceptible to this hazard because of their increased risk of injuries and death from falls and overexertion, and/or hypothermia from exposure while attempting to clear snow and ice. In addition, winter storm events can reduce ability of these populations to access emergency services. Residents with low incomes may not have access to housing, or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply). Section 2, County Profile, of this HMP provides population statistics regarding each participating municipality and a summary of the more vulnerable populations (over the age of 65 and individuals living below the U.S. Census poverty threshold).

Impact on General Building Stock

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

An area especially vulnerable to the winter storm hazard is the floodplain. At-risk building stock and infrastructure in floodplains are presented in the flood hazard profile in Section 4.3.6. Generally, losses from flooding associated with winter storms should be less than those associated with a 1-percent or 0.2-percent flood. Snow and ice melt can cause both riverine and urban flooding. Estimated losses caused by riverine flooding in the county are discussed in Section 4.3.6.

Impact on Critical Facilities

Full functionality of critical facilities such as police, fire and medical facilities is essential for response during and after a severe winter storm event. These critical facility structures are largely constructed of concrete and masonry; therefore, they should only suffer minimal structural damage from severe winter storm events. Because power interruption can occur, backup power is recommended. Infrastructure at risk for this hazard includes roadways that could be damaged due to the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces (NSSL 2022).

requires the clearing roadways and alerting citizens to dangerous conditions; following the winter season, resources for road maintenance and repair are required (NSSL 2022).

Impact on the Economy

Infrastructure at risk from the winter storm hazard includes roadways that could be damaged by application of salt and intermittent freezing and warming conditions that can damage roads over time. Costs of snow and ice removals, as well as repairs of roads undergoing freeze/thaw cycles, can drain local financial resources. Potential secondary impacts from winter storms also impact the local economy, including loss of utilities, interruption of transportation corridors, and loss of business function.

Impact on the Environment

Environmental impacts often include damage to trees and shrubs caused by heavy snow loading, ice build-up, and/or high winds, which can break limbs and down large trees. Indirect effects of winter storms include possible damage to surfaces and contamination of groundwater adjacent to roadway surfaces treated with salt, chemicals, and other de-icing materials (PEMA 2019).

Winter storms have a positive environmental impact; gradual melting of snow and ice recharges groundwater. However, abrupt high temperatures following a heavy snowfall can accelerate snowmelt, leading to rapid surface water runoff and severe flooding (PEMA 2019).

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across the county at the municipal level and are further discussed in Section 4.4 of this HMP. Because Delaware County in its entirety has been identified as the hazard area vulnerable to the winter storm hazard, any new development will be exposed to associated risks. However, because of increased standards and codes, new development may be less vulnerable to the severe winter weather hazard compared with the aging building stock in the county.

As discussed in Section 2, County Profile, the Delaware County population has been increasing and is projected to continue to increase in coming decades. In addition, the population is aging. As the aging population grows, so too will the number of persons vulnerable to severe winter weather and extreme cold temperatures.

Effect of Climate Change on Vulnerability

The climate of Pennsylvania has changed in several ways. Over the past 100 years, annual average temperatures have been rising across the Commonwealth. Warmer winters have led to decrease in snow cover and earlier arrival of spring. Recent analyses based on the Intergovernmental Panel on Climate Change models suggest a decrease in frequency and an increase in intensity of extra-tropical winter cyclones. However, based on the methodology applied, some models show no significant change in the storm track whereas others indicate a northward displacement of the storm track in the North Atlantic. For the mid-Atlantic region, there is little indication of a change in storm activity or track over Pennsylvania. An overall increase in winter precipitation is anticipated, with decrease in snow and increase in rain during the winter months. Projections regarding future occurrences of extra-tropical cyclones in Pennsylvania are substantially uncertain. Based on available information and projections, winter storms are anticipated to continue to affect Pennsylvania in the future. Future improvements in modeling smaller-scale climatic processes can be expected and will lead to improved understanding of ways in which changing climate will alter temperature, precipitation, and storm events in Pennsylvania (Shortle and others 2009).

Additional Data and Next Steps

The assessment above identifies vulnerable populations and economic losses associated with the winter storm hazard of concern. Historical data on structural losses to general building stock are not adequate to predict specific losses to this inventory; therefore, the percent of damage assumption methodology was applied. This methodology is based on FEMA How-to Series (FEMA 386-2), Understanding Your Risks, Identifying and Estimating Losses (FEMA 2001), and FEMA's Using HAZUS-MH for Risk Assessment (FEMA 433) (FEMA 2015a). Acquisition of additional and actual valuation data regarding general building stock and critical infrastructure losses would further support future estimates of potential exposure of and damage to the general building stock inventory.

4.4 HAZARD VULNERABILITY SUMMARY

This section describes the methodology and tools used to support the risk assessment process.

4.4.1 Methodology

A risk assessment is a process that involves measuring the potential loss of life, personal injury, economic losses, and property damage resulting from identified hazards. It allows planning personnel to address and reduce hazard impacts and emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. Results of the risk assessment are used in subsequent mitigation planning processes, including determining and prioritizing mitigation actions that reduce each jurisdiction's risk to a specified hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for the county and each jurisdiction. The process focuses on the following elements:

- **Hazard Identification** – Use all available information to determine what types of hazards might affect a jurisdiction
- **Profile Each Hazard** – Understand each hazard in terms of:
  - Location – geographic area most affected by the hazard
  - Extent – severity of each hazard
  - Range of magnitude
  - Previous occurrences and losses
  - Probability of future hazard events
- **Assess Vulnerability**
  - **Exposure identification** – Estimate the total number of assets in the jurisdiction that are likely to experience a hazard event by overlaying hazard maps with the asset inventories.
  - **Vulnerability identification and loss estimation** – Assess the impact of hazard events on the people, property, environment, economy, and lands of the region, including estimates of the cost of potential damage or costs that could be avoided by mitigation.

The following summarizes the asset inventories, methodology, and tools used to support the risk assessment process.

Asset Inventories

Delaware County identified county assets to assess potential exposure and loss associated with the hazards of concern. For the Hazard Mitigation Plan (HMP) update, Delaware County assessed the vulnerability of the following types of assets: population, buildings and critical facilities/infrastructure, and the environment. Some assets are more vulnerable because of their physical characteristics or socioeconomic uses. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate without details about specific individual personal or public properties.

Population

Delaware County used the total population statistics from the 2020 Decennial Census data and 2015-2019 American Community Survey (ACS) 5-year estimate to estimate the exposure and potential impacts to the county's population in place of the 2010 U.S. Census block estimates. Borough and township populations were extracted directly from the Census Bureau and ACS. Population counts at the jurisdictional level were averaged among the total number of residential properties for each dasymetric Census Block within the county to estimate the population distribution at the aggregate Census Block level. Limitations of these analyses are recognized, and thus the results are used only to provide a general estimate for planning purposes.

As discussed in Section 2 (County Profile), research has shown that some populations are at greater risk from hazard events because of decreased resources or physical abilities. Vulnerable populations in Delaware County included in the risk assessment are children, elderly, and people living in low-income households.

Buildings

Delaware County used the default general building stock from FEMA Hazus v5.1 modeling software for the HMP update. The general building stock is analyzed at the aggregate Census Block and Census Tract levels and incorporates 2010 Census data with 2018 RS Means replacement cost values. The occupancy classes available in Hazus were condensed into the categories of residential, commercial, industrial, agricultural, religious, governmental, and educational to facilitate analysis and presentation of results. Residential loss estimates addressed both multi-family and single-family dwellings.

Critical Facilities

The critical facility inventory, which includes essential facilities, utilities, transportation features, and user-defined facilities (as outlined in Section 2), was updated with GIS data provided by Delaware County and supplemented with 2018 and 2022 Homeland Infrastructure Foundation-Level Data (HIFLD). To protect individual privacy and the security of assets, information is presented in aggregate, without details about specific individual properties or facilities. Tetra Tech updated the default inventory in Hazus with the critical facility inventory generated for this plan.

New Development

The county has identified Growth Areas, as described in Section 4.4.4, below. The 2015-2019 American Community Survey estimates that Delaware County has seen construction of 6,306 housing units from 2010 to 2020 (ACS 2019).

Methodology

To address the requirements of the DMA 2000 and better understand potential vulnerability and losses associated with hazards of concern, Delaware County used standardized tools, combined with local, state, and federal data and expertise to conduct the risk assessment. Three different levels of analysis were used depending upon the data available for each hazard, as described below.

1. ***Historical Occurrences and Qualitative Analysis*** *– This analysis includes an examination of historical impacts to understand potential impacts of future events of similar size. In addition, potential impacts and losses are discussed qualitatively using best available data and professional judgment.*
2. ***Exposure Assessment*** *– This analysis involves overlaying available spatial hazard layers, or hazards with defined extent and locations, with assets in GIS to determine which assets are located in the impact area of the hazard. The analysis highlights which assets might be affected by the hazard. If the center of each asset is located in the hazard area, it is deemed exposed and potentially vulnerable to the hazard.*
3. ***Loss estimation*** *– The FEMA Hazus modeling software was used to estimate potential losses for the following hazards: flood, earthquake, and hurricane (wind). In addition, an examination of historical impacts and an exposure assessment was conducted for these spatially delineated hazards.*

Table 4.4-1. Summary of Risk Assessment Analyses

Hazard	Data Analyzed			
	Population	General Building Stock	Critical Facilities	Environment
Civil Disturbance	Q	Q	Q	Q
Dam Failure	Q	Q	Q	Q
Drought	Q	Q	Q	Q
Earthquake	H	H	H	H
Env Haz- HAZMAT	E	E	E	E
Env Haz- Pipeline	E	E	E	E
Extreme Temp	Q	Q	Q	Q
Flood	E, H	E, H	E, H	E, H
Hail	Q	Q	Q	Q
Hurricane/ Trop Storm	H	H	H	H
Landslide	E	E	E	E
Levee	E	E	E	E
Lightening	Q	Q	Q	Q
Pandemic	Q	Q	Q	Q
Radon	Q	Q	Q	Q
Subsidence	E	E	E	E
Terrorism	Q	Q	Q	Q
Tornado	Q	Q	Q	Q
Transportation	Q	Q	Q	Q
Urban Fire	Q	Q	Q	Q
Utility	Q	Q	Q	Q
Wildfires	E	E	E	E
Winter Storms	Q	Q	Q	Q

E – Exposure analysis; H – Hazus analysis; Q – Qualitative analysis

Hazards U.S. – Multi-Hazard (Hazus)

In 1997, FEMA developed a standardized model for estimating losses caused by earthquakes, known as Hazards U.S. or Hazus. Hazus was developed in response to the need for more effective national-, state-, and community-level planning and to identify areas that face the highest risk and potential for loss. Hazus was expanded into a multi-hazard (MH) methodology, Hazus-MH, with new models for estimating potential losses from wind (severe storms) and flood (riverine) hazards. Hazus is a GIS-based software tool that applies engineering and scientific risk calculations, which have been developed by hazard and information technology experts, to provide defensible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across a variety of hazards. The GIS framework also supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

Hazus uses GIS technology to produce damage reports, detailed maps, and analytical reports that estimate a community's direct physical damage to building stock, critical facilities, transportation systems, and utility systems. To generate this information, Hazus uses default Hazus-provided data for inventory, vulnerability, and hazards. This default data can be supplemented with local data to provide a more refined analysis. Damage reports can include induced damage (inundation, fire, threats posed by hazardous materials and debris) and direct economic and social losses (casualties, shelter requirements, economic impact) depending on the hazard and available local data. The open data architecture of Hazus can be used to manage community GIS data in a central location. The use of this software also promotes consistency of data output now and in the future and standardization of data collection and storage. More information on Hazus is available at http://www.fema.gov/hazus.

In general, probabilistic analyses were performed to develop expected and estimated distribution of losses (mean return period losses) for the flood and wind hazards. The probabilistic model generates estimated damage and losses for specified return periods (e.g., 100- and 500-year). For annualized losses, Hazus calculates the maximum potential annual dollar loss resulting from various return periods averaged on a per year basis. The model sums all Hazus-supplied return periods (e.g., 10, 50, 100, 200, 500) multiplied by the return period probability (as a weighted calculation) to calculate the estimated cost of a hazard each year. Table 5.1-2 displays the various levels of analyses that can be conducted using the Hazus software.

Table 4.4-2. Summary of Hazus Analysis Levels

Hazus-MH Analysis Levels	
Level 1	*Hazus-MH provided hazard and inventory data with minimal outside data collection or mapping.*
Level 2	*Analysis involves augmenting the Hazus-MH provided hazard and inventory data with more recent or detailed data for the study region, referred to as local data.*
Level 3	*Analysis involves adjusting the built-in loss estimation models used for the hazard loss analyses and is typically done in conjunction with the use of local data.*

Source: FEMA 2019

Earthquake

Delaware County conducted a probabilistic assessment for the 500-year mean return period (MRP) through a Level 2 analysis in Hazus to analyze the earthquake hazard and provide a range of loss estimates. The probabilistic method uses information from historic earthquakes and inferred faults, locations and magnitudes, and computes the probable ground shaking levels that may be experienced during a recurrence period by Census tract.

As noted in the Hazus Earthquake User Manual, "*Although the software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that uncertainties are inherent in any estimation methodology, even with state-of-the-art techniques. Any region or city studied will have an enormous variety of buildings and facilities of different sizes, shapes, and structural systems that have been constructed over a range of years under diverse seismic design codes. There are a variety of components that contribute to transportation and utility system damage estimations. These components can have differing seismic resistance."* However, the Hazus potential loss estimates are acceptable for the purposes of this HMP.

Groundwater was set at a depth of 5 feet (default setting). The default assumption is a magnitude 7.0 earthquake for all return periods. Although damage is estimated at the census tract level, results were presented at the municipal level. Since multiple census tracts contain more than one jurisdiction, a density analysis was used to extract the percent of building structures that fall within each tract and jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each municipality.

Damage estimates are calculated for losses to buildings (structural and non-structural) and contents; structural losses include load-carrying components of the structure, and non-structural losses include those to architectural, mechanical, and electrical components of the structure, such as nonbearing walls, veneer and finishes, HVAC systems, boilers, etc.

Environmental Hazard – Hazardous Material Release

Overall, potential losses from hazardous materials incidents are difficult to quantify because of many variables and human elements. Data regarding this hazard were obtained from Delaware County and the Planning Team as well as appropriate state and federal resources.

Delaware County conducted the exposure analysis for the county's assets (population, building stock, critical facilities/lifelines) using a radius around potential hazardous materials incident sites as follows: exposure within a half-mile of major roadways, railways, and pipelines, as well as exposure within unique radii supplied by the county for hazardous material facilities.

Flood, Flash Flood, Ice Jam

Delaware County examined the 1 percent and 0.2 percent annual chance flood events to evaluate the county's risk from the flood hazard. These flood events are generally those considered by planners and evaluated under federal programs, such as NFIP.

The following data were used to evaluate exposure and determine potential future losses for this plan update:

- The effective Delaware County FEMA Digital Flood Insurance Rate Maps (DFIRMs) dated November 2017
- The 1 percent annual chance riverine flood depth grid published by FEMA in August 2017
- The 1 percent annual chance coastal flood depth grid published by FEMA in August 2016
- The coastal hazard area boundary published by FEMA in July 2021
- A 1-meter resolution Digital Elevation Model (DEM) published by PA State University and Pennsylvania Spatial Data Access (PASDA) in 2012

Delaware County used the effective Delaware County FEMA DFIRM published in 2017 to evaluate exposure to the county's assets. A depth grid was created by merging the riverine and coastal flood depth grids with an updated depth grid boundary that was formed using the 2017 effective DFIRM data. Only flood areas excluded from the FEMA riverine and coastal depth grids were modeled to create an updated depth grid. The merged depth grid was integrated into the Hazus riverine and coastal flood models to estimate potential losses for the 1 percent annual chance flood event.

To estimate exposure to the 1 percent- and 0.2 percent annual chance flood events, the DFIRM flood boundaries were overlaid on the centroids of updated assets (population, building stock, and critical facilities). Centroids that intersected the flood boundaries were totaled to estimate the building replacement cost value and population vulnerable to the flood inundation areas. A Level 2 Hazus riverine flood analysis was performed. The critical facilities were formatted to be compatible with Hazus and its Comprehensive Data Management System (CDMS). Once updated with the inventory data, the Hazus riverine and coastal flood models were run to estimate potential losses in Delaware County for the 1 percent annual chance flood event. Hazus calculated the estimated potential losses to the population (default 2010 U.S. Census data across dasymetric blocks), potential damage to the general building stock, and potential damage to critical facility inventories based on the depth grids generated and the default Hazus damage functions in the flood model.

Additionally, projected sea-level rise data (in 1-foot increments) available from the NOAA Office of Coastal Management (https://coast.noaa.gov/slrdata/) was considered and used for this analysis to understand the assets within communities projected to be impacted by sea level rise. Please note these levels do not include additional storm surge due to a hurricane or Nor'easter. The current Flood Insurance Rate Maps (FIRMs) also do not include the effects of sea-level rise. To assess the county's risk to sea level rise, the 2017 NOAA 1-foot, 2-foot, 3-foot, and 4-foot sea level rise hazard areas were referenced.

Asset data (population, building stock, critical facilities/lifelines) were used to support an evaluation of assets exposed and potential impacts and losses. To determine what assets are vulnerable to sea-level rise, the county's assets were overlaid with the hazard area. Assets with their centroid located in the hazard area were totaled to estimate the number of persons, buildings, and facilities at risk to impacts from sea-level rise.

Hurricane

Delaware County performed a Hazus probabilistic analysis to analyze the wind hazard losses for the 500-year mean return period (MRP) event. The probabilistic Hazus hurricane model activates a database of thousands of potential storms that have tracks and intensities, reflecting the full spectrum of Atlantic hurricanes observed since 1886, and identifies those with tracks associated with Delaware County. Hazus contains data on historic hurricane events and wind speeds. It also includes surface roughness and vegetation (tree coverage) maps for the area. Surface roughness and vegetation data support the modeling of wind force across various types of land surfaces. Default demographic and updated building and critical facility inventories in Hazus were used for the analysis. Although damage is estimated at the Census tract level, results were presented at the municipal level. Since there are multiple Census tracts that contain more than one jurisdiction, a density analysis was used to extract the percent of building structures that fall within each tract and jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Storm surge hazard data available from the NOAA was also considered and used for this analysis to understand the assets within communities projected to be impacted by hurricane storm surge. This risk assessment used NOAA's 2014 Sea Lake Overland Surge from Hurricanes (SLOSH) data to analyze the assets at risk to impacts from hurricane storm surge. SLOSH represents potential flooding from worst-case combinations of hurricane direction, forward speed, landfall point, and high astronomical tide were used to estimate exposure. It should be noted that these inundation zones do not include riverine flooding caused by hurricane surge or inland freshwater flooding. The model, developed by the NOAA National Hurricane Center to forecast surges that occur from wind and pressure forces of hurricanes, considers only storm surge height and does not consider the effects of waves. The SLOSH spatial data includes the boundary for a Category 1 hurricane event.

To estimate exposure to the SLOSH Category 1 flood hazard area, the spatial flood hazard boundaries were overlaid on centroids of updated assets (population, building stock, critical facilities/lifelines). Centroids that intersected the hazard areas were totaled to estimate the building replacement cost value and population vulnerable to the storm surge inundation areas.

Landslide

Delaware County assessed the landslide hazard area using the 1-meter digital elevation model (DEM) created by PA State University in 2012. The 1-meter DEM was used to determine areas where land area is sloping greater than 25-percent grade. Asset data (population, building stock, and critical facilities) presented in the County Profile (Section 2) were used to support an evaluation of assets at risk to potential impacts and losses associated with this hazard. To determine what assets are at risk to landslide events, available and appropriate GIS data were overlaid with the hazard area.

Levee Failure

Delaware County assessed the levee failure hazard area using the effective Delaware County FEMA effective DFIRM published in 2017. The effective DFIRM data has levee protection lines that were used to delineate estimated protection areas:

- Levee lines around the high school are connected using the school fields and surrounding roadways
- Levee lines around the airport are connected, protecting I-95 from Darby Creek
- Levee lines west of the airport protect the western portion of the airport
- Levee lines south of the airport protect the southern portion of airport
- Levee lines around the tank yards protect the county tanks

Asset data (population, building stock, and critical facilities) presented in the County Profile (Section 2) were used to support an evaluation of assets at risk to potential impacts and losses associated with this hazard. To determine what assets are at risk from levee failure, available and appropriate GIS data were overlaid with the hazard area.

Subsidence/Sinkholes

Delaware County assessed the subsidence/sinkhole hazard area with delineated areas of potential sinkholes, which were determined using 2019 and 1938 land use land cover (LULC) USGS data. A change analysis was performed to delineate areas that used to be classified as wetlands, waterbodies, and mining locations that are now classified as developed, urban areas. Asset data (population, building stock, and critical facilities) presented in the County Profile (Section 2) were used to support an evaluation of assets at risk to potential impacts and losses associated with this hazard. To determine what assets are at risk to subsidence events, available and appropriate GIS data were overlaid with the hazard area.

Wildfire

Delaware County referenced the Wildfire-Urban Interface (Interface and Intermix) obtained through the SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin – Madison, to delineate wildfire hazard areas. The University of Wisconsin – Madison wildland fire hazard areas are based on the 2010 Census and 2006 National Land Cover Dataset and the Protected Areas Database. For this risk assessment, the high-, medium-, and low-density interface areas were combined and used as the "Interface" hazard area, and the high-, medium-, and low-density intermix areas were combined and used as the "Intermix" hazard areas.

Asset data (population, building stock, and critical facilities) presented in the County Profile (Section 2) were used to support an evaluation of assets exposed and potential impacts and losses associated with this hazard. To determine what assets are exposed to wildfire, available and appropriate GIS data were overlaid with the hazard area.

Qualitative Analyses

For many of the hazards evaluated in this risk assessment, historical data are not adequate to model future losses at this time. Where GIS data are not available, Delaware County conducted a qualitative analysis for the following hazards using the best available data and professional judgment. Multiple federal, state, and academic sources were used to evaluate these hazards:

- Civil Disturbance
- Dam Failure
- Drought
- Extreme Temperatures
- Hail
- Lightening
- Pandemic
- Radon
- Terrorism
- Tornado
- Transportation
- Urban Fire
- Winter Storm

Data Source Summary

Table 4.4-3 summarizes the sources of data used in the risk assessment.

Table 4.4-3. Data Source Summary

Data	Source	Date	Format
Population data	U.S. Census Bureau; American Community Survey 5-Year Estimates	2010/2020; 2015-2019	Digital (GIS) format
Building Inventory	Hazus v5.1	2010/2018	Digital (GIS) format
Critical facilities	Delaware County; HIFLD	2021/2022; 2018/2022	Digital (GIS) format
Digitized Effective FIRM maps	FEMA	2016/2017	Digital (GIS) format
Digital Elevation Model	PA State University	2012	Digital (GIS) format
Road Network	PennDOT	2020	Digital (GIS) format
Rail Network	Delaware County	2021	Digital (GIS) format
Wildfire Fuel Hazard	University of Wisconsin	2010	Digital (GIS) format
Sinkhole Hazard	USGS	2018/2021	Digital (GIS) format
Landslide (Steep Slopes)	PA State University	2012	Digital (GIS) format
SARA Sites	Delaware County	2022	CSV converted to Digital (GIS) format
HazMat Pipelines	HIFLD	2019	Digital (GIS) format
Levee Failure	FEMA	2017	Digital (GIS) format
SLOSH Category 1	FEMA	2014	Digital (GIS) format
Sea Level Rise	FEMA	2017	Digital (GIS) format

Limitations

For this risk assessment, the loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

1) Approximations and simplifications necessary to conduct such a study
2) Incomplete or dated inventory, demographic, or economic parameter data
3) The unique nature, geographic extent, and severity of each hazard
4) Mitigation measures already employed by the participating municipalities
5) The amount of advance notice residents have to prepare for a specific hazard event

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, Delaware County will collect additional data and update and refine existing inventories to assist in estimating potential losses.

Potential economic loss is based on the present value of the general building stock utilizing best available data. The county acknowledges significant impacts could occur to critical facilities and infrastructure as a result of these hazard events, causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure and economic impacts were not quantified and require more detailed loss analyses. In addition, economic impacts to industries, such as tourism and the real-estate market, were not analyzed.

4.4.2 Ranking Results

As discussed in Section 4.2, Hazard Identification, Delaware County selected and considered a comprehensive range of natural and non-natural hazards that pose significant risk to Delaware County. However, the communities in Delaware County have differing levels of exposure and vulnerability to each of these hazards. It is important for each community participating in this plan to recognize those hazards that pose the greatest risk to their community and direct their attention and resources accordingly to manage risk effectively and efficiently.

To this end, a relative hazard risk ranking process was conducted for the county using the Risk Factor (RF) methodology identified in Section 5 and Appendix 9 of the Pennsylvania Emergency Management Agency's (PEMA) All-Hazard Planning Standard Operating Guide (PEMA 2020). The guidance states:

> The RF approach produces numerical values that allow identified hazards to be ranked against one another (the higher the RF value, the greater the hazard risk). RF values are obtained by assigning varying degrees of risk to five categories for each hazard: *probability, impact, spatial extent, warning time,* and *duration*.
>
> To calculate the RF value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the example equation below:

Risk Factor Methodology Equation

RF Value = [(Probability x .30) + (Impact x .30) +
(Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)]

> Hazards identified as high-risk have RFs greater than or equal to 2.5. RFs ranging from 2.0 to 2.4 are considered moderate-risk hazards. Hazards with RFs less than 2.0 are considered low-risk.

Table 4.4-4 identifies the five risk assessment categories, the criteria and associated risk level indices used to quantify their risk, and the suggested weighting factor (weight value) applied to each risk assessment category. Table 4.4-5 shows the values of five risk assessment categories for each of Delaware County's hazards and each hazard's RF.

Table 4.4-4. Summary of Risk Factor (RF) Approach

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	3	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	MORE THAN 24 HRS	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION *How long does the hazard event usually last?*	LESS THAN 6 HRS	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

Source: PEMA 2020

Table 4.4-5. Risk Ranking for Delaware County

HAZARD RISK	HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROB.	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, Ice Jam	4	3	4	3	3	3.5
	Winter Storm	4	2	4	1	3	3
	Drought and Water Supply Deficiencies	4	2	3	1	4	2.9
	Env Haz - HAZMAT	4	2	2	4	2	2.8
	Utility Interruption	3	2	3	4	3	2.8
	Hailstorm	4	2	2	2	1	2.5
MODERATE	Extreme Temperature	2	2	4	1	3	2.4
	Radon Exposure	4	1	2	1	4	2.4
	Tornado, Windstorm	3	2	2	4	1	2.4
	Pandemic and Infectious Disease	2	2	3	1	4	2.3
	Env Haz - Pipeline	2	2	2	4	2	2.2
	Lightning	4	1	2	2	1	2.2
	Transportation Accident	4	1	1	4	1	2.2
	Wildfire	3	1	2	2	3	2.1
	Hurricane, Tropical Storm, Nor'easter	2	2	2	1	3	2
LOW	Urban Fire and Explosions	3	1	1	4	1	1.9
	Dam Failure	1	2	1	4	2	1.7
	Subsidence and Sinkholes	2	1	1	4	1	1.6
	Terrorism	1	2	2	1	1	1.5
	Landslide	1	1	2	3	1	1.4
	Civil Disturbance	1	2	1	1	2	1.4
	Earthquake	1	1	1	4	1	1.3
	Levee Failure	1	1	1	2	2	1.2

Note: Prob. = Probability

Based on these results, there are six high-risk hazards, nine moderate-risk hazards, and eight low-risk hazards in Delaware County. Mitigation actions were developed for all hazards (see Section 6.4). The threat posed to life and property for moderate-risk and high-risk hazards is considered significant enough to warrant the need for establishing hazard-specific mitigation actions.

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk to each hazard. Table 4.4-6 shows the different municipalities in Delaware County and indicates whether each municipality considers their risk is greater than (>), less than (<), or equal to (=) the RF assigned to the county as a whole.

Table 4.4-6. Jurisdictional Risk by Municipality

Municipality	Civil Disturbance	Dam Failure	Drought	Earthquake	Env Haz - HAZMAT	Env Haz - Pipeline	Extreme Temp	Flood	Hail	Hurricane/Tropical Storm	Landslide	Levee	Lightning	Pandemic	Radon	Subsidence	Terrorism	Tornado	Transportation	Urban Fire	Utility	Wildfires	Winter Storm
	1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3
Aldan (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Aston (Twp)	=	<	=	=	>	>	=	=	=	=	=	=	=	=	=	=	=	=	>	>	=	>	=
Bethel (Twp)	<	<	>	=	<	<	=	<	<	=	=	=	=	=	=	=	<	<	<	=	>	<	<
Brookhaven (B)	=	<	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	>	=	=	=
Chadds Ford (Twp)	=	<	=	=	<	<	=	>	=	=	=	=	=	=	=	=	=	=	>	=	=	>	>
Chester City (C)	=	<	=	=	>	>	=	>	=	=	=	>	=	=	=	=	=	=	>	>	>	<	=
Chester (Twp)	=	<	=	=	>	>	=	>	=	=	=	=	=	=	=	=	=	=	=	=	=	<	=
Chester Heights (B)	<	=	=	=	<	>	=	>	=	=	<	=	=	=	=	=	<	=	=	>	=	>	=
Clifton Heights (B)	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=	>	>	=	=	=
Collingdale (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=
Colwyn (B)	=	<	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	>	=	>	=
Concord (Twp)	=	>	>	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	>	=	>	>	=
Darby (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Darby (Twp)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	<	=
East Lansdowne (B)	=	<	=	=	=	=	=	<	=	>	<	<	=	=	>	=	=	=	>	>	>	<	>
Eddystone (B)	=	<	=	=	>	>	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Edgmont (Twp)	=	<	>	=	<	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	>	=
Folcroft (B)	=	<	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	>	=	<	=
Glenolden (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=

Municipality	Civil Disturbance	Dam Failure	Drought	Earthquake	Env Haz - HAZMAT	Env Haz - Pipeline	Extreme Temp	Flood	Hail	Hurricane/Tropical Storm	Landslide	Levee	Lightning	Pandemic	Radon	Subsidence	Terrorism	Tornado	Transportation	Urban Fire	Utility	Wildfires	Winter Storm
	1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3
Haverford (Twp)	=	<	=	=	=	=	=	=	=	=	=	<	=	=	>	=	<	<	=	=	=	>	=
Lansdowne (B)	=	<	=	=	=	=	=	=	=	=	=	<	=	=	>	=	=	=	=	>	=	=	=
Lower Chichester (Twp)	=	<	=	=	>	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=
Marcus Hook (B)	=	<	=	=	>	>	=	=	=	=	=	<	=	=	=	=	=	=	=	>	=	<	=
Marple (Twp)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=
Media (B)	>	<	=	>	>	>	=	<	=	>	<	<	=	=	=	<	>	>	>	>	>	<	=
Middletown (Twp)	=	<	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=
Millbourne (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	>	=
Morton (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Nether Providence (Twp)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=
Newtown (Twp)	=	<	=	=	<	<	=	=	=	=	<	<	=	=	=	=	=	=	=	<	=	<	=
Norwood (B)	=	<	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	>	=	=	=
Parkside (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	<	=
Prospect Park (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Radnor (Twp)	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=	<	=
Ridley (Twp)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	>	=	>	>	=	=	=	<	=
Ridley Park (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Rose Valley (B)	=	<	=	=	<	<	=	=	=	=	=	=	=	=	=	=	=	=	=	<	=	>	=
Rutledge (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	<	=
Sharon Hill (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=
Springfield (Twp)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=

Municipality	Civil Disturbance	Dam Failure	Drought	Earthquake	Env Haz - HAZMAT	Env Haz - Pipeline	Extreme Temp	Flood	Hail	Hurricane/Tropical Storm	Landslide	Levee	Lightning	Pandemic	Radon	Subsidence	Terrorism	Tornado	Transportation	Urban Fire	Utility	Wildfires	Winter Storm
	1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3
Swarthmore (B)	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	>	=	>	=
Thornbury (Twp)	=	<	>	=	<	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=
Tinicum (Twp)	=	<	=	=	>	>	=	>	=	>	=	>	=	=	=	=	>	>	>	>	=	<	=
Trainer (B)	>	<	=	=	>	>	=	=	=	=	=	>	=	=	=	=	>	>	=	>	=	>	=
Upland (B)	=	<	=	=	=	=	=	>	=	=	=	>	=	=	=	=	=	=	=	>	=	>	=
Upper Chichester (Twp)	=	<	=	=	>	>	=	=	=	=	=	=	=	=	=	=	=	=	>	>	=	>	=
Upper Darby (Twp)	=	<	=	=	=	=	=	=	=	=	=	>	=	=	=	=	>	>	=	=	=	<	=
Upper Providence (Twp)	=	<	>	=	=	=	=	>	=	=	=	>	=	=	=	=	=	=	>	=	>	>	=
Yeadon (B)	=	<	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	>	=	>	=
Brandywine Conservancy and Museum of Art Special District	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	<	=	<	<	=	=	=

Notes:
“>” indicates that the risk is greater than the RF assigned to the county
“<” indicates that the risk is lower than the RF assigned to the county
“=” indicates that the risk is equal to the RF assigned to the county

4.4.3 Potential Loss Estimates

Potential loss estimates for hazard events help a community understand the monetary value of what might be at stake during a hazard event. Estimates are considered *potential* in that they generally represent losses that could occur in a countywide hazard scenario. Localized events could yield lower losses, while regional events could yield higher losses.

The data utilized to conduct the vulnerability assessment came from a variety of sources, as noted throughout each hazard profile and Appendix A. As summarized in the Methodology subsection, the 2018 U.S. Census demographic data, Hazus v5.1 default building inventory and its associated replacement cost value of the structures and contents, and the comprehensive critical facility inventory update in HAZUS v5.1 were used for Delaware County.

Potential loss estimates provided in Section 4.3 (Hazard Profiles) were either based on historical losses, current-condition losses, and/or predictive losses by performing spatial analyses in GIS and hazard probabilistic modeling. In summary, HAZUS v5.1 was used to estimate potential losses for the flood, hurricane/tropical storm, and tornado/windstorm hazards. For many of the hazards evaluated, historical data are not adequate to model future losses at this time. For these hazards of concern, areas and inventory susceptible to specific hazards were mapped, and exposure was evaluated to help guide mitigation efforts (mitigation efforts are discussed further in Section 6). Spatial analyses were conducted to assess potential exposure for hazards of concern with delineated hazard areas: dam failure; environmental hazard hazardous materials release; flood, flash flood, and ice jam; landslide; subsidence and sinkhole; and wildfire. Where GIS data are not available for some hazards, a qualitative analysis was conducted using the best available data and professional judgment.

4.4.4 Future Development and Vulnerability

Risk and vulnerability to natural and human-caused hazard events are not static. Risk will increase or decrease as counties and municipalities see changes in land use and development, as well as changes in population. Population change (in terms of total and demographics) and the age of the housing stock continue to be the main indicators of vulnerability change in Delaware County.

Delaware County experienced a 1.0 percent increase in population from 2010 to 2020, as summarized in Section 2 of this HMP. According to PA DEP, the population in Delaware County is projected to increase over the coming decades. The range of projected change in population varies from a 32 percent population decrease in Chester City to a 141 percent increase in population in Concord Township (PA DEP 2012).

Continued analysis of the population's age structure in Delaware County will provide deeper understanding of future vulnerability to at-risk populations. Approximately 16 percent of Delaware County's population is age 65 or older (ACS 2019). As these residents continue to age in the county, they might have increased access and functional needs. For example, many residents in this age bracket might be unable to drive; therefore, development of special evacuation plans for them will be necessary. They might also have hearing or vision impairments that could hinder their reception of emergency instructions. Both older and younger populations are at higher risks for contracting certain diseases. Delaware County's combined under-5-years-of-age and over-65 populations constitute approximately 22 percent of its population (ACS 2019).

Approximately 3.7 percent of Delaware County's population lives in group quarters, which are communal settings that can include inmates in a prison, students in a dorm, or elderly or mentally disabled in group-care homes. Many residents living in group quarters have special needs. It is important to ensure that each group-quarter facility has an emergency plan to account for the unique needs of its residents during a hazard event.

Future hazard mitigation strategies should consider addressing language barriers to ensure that all residents can receive emergency instructions since 11.6 percent of Delaware County's population is not proficient in English.

In addition, remote and sparsely populated municipalities face higher vulnerability to hazards because they do not have as easy access to care facilities or response personnel. For instance, sparsely populated municipalities face increased vulnerability to tornadoes, windstorms, and winter storms due to isolation, access issues, and longer emergency response times.

The aging housing stock in Delaware County is another source of current and future vulnerability in many hazard events. As discussed throughout Section 4, Risk Assessment, Delaware County can experience strong gusts of wind during windstorms, tornadoes, hurricanes, tropical storms, or Nor'easters. The structures of these older buildings can put them at greater risk of destruction under these strong wind conditions. These structures might also be at risk during flooding and winter storm events if the materials are either not strong enough to withstand the pressure or weight of the precipitation or are liable to leak, causing further risk of destruction to the house.

While any development increases the risk of damage and loss to natural hazards, a number of factors indicate that this increase in risk is low and mitigated by existing federal, state, county, and local regulations, policies, and programs. Municipalities in Delaware County have adopted subdivision regulations, and local zoning regulations.

Delaware County has identified areas of new potential growth in the Delaware County 2035 Land Use Framework Plan (Delaware County 2013). Because Delaware County is largely built out, the future land use policies of the county focused largely on infill development, particularly around centers. For those areas that are not currently built out, responsible development can take place adjacent to existing activity corridors or centers. The Land Use Framework Plan notes that other undeveloped areas of high scenic, environmental, recreational, or agricultural value should be preserved in their undeveloped or minimally developed state.

Figure 4.4-1 through Figure 4.4-4 show the projected future land use in Delaware County growth areas, including potential infill development and new development areas.

Figure 4.4-1. Future Land Use in Delaware County

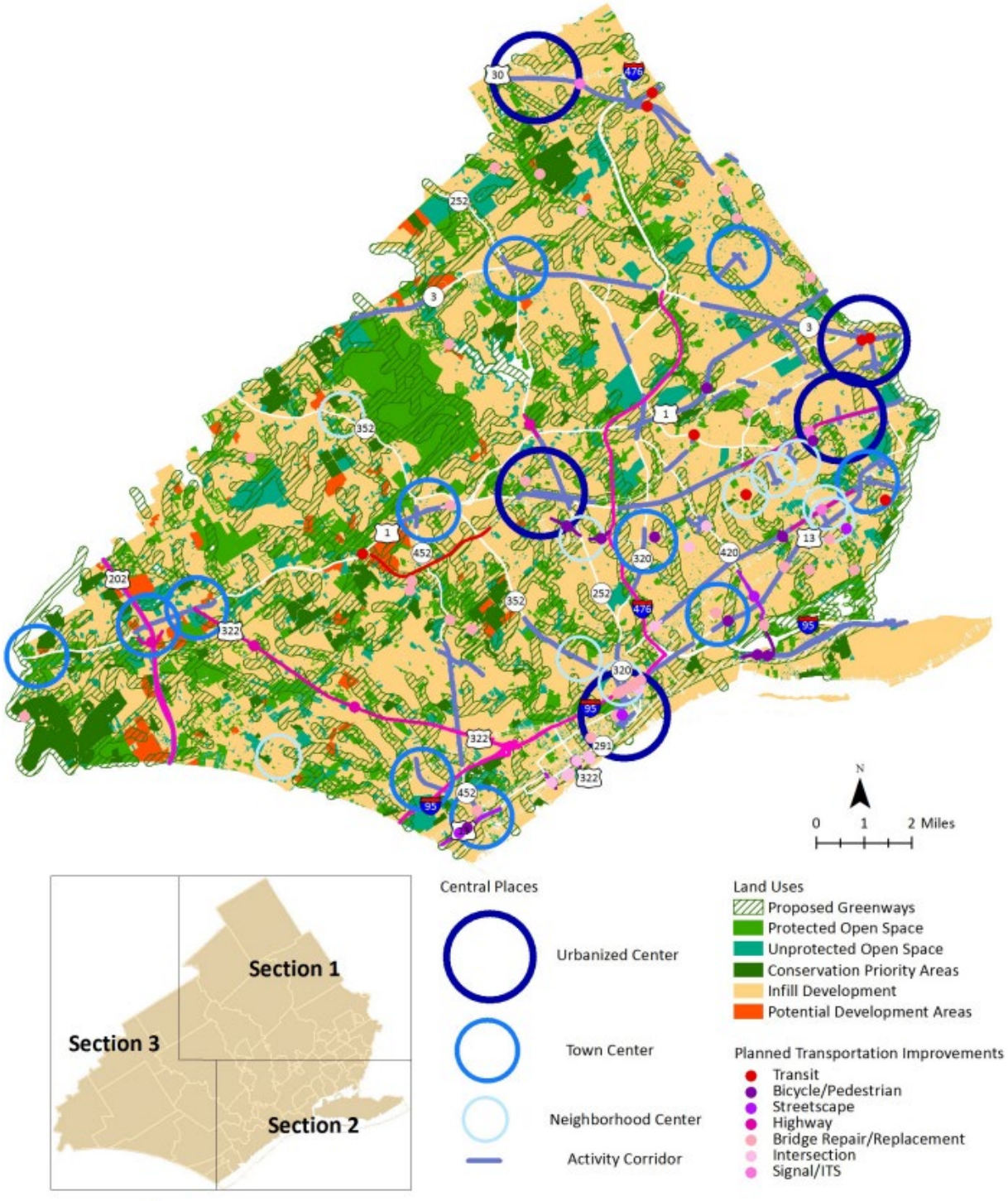
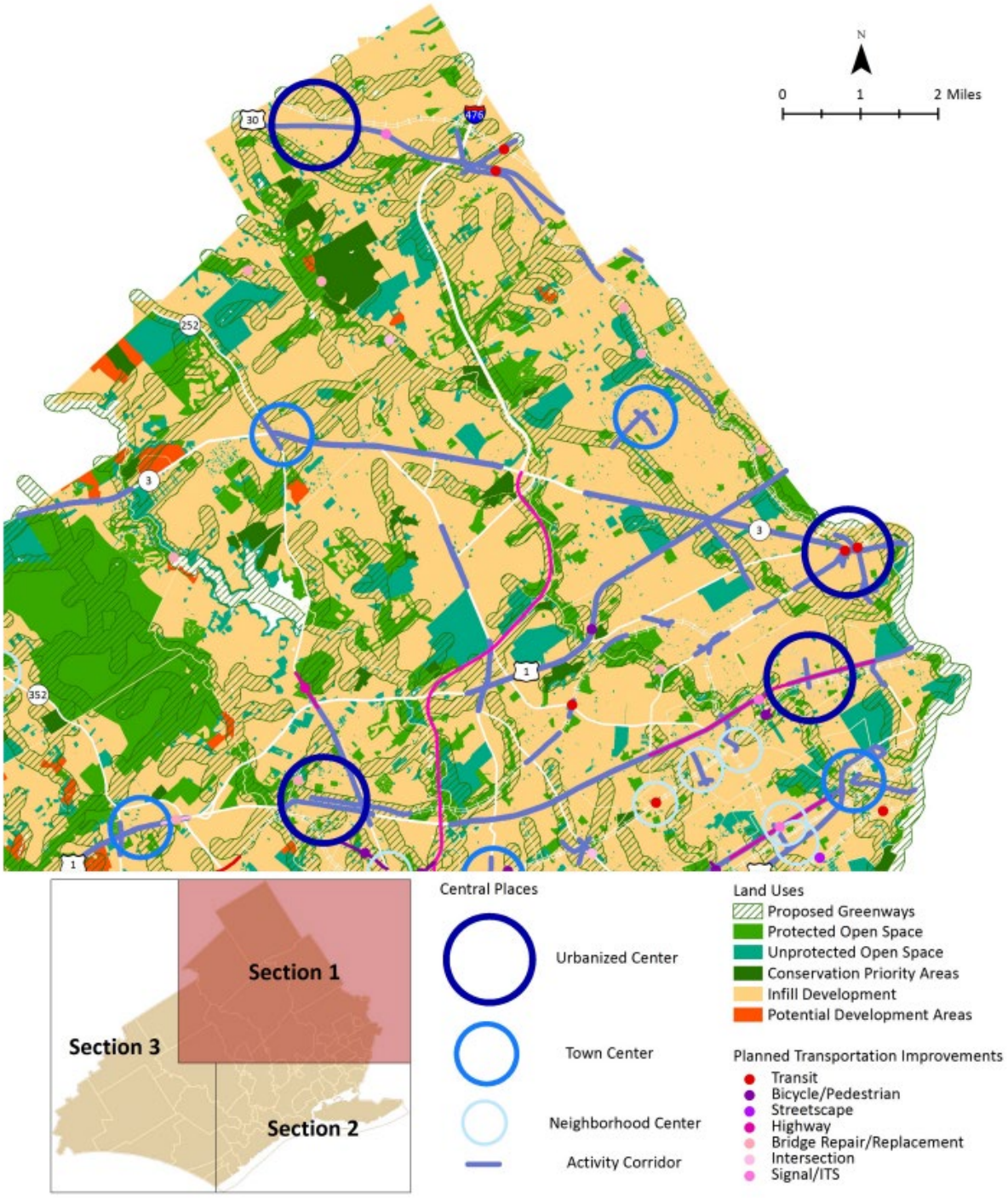
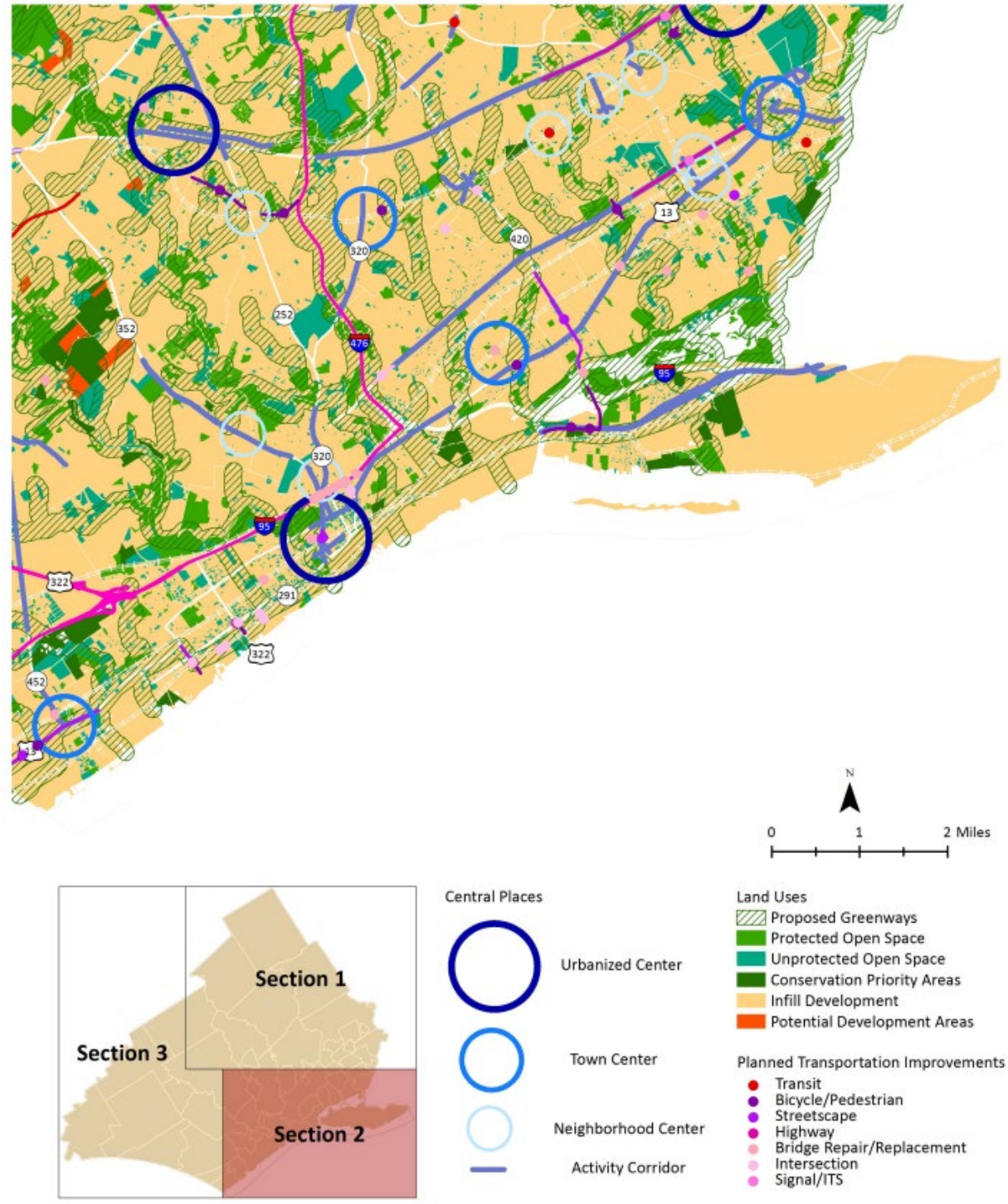


Figure 4.4-2. Future Land Use in Delaware County Section 1



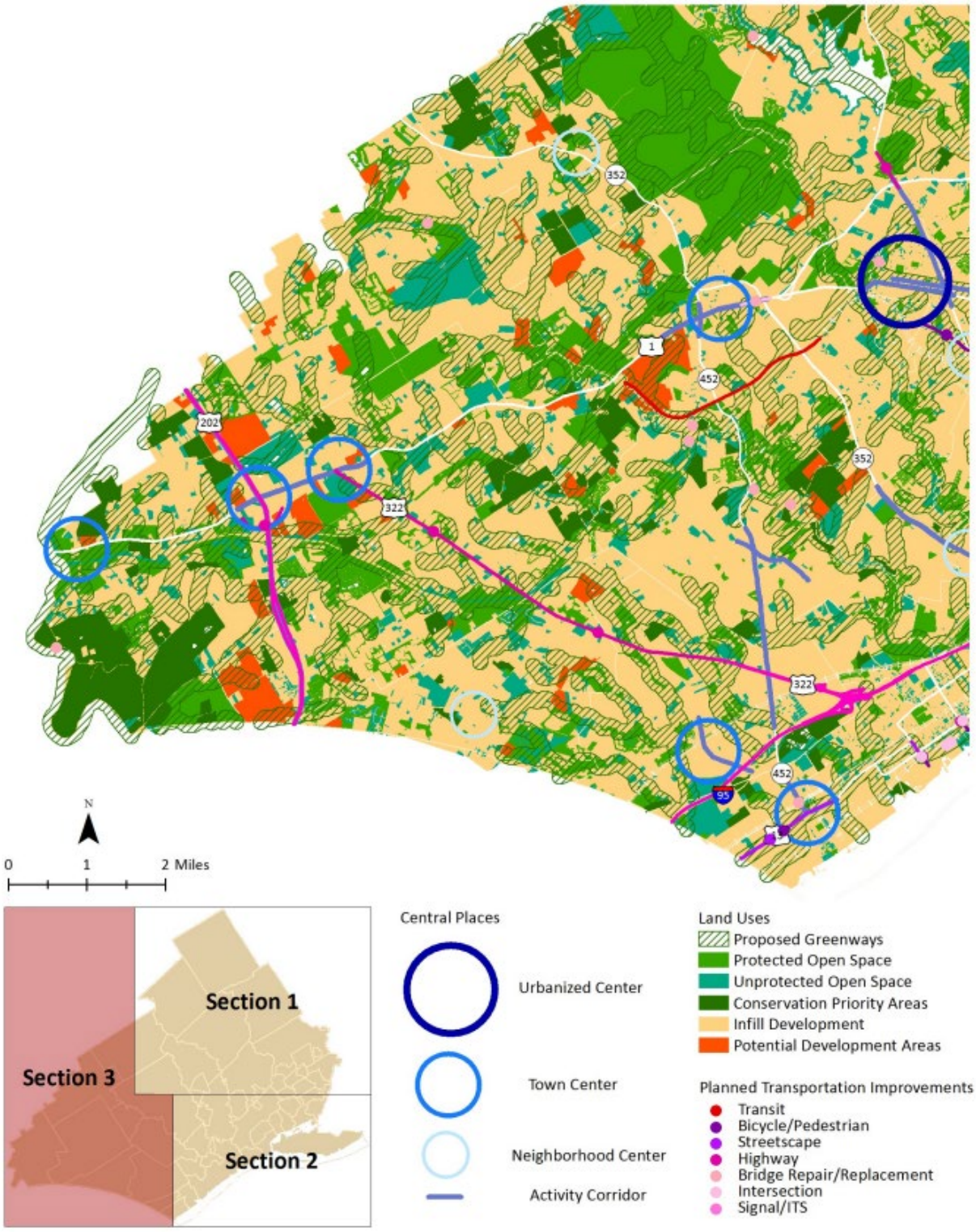
Source: Delaware County 2013

Figure 4.4-3. Future Land Use in Delaware County Section 2



Source: Delaware County 2013

Figure 4.4-4. Future Land Use in Delaware County Section 3



Source: Delaware County 2013

SECTION 5 CAPABILITY ASSESSMENT

The capability assessment evaluates the community's capabilities and resources already in place at the municipal, county, state, and federal levels to reduce hazard risks. The assessment also identifies where improvements can be made to increase disaster resistance in the community through future mitigation actions.

The first step in organizing hazard mitigation capabilities or resources is to describe the basic approaches available to reduce hazard risks. According to the 2020 Pennsylvania Emergency Management Agency (PEMA) All-Hazard Mitigation Planning Standard Operating Guide (SOG), the following four general mitigation actions may reduce hazard risks: (1) local plans and regulations, (2) structure and infrastructure, (3) natural systems protection, and (4) education and awareness. A brief description of each (according to the PEMA All-Hazard Mitigation Planning SOG) is provided below:

- **Local Plans and Regulations** – These actions include government authorities, policies, or codes that influence the ways land and buildings are developed and built.
- **Structure and Infrastructure** – These actions involve modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability.
- **Natural Systems Protection** – These actions minimize damage and losses and preserve or restore the functions of natural systems.
- **Education and Awareness** – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate these hazards, including participation in national programs.

Capability assessments document the existing resources available to local communities to reduce hazard risks. Resources can be divided into five categories: human, physical, technical, informational, and financial. For each basic capability or approach, one or more of the five resources may be available. A brief description of each resource (PEMA 2020) is provided below:

- **Human resources** include local police, fire, ambulance, and emergency management and response personnel; local government services; and electric, gas, and other utility providers that are critical during disasters.
- **Physical resources** include the equipment and vehicles (such as emergency response and recovery equipment and vehicles), public lands, facilities, and buildings available to the community.
- **Technical/technological resources** include early warning systems, weather alert radios, stream-level monitoring gauges, and 9-1-1 communications systems. They also include technical requirements established by law, regulation, or ordinance.
- **Informational resources** include materials about disasters and hazard mitigation and planning; these resources are available from a wide variety of sources, such as applicable websites, libraries, and state and federal agencies.
- **Financial resources** identify the sources of funding available for hazard mitigation. 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. Local communities need to assess their financial capability and resources to implement hazard mitigation action plans.

This section describes and summarizes the federal, state, county, and local capabilities to address hazard risks in Delaware County.

5.1 UPDATE PROCESS SUMMARY

During the plan update process, Delaware County and all participating municipalities were asked to provide an updated assessment of their mitigation planning capabilities. Each municipality was provided with a Capability Assessment Survey based on Appendix 3 of the October 2020 edition of the PEMA All-Hazard Mitigation Planning SOG (PEMA 2020). The survey was provided to each of the municipal planning points of contact at the Planning Team kickoff meeting. Appendix D provides completed Capability Assessment Surveys, whether completed by hand, electronically, or filled in working alongside the Delaware County Emergency Services staff or planning consultant.

Delaware County has several resources available to implement hazard mitigation initiatives, including emergency response measures; local planning and regulatory tools; administrative assistance and technical expertise; fiscal capabilities; and participation in local, regional, state, and federal programs. These resources enable community resiliency through actions taken before, during, and after a hazard event. Emergency services, manpower, equipment, and fiscal resources are important tools in addressing hazard potential and mitigation in Delaware County communities.

This section describes and summarizes the federal, state, county, and local capabilities to address hazard risk in Delaware County.

5.2 CAPABILITY ASSESSMENT FINDINGS

A jurisdiction's ability to effectively manage natural hazard risk is directly related to its level of hazard mitigation capabilities. As such, mitigation strategies developed in coordination with Delaware County's municipalities have a direct effect on establishing new capability functions in the community or strengthening existing capabilities.

Delaware County and most of its municipalities updated and completed the Capability Assessment Survey (Appendix D: Municipal Participation Documentation). If municipalities did not update or only partially updated their capabilities information, the information provided for the 2016 Hazard Mitigation Plan (HMP) was carried forward into this plan update.

All municipalities in Delaware County, aside from Rutledge Borough (suspended), participate in the National Flood Insurance Program (NFIP); however, only one municipality participates in the Community Rating System (CRS). Participating in CRS can reduce insurance premiums for properties located outside of Special Flood Hazard Areas of up to 10 percent. Properties located in Special Flood Hazard Areas can reduce premiums up to 45 percent by participating in the CRS program. These discounts can be obtained by undertaking public information, mapping and regulations, flood damage reduction and flood preparedness activities (FEMA 2021).

Finally, limited funding is a critical barrier to the implementation of hazard mitigation activities in Delaware County. The county will need to rely on regional, state, and federal partnerships for financial assistance. Delaware County will continue to alert municipalities when FEMA grant funding is available to apply for to implement eligible projects in this HMP update.

The following sections further detail the capability assessment findings.

5.2.1 Planning and Regulatory Capability

While municipalities in Pennsylvania must comply with the minimum regulatory requirements established under the Pennsylvania Municipal Planning Code, they otherwise have considerable latitude in adopting ordinances, policies, and programs that can be used to manage natural and non-natural hazard risks. Specifically, municipalities can manage these risks through comprehensive land use planning, hazard-specific ordinances (for example, flood damage prevention, sinkholes, and steep slopes), zoning, site-plan approval, and building code enforcement. When effectively prepared and administered, these regulations can lead to hazard mitigation. Guiding documents, known as the "Planning Series" can assist municipalities develop regulations and best

management practices. These *Series* can be found on Pennsylvania Department of Community and Economic Development Library under Local Government – Handbooks and Guides – Community Planning.

For example, the adoption of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166 of 1978) established minimum floodplain management criteria. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning and/or subdivision and land development ordinances or building codes, thereby mitigating the potential impacts of local flooding.

County and Municipal Planning Capabilities

Delaware County 2035 Comprehensive Plan

A comprehensive plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The comprehensive plan is a blueprint for housing, transportation, community facilities, utilities, and land use. It examines how the past led to the present and charts the community's future path. The Pennsylvania Municipalities Planning Code (MPC) Act 247 of 1968, as reauthorized and amended, requires counties to prepare and maintain a comprehensive plan. In addition, the MPC requires counties to update the comprehensive plan every 10 years.

Section 301a.(2) of the MPC requires comprehensive plans to include a plan for land use, which, among other provisions, suggests that the plan should give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services and recommends giving consideration to storm drainage and floodplain management.

The county's comprehensive plan, *Delaware County 2035* is slated to guide Delaware County through 2035. The comprehensive plan consists of a central *Land Use Policy Framework (2013)* and is interconnected with five additional component plans: the *Open Space, Recreation, and Greenway Plan (2015)*, *Economic Development Plan (2017)*, *Transportation Plan (2017)*, *Historic Preservation Plan (2018)*, and *Housing Plan (2020)*. Each component plan described below follows the same framework and expounds upon goals and policies established in the *Land Use Policy Framework*.

The *Land Use Policy Framework* established a countywide goal to, "preserve and enhance the existing diversified mix of land uses and provide for orderly and coordinated development that sustains a high quality of life." The goal would be achieved through the development of objectives, policies, and strategies that follow 11 place-making themes. The themes are as follows:

- Sustainable Development Patterns
- Multi-modal Transportation
- Range of Housing Options
- Community Investment and Revitalization
- Multi-modal Partnerships
- Quality Community Facilities
- Historic and Natural Resource Protection
- Smart Energy Choices
- Healthy Lifestyles
- Community Character; and
- Regional Economic Development

The *Open Space, Recreation, and Greenway Plan* serves as a guide and resource for countywide, multi-municipal, and municipal open space planning efforts. It examines open space policies and trends identified in the *Delaware County 2035 Land Use Framework Plan* and makes recommendations regarding open space, recreation, and greenway needs and opportunities specific to the county. The goals of the Plan are as follows:

- Conserve the natural and cultural resources of the county
- Increase and enhance the environmental and/or recreational value of developed and undeveloped lands; and

- Develop a greenway network that connects natural features and people to community and regional destinations.

The *Open Space, Recreation, and Greenway Plan* was developed to provide long-term sustainable usage of the County's open space and natural resources. This plan includes an inventory of municipal, county, state, and federal open space within the county; established the first countywide greenway plan; and provides a long-range analysis of the parks and recreation system. The plan prioritizes conserving natural features, enhancing existing open spaces, and connecting open spaces and cultural destinations. It identifies a countywide greenway network that includes several "Conservation Greenways." These greenways emphasize the protection and connection of environmental features and primarily follow environmental features, such as streams. Identifying this network, and working to connect it, will help to provide natural riparian zones to help reduce flooding damage and injury. Additionally, the plan recognizes the risk posed by flash-flooding and recommends opportunities to reduce risk through innovative stormwater management and green stormwater infrastructure. The plan identifies a nearly 130-mile conceptual trail network that can help serve as an alternative transportation network to improve pedestrian and bicyclist safety. This trail network could serve as an alternative means of travel in the case of an emergency.

The *Economic Development Plan* outlines a long-range, place-based strategy that builds upon the unique features of Delaware County. It identifies trends in industry, employment, and housing that affect the markets of the 21st century and connects them to an action plan tailored to the different types of places. The plan emphasizes the importance of maintaining the unique sense of place across the county as communities address the changing needs of a twenty-first-century economy. The Plan sets three goals:

- Innovate business recruitment and retention strategies to attract new employers
- Diversify the built environment to attract a range of people and foster new business; and
- Adapt to and anticipate changing market needs of businesses.

The *Transportation Plan* outlines a long-range strategy for the movement of people and goods in Delaware County. By examining existing conditions and emerging trends, the plan highlights opportunities to improve, expand, and integrate the county's transportation network. The plan emphasizes the importance of making the county's transportation more multi-modal to provide safe, efficient, and reliable transportation for all users. The Plan identified three overarching goals:

- Improve the safety and capacity of all modes through adaptable and innovative solutions
- Expand the transportation network so residents can access more than one mode; and
- Integrate all modes into a complete system.

The *Transportation Plan* identifies areas in need of safety improvements to create a safe, multi-modal transportation system in the county. This will aid in reducing risks associated with transportation accidents and improve evacuation during emergencies.

The *Historic Preservation Plan* intends to capture the essence of the variety of historic resources in the county and seeks to better understand how to best identify, prioritize, and protect them. The plan incorporates information on known historic resources and countywide history, shares preservation planning strategies, and identifies actions that will further the role of the county and its municipalities as good stewards of its rich heritage and help to incorporate historic resources into what makes our communities thrive. Three goals guide historic and preservation efforts:

- Identify and document historic resources, narratives, and themes in Delaware County
- Protect resources that have the most meaning, cultural impact, or historical significance to the county and its communities; and
- Promote the benefit that historic resources and historic preservation practices contribute to the county's character and future prosperity.

The final component plan, the *Housing Plan,* is a long-range strategy to provide for adequate housing solutions for all citizens in Delaware County. The plan identifies existing conditions, needs and opportunities, and recommendations related to the county's housing stock. It outlines actions to be taken over the course of the next

15 years that are in line with the broader goals of *Delaware County 2035*. The plan contains goals to enrich, provide, and collaborate, as described below.

- Enrich the supply and variety of quality housing stock while providing positive models to promote diverse communities of character
- Provide for and anticipate the housing needs of existing and future county residents of all ages, abilities, and incomes; and
- Collaborate across organizations and municipalities to share information and resource while working toward commons goals.

The *Housing Plan* provides an inventory of existing housing stock, which can help the county anticipate housing needs for varying emergencies.

The MPC requires that municipal plans are consistent with the county comprehensive plan. Delaware County Planning Department reviews each comprehensive plan for consistency and completes a municipal plan audit tool. These reviews contain the date of the plan, policies, goals, and objectives, special features, and identified challenges. The findings of the audits are utilized to inform *Delaware County 2035*.

Stormwater Management Planning

In 1978, the Pennsylvania General Assembly passed the Stormwater Management Act (Act 167) of 1978 (Pennsylvania State Data Center 1978). Act 167 requires counties to prepare stormwater management plans on a watershed-by-watershed basis. The plans must be developed in consultation with the affected municipalities. Each new plan is required to include standards for control of runoff from new development based on a detailed hydrologic assessment. A key objective of each plan is to coordinate the stormwater management decisions of the watershed municipalities. Implementation of each plan is through mandatory municipal adoption of ordinance provisions consistent with the plan.

Plans prepared under Act 167 will not resolve all drainage issues. A key goal of the planning process is to maintain existing peak runoff rates throughout a watershed as land development continues to take place. While the planning process does not solve existing flooding problems, it aims to prevent these problems from getting worse. Each municipality is responsible for correcting existing flooding problems.

Delaware County has five Act 167 stormwater management plans in effect: Ridley Creek (1988), Chester Creek (2002), Darby-Cobbs Creek (2005), Crum Creek (2011), and Brandywine Creek (2013). These plans provide a comprehensive watershed plan and model stormwater ordinance based on the unique physical conditions of each specific watershed. Municipalities are required to implement the Act 167 plan through adoption of the model ordinance.

Under the National Pollutant Discharge Elimination System (NPDES) and for small Municipal Separate Storm Sewer Systems (MS4), Delaware County is a regulated entity. The purpose of the NPDES MS4 program is to limit the amount of pollutants that enter into waterways and water bodies through separate storm sewer systems. These systems include, but are not limited to, inlets, pipes, outlets, and gutters. The MS4 program has six minimum control standards that include public education, public participation, illicit discharge detection and elimination, construction site stormwater management, post-construction stormwater management, and pollution prevention and good housekeeping at municipal facilities. All municipalities in Delaware County are listed as MS4 and are required to have a permit issued by the Pennsylvania Department of Environmental Protection (PA DEP). Additionally, the PA DEP permit requires municipalities to prepare pollutant reduction plans for each impaired stream.

Informational Resources

Delaware County has a variety of informational resources available, and many of the publications discussed previously are available for review by the public on the Delaware County Planning Department website: Planning Department - Delaware County, Pennsylvania (delcopa.gov). Information is also posted on municipal websites, and hard copies of informational materials are available in municipal offices.

Delaware County Emergency Services

Delaware County Emergency Services maintains a strong emergency management capability that supports Delaware County. The county operates an emergency 9-1-1 call center and activates its own emergency operations center (EOC) during emergencies. In addition, the county provides or supports emergency service programs and measures, including emergency response, public alert and warning systems, emergency communications systems, hazard event monitoring systems, and public information and outreach programs. Capabilities include the 9-1-1 center, EOC, emergency service measures, emergency response planning, public information programs, and geographic information system, which are described in the sections below.

9-1-1 Center

9-1-1 is the telephone number used to report emergencies. Citizens use the service in the event of the presence or potential for an immediate threat to life or property and to request response from police, fire, or emergency medical services (EMS) agencies. Examples include reporting a crime that has just occurred or is in progress; describing an odor (such as gas) or reporting a fire; or calling for assistance with a sick or injured person who requires treatment and possibly transportation to a hospital emergency department. The 9-1-1 system is capable of accepting calls from hearing or speech-impaired callers using a Telecommunications Device for the Deaf (TDD), and text messages. Each county in Pennsylvania operates a 9-1-1 Public Safety Answering Point (PSAP). Personnel at these PSAPs would need to coordinate their efforts in a regional hazard event. Computerized mapping of streets with address information is critical for emergency response purposes. The 9-1-1 center is also used to alert citizens during an emergency using "Delco Alert," a community warning system.

Emergency Operations Center

In the event of an impending emergency or disaster that cannot be managed by the county 9-1-1 staff, Delaware County would activate its EOC. The purpose of the EOC is to manage an emergency response and coordinate the distribution of resources to a disaster incident. When the EOC is activated and becomes operational, it will be staffed with highly trained, experienced personnel who have the authority, flexibility, imagination, and initiative needed to take command and make coordinated decisions relative to their field of expertise. EOC staffing includes personnel with skills from the disciplines below, in accordance with the National Response Framework (NRF) and the Commonwealth of Pennsylvania Emergency Operations Plan (CEOP). Each discipline is assigned a coordinating agency and at least one primary agency and one support agency. In cases where more than one agency has primary jurisdiction over a discipline, a coordinating agency is designated from among them. Where there is only one agency with primary jurisdiction, that agency is also the coordinating agency. EOC disciplines are listed below:

- Transportation
- Communications and Warning
- Public Works and Engineering
- Firefighting
- Emergency Management
- Mass Care, Evacuation, and Human Services
- Logistics Management and Resource Support
- Public Health and Medical Services
- Search and Rescue
- Oil and Hazardous Materials /Radiation
- Agriculture and Natural Resources
- Energy and Utilities
- Public Safety and Security
- Long-Term Community Recovery
- Public Information Officer (PIO) External Affairs

When activated, the EOC is in constant communication with the 9-1-1 center to ensure coordination of activities.

The Emergency Services capabilities fall under two categories: emergency service measures and emergency response planning. These capabilities are described below.

Emergency Service Measures

Emergency service measures protect people during and immediately following a disaster. The county monitors several systems that will disseminate emergency information and warnings. These monitoring systems include Satellite Emergency Voice Alerting Network (SEVAN), Radio Amateur Civil Emergency Services (RACES), National Oceanic and Atmospheric Administration (NOAA) radios, 800-megahertz (MHz) statewide radios, and EMNet, which are described below.

- SEVAN is the voice component of the satellite warning system. This allows PEMA, Pennsylvania counties, regional offices, and cities to communicate directly in real time, regardless of the status of the telephone system. Warning messages are routinely broadcast by PEMA using the system.
- RACES is a group of amateur radio operators who donate their services in times of natural disaster or emergency. They provide communication to fire, police, and other agencies that need assistance.
- NOAA Weather Radio All-Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from a nearby National Weather System (NWS) office. NWR broadcasts NWS warnings, watches, forecasts, and other hazard information 24 hours a day. NWR also broadcasts warning and post-event information for all types of hazards, including natural, human-caused (such as chemical releases or oil spills), and public safety (such as AMBER alerts or 9-1-1 telephone outages).
- The 800-MHz radio system provides two-way voice and data communications for all Delaware County and Commonwealth agencies. The primary function of this system is to provide redundant communications between the county and partner agency facilities in case the primary means of communication becomes interrupted.
- EMNet is a fast, reliable alert and warning system, with 362 terminals across Pennsylvania over 214 broadcast stations and 62 cable networks. It provides an avenue for text-based messages to be sent among system users.

Emergency Planning

Emergency Operations Plan (EOP)

The Delaware County EOP documents the county's emergency preparedness planning. The EOP includes county-specific emergency response procedures during significant emergency events. Delaware County's EOP complies with the National Incident Management System (NIMS) and is updated every 2 years. The updated risk assessment information from this HMP will be incorporated into subsequent updates to the EOP.

In addition to the county's plan, the Emergency Management Services Code (PA Title 35) requires all municipalities in the Commonwealth to have a local EOP, which is updated every 2 years.

Mutual Aid Agreements

Delaware County is part of a larger county consortium, the Southeastern Pennsylvania Regional Task Force (SEPA-RTF), which works together and shares resources during times of emergency. Originally formed in response to a growing awareness of the threat of terrorism, the Task Force's focus has broadened to include an all-hazards approach. SEPA-RTF works to prevent, prepare for, respond to, and recover from all types of emergencies and disasters. This intergovernmental agreement is between the following counties:

- Bucks
- Chester
- Delaware
- Montgomery
- Philadelphia

Regional Planning Initiatives

Delaware County also assists in county or regional planning and preparation for the following:

- Local (municipal) EOPs
- Medical facilities assessments
- Dam failures
- Airport accidents
- Pandemic
- Mass casualty/fatality incidents
- Counterterrorism
- Special events, such as concerts, parades, etc.
- School emergencies
- Day care, group home, and special needs facility assessments
- Development of an Evacuation and Detour Plan
- Superfund Amendments and Reauthorization Act of 1986 (SARA) – The Local Emergency Planning Committee program is based on the SARA of 1986, Title III. This legislation requires local planning by businesses and response agencies (such as fire departments and hazardous materials teams) whenever hazardous materials are involved. SARA also requires the establishment of a system in each community that informs the citizens of chemicals used, manufactured, and stored locally.
- In cooperation with the American Red Cross, the county also has designated shelters that may be used during emergencies and disasters.

Local Emergency Management Capabilities

According to Pennsylvania Title 35 (Emergency Management Services Code), Chapter 7500, the following stipulations apply:

- Each political subdivision of this Commonwealth is directed and authorized to establish a local emergency management organization in accordance with the plan and program of PEMA. Each local organization shall have responsibility for emergency response and recovery within the territorial limits of the political subdivision within which it is organized and, in addition, shall conduct such services outside of its jurisdictional limits as may be required under this part.
- The governing body of a political subdivision may declare a local disaster emergency upon finding a disaster has occurred or is imminent. The effect of a declaration of a local disaster emergency is to activate the response and recovery aspects of any and all applicable local emergency management plans and to authorize the furnishing of aid and assistance.
- Each local organization of emergency management shall have a coordinator who shall be responsible for the planning, administration, and operation of the local organization.
- Each political subdivision shall adopt an Intergovernmental Cooperation agreement with other political subdivisions to accomplish the following:
    - Prepare, maintain, and keep current a disaster emergency management plan for (1) the prevention and minimization of injury and damage caused by a disaster, (2) prompt and effective response to disaster, and (3) disaster emergency relief and recovery consistent with the Pennsylvania Emergency Management Plan.
    - Establish, equip, and staff an EOC (integrated with warning and communication systems) to support government operations in emergencies and provide other essential facilities and equipment for agencies and activities assigned emergency functions.

  - Provide individual and organizational training programs to ensure prompt, efficient, and effective disaster emergency services.
  - Organize, prepare, and coordinate all locally available manpower, materials, supplies, equipment, facilities, and services necessary for disaster emergency readiness, response, and recovery.
  - Adopt and implement precautionary measures to mitigate the anticipated effects of a disaster. Execute and enforce such rules and orders as the agency shall adopt and promulgate under the authority of this part.
  - Cooperate and coordinate with any public and private agency or entity in achieving any purpose of this part.
  - Have available for inspection at its EOC all emergency management plans, rules, and orders of the Governor and PEMA.
  - Provide prompt and accurate information regarding local disaster emergencies to appropriate Commonwealth and local officials and agencies and the general public.
  - Participate in all tests, drills, and exercises—including remedial drills and exercises—scheduled by the agency or by the federal government.
  - Participate in the program of integrated flood warning systems under Section 7313 (6) (relating to powers and duties).

- Direction of disaster emergency management services is first the responsibility of the lowest level of government affected. When two or more political subdivisions within a county are affected, the county organization shall exercise responsibility for coordination and support to the area of operations. When two or more counties are involved, coordination shall be provided by PEMA or by area organizations established by PEMA.
- When all appropriate locally available forces and resources are fully committed by the affected political subdivision, assistance from a higher level of government shall be provided.
- Local coordinators of emergency management shall develop mutual aid agreements with adjacent political subdivisions for reciprocal emergency assistance. The agreements shall be consistent with the plans and programs of PEMA.

Emergency Operations Centers

In the event of an impending emergency or disaster, the local EOC may be activated. The purpose of the EOC is to manage the emergency response and coordinate distribution of resources to a disaster incident at the local level.

Emergency Response

Each municipality is responsible for providing emergency response to their municipality consisting of EMS, fire, and police. If a municipality does not have one of these providers in their community, they should have mutual aid agreements with an adjacent political subdivision or the Commonwealth (e.g., law enforcement coverage by the Pennsylvania State Police [PSP]) to respond.

Monitoring Systems

The municipalities may also be equipped with several systems to monitor emergency information and warnings, including RACES and the NWS, which have been described previously.

Emergency Response Planning

The municipalities may also assist with emergency response planning for:

1. EOPs
2. Medical facilities
3. Dams
4. Counterterrorism preparedness

5. Special events
6. School emergencies
7. Day care, group homes, and special needs facilities
8. Evacuation

A summary of existing federal, state, regional, and county programs (regulatory and otherwise) to manage specific hazard risks is provided in the hazard profiles in Section 4 of this plan update. While the risk of certain hazards can be addressed at least partially through mitigation, the risks of other hazards (particularly certain non-natural hazards) are primarily managed through the preparedness and response elements of emergency management or through other regulatory programs at the federal and state levels.

Participation in the National Flood Insurance Program

According to Federal Emergency Management Agency's (FEMA) 2002 NFIP: Program Description, the U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968 (FEMA 2002). The NFIP is a federal program enabling 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 damage.

Participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction and substantial improvements in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an alternative to disaster assistance and reduce the escalating costs of repairing damage to buildings and their contents caused by floods (FEMA 2002).

NFIP-participating communities in Delaware County are required to adopt a flood damage prevention ordinance (also sometimes called a "floodplain" or "floodplain management ordinance") and update this ordinance when the regulatory NFIP Flood Insurance Rate Maps (FIRM) are officially updated. The Pennsylvania Department of Community and Economic Development (PA DCED) (the legislated Commonwealth coordinating agency for the NFIP) and PEMA (the Commonwealth agency that carries out floodplain coordination in practice) provide support to municipalities by providing suggested text for floodplain management ordinances.

All the county's municipalities, except Rutledge Borough, participate in the NFIP. The Delaware County FEMA Digitized Flood Insurance Rate Maps (DFIRMs) for each municipality were made effective November 18, 2009; September 2, 2015; July 5, 2017; and September 2, 2015. Countywide DFIRMs were published on September 29, 2017. All participating municipalities have adopted a floodplain ordinance, and many have adopted a stormwater management ordinance.

Rutledge Borough received a sanction on November 25, 2009, and was suspended from the NFIP. The suspension may be lifted if the municipality submits a compliant ordinance, a letter from the Borough requesting reinstatement in the program, and a letter stating that there has not been any development in the special flood hazard area (SFHA) that was not in compliance with the minimum standards of the NFIP. In a suspended community, new flood insurance coverage cannot be purchased and policies cannot be renewed. In addition, 3-year policies become void at the end of the current policy year with a pro rata refund given for remaining years of the original 3-year policy term, per FEMA.

The municipalities' floodplain administrators, who are often either the code enforcement officer or zoning officer for the municipality, enforce the floodplain ordinances locally. Throughout Delaware County, all municipalities enforce the Uniform Construction Code, and most enforce zoning regulations. Rather than using a specific Floodplain Development Permit, the zoning or building permit applications for the county's municipalities include o a space for applicants to state whether the proposed development is in the floodplain. The permit application reviewer confirms whether the property in question is in the floodplain. If it is, the municipal floodplain administrator reviews the proposed development against the municipality's floodplain management ordinance. The floodplain administrator conducts similar reviews of any revisions to the permit application until all requirements are met. As the proposed activity is conducted, the floodplain administrator works with the code

enforcement officer and/or zoning officer to conduct inspections and ensure that the proposed activity is carried out as it was permitted.

NFIP-participating communities in Delaware County are required to make current NFIP FIRMs available to their residents for review and may provide mapping assistance through their floodplain administrators. Typically, this mapping is available at the municipal offices in each community. Floodplain administrators provide information about mapping to their residents using established outreach methods such as municipal websites, newsletters, and mailings. At the time of this plan update, the Delaware County FEMA Digitized Flood Insurance Rate Maps (DFIRM) (dated 2017) were used to evaluate exposure and determine potential future losses.

Floodplain administrators also use established outreach methods to provide information about flood insurance to residents and business owners. They can provide information on the availability of flood insurance, how to get a flood insurance policy, and determining the appropriate level of coverage.

Municipal participation in and compliance with the NFIP is supported at the federal level by FEMA Region III and the Insurance Services Organization (ISO) and at the state level by the PA DEP, PA DCED, and PEMA. The county's Planning Commission and Conservation District both support flood mitigation efforts, associated training, and public education and awareness programs. A compilation of suggested provisions is available to municipalities to help to ensure the municipalities meet the minimum requirements of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166). Every flood-prone municipality is required to submit an annual report detailing floodplain management activities to PEMA to ensure compliance with floodplain regulations.

The flood hazard profile in Section 4.3.8 provides additional information on the NFIP program and its implementation within the county.

Community Rating System (CRS)

In the 1990s, the Flood Insurance Administration (FIA) established the CRS to encourage local governments to increase their standards for floodplain development. The goal of the program is to encourage communities, through flood insurance rate adjustments, to implement standards beyond the minimum required to:

- Reduce losses from floods
- Facilitate accurate insurance ratings
- Promote public awareness of the availability of flood insurance

CRS is a voluntary program designed to reward participating jurisdictions for their efforts to create more disaster-resistant communities using the principles of sustainable development and management. By enrolling in CRS, municipalities can leverage greater flood protection while receiving flood insurance discounts.

There are 10 CRS classes that provide varied reduction in insurance premiums. Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities. The CRS recognizes 18 creditable activities that are organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. Currently, only Brookhaven Borough participates in the CRS Program.

Municipal Capabilities

Participating municipalities in this planning effort were provided a Capability Assessment Survey. Table 5-1 summarizes the responses of the municipalities based on planning and regulatory capability, supplemented by information received from the county regarding municipal capabilities. Appendix D includes the municipal survey responses with detailed information regarding the Delaware County municipalities' planning and regulatory capabilities.

Table 5-1. Planning and Regulatory Capability

Municipality	Hazard Mitigation Plan	EOP	Disaster Recovery Plan	Evacuation Plan	Continuity of Operations (COOP) Plan	NFIP	NFIP – CRS	Floodplain Regulations	Floodplain Mgmt. Plan	Zoning Regulations	Subdivision Regulations	Comprehensive Land Use Plan (or General, Master, or Growth Mgmt. Plan)	Open Space Mgmt. Plan	Stormwater Mgmt. Plan/Ordinance	Natural Resource Protection Plan	Capital Improvements Plan	Economic Dev. Plan	Historic Preservation Plan	Farmland Preservation	Building Code	Fire Code	Other
Delaware County	+											X	X	X			X	X				
Aldan Borough	X					X	-	X		X	X	X		X						X		
Aston Township	-					X	-	X		X	X	X		X						X		
Bethel Township	-	X	-	-	-	X	-	X	X	X	X	X	+	X	X	-	-	X	-	X	X	-
Brookhaven Borough	-	X	-	X	X	X	X	X	-	X	X	X		X	-	-	-	-	-	X	X	-
Chadds Ford Township	-					X	-	X		X	X	X		X						X		
Chester City	-	X	X	X	X	X	-	X	X	X	-	+	+	X	X	X	X	X	X	X	X	-
Chester Heights Borough	X	+	+	+	+	X	-	X	-	X	X	X	+	X	+	+	-	+	+	X	X	-
Chester Township	X					X	-	X		X	X	X		X						X		
Clifton Heights Borough	X					X	-	X		X	X	X		X						X		
Collingdale Borough	-					X	-	X		X	X	X		X						X		
Colwyn Borough	-					X	-	X		X	X	X		X						X		
Concord Township	-	+	-	-	+	X	-	X	X	X	X	X	X	X	-	X	-	X	+	X	X	-
Darby Borough	-					X	-	X		X	X	X		X						X		
Darby Township	-					X	-	X		X	X	X		X						X	X	
East Lansdowne Borough	X					X	-	X		X	X	X		X						X		
Eddystone Borough	-					X	-	X		X	X	X		X						X		
Edgmont Township	-					X	-	X		X	X	X		X						X		
Folcroft Borough	-					X	-	X		X	X	X		X						X		
Glenolden Borough	-					X	-	X		X	X	X		X						X		
Haverford Township	-					X	-	X		X	X	X		X						X		
Lansdowne Borough	-					X	-	X		X	X	X		X						X		

Municipality	Hazard Mitigation Plan	EOP	Disaster Recovery Plan	Evacuation Plan	Continuity of Operations (COOP) Plan	NFIP	NFIP – CRS	Floodplain Regulations	Floodplain Mgmt. Plan	Zoning Regulations	Subdivision Regulations	Comprehensive Land Use Plan (or General, Master, or Growth Mgmt. Plan)	Open Space Mgmt. Plan	Stormwater Mgmt. Plan/Ordinance	Natural Resource Protection Plan	Capital Improvements Plan	Economic Dev. Plan	Historic Preservation Plan	Farmland Preservation	Building Code	Fire Code	Other
Lower Chichester Township	-					X	-	X		X	X	X		-						X		
Marcus Hook Borough	X	X	-	+	-	X	-	X	X	X	X	X	-	X	-	-	-	-	-	X	X	-
Marple Township	X	X	-	-	-	X	-	X	X	X	X	X	X	X	X	X	X	X	-	X	X	-
Media Borough	-					X	-	X		X	X	X		X						X		
Middletown Township	-	X	-	-	-	X	-	X	-	X	X	X	-	X	-	-	-	-	-	X	X	-
Millbourne Borough	-					X	-	X		X	X	X		X						X		
Morton Borough	-					X	-	X		X	X	X		X						X		
Nether Providence Township	X					X	-	X		X	X	X		X						X		
Newtown Township	-	X	-	-	-	X	-	X	+	X	X	X	X	X	X	X	-	X	-	X	X	-
Norwood Borough	-					X	-	X		X	X	X		X						X		
Parkside Borough	-					X	-	X		X	X	X		X						X		
Prospect Park Borough	-	X	-	X	X	X	-	X	-	X	X	-	-	X	-	-	-	-	-	X	X	-
Radnor Township	-	X	-	-	-	X	-	X	-	X	X	X	X	X	X	X	X	-	-	X	X	-
Ridley Park Borough	-					X	-	X		X	X	X		X						X		
Ridley Township	-					X	-	X		X	X	X		X						X		
Rose Valley Borough	-					X	-	X		X	X	X		X						X		
Rutledge Borough	-					-	-	X		X	X	X		X						X		
Sharon Hill Borough	-					X	-	X		X	X	X		X						X		
Springfield Township	-					X	-	X		X	X	X		X						X		
Swarthmore Borough	-					X	-	X		X	X	X		X						X		
Thornbury Township	X	X	X	X	X	X	-	X	X	-	X	X	X	X	X	X	-	X	-	X	X	-
Tinicum Township	-					X	-	X		X	X	X		X						X		
Trainer Borough	-					X	-	X		X	X	X		-						X		
Upland Borough	-					X	-	X		X	X	X		X						X		

Municipality	Hazard Mitigation Plan	EOP	Disaster Recovery Plan	Evacuation Plan	Continuity of Operations (COOP) Plan	NFIP	NFIP – CRS	Floodplain Regulations	Floodplain Mgmt. Plan	Zoning Regulations	Subdivision Regulations	Comprehensive Land Use Plan (or General, Master, or Growth Mgmt. Plan)	Open Space Mgmt. Plan	Stormwater Mgmt. Plan/Ordinance	Natural Resource Protection Plan	Capital Improvements Plan	Economic Dev. Plan	Historic Preservation Plan	Farmland Preservation	Building Code	Fire Code	Other
Upper Chichester Township	X					X	-	X		X	X	X		X						X		
Upper Darby Township	-					X	-	X		X	X	X		X						X		
Upper Providence Township	X					X	-	X		X	X	X		X						X		
Yeadon Borough	X					X	-	X		X	X	X		X						X		

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
"+" indicates that the capability is under development.
"N/A": Not applicable
Blank space indicates no response was received from the municipality in 2015/2016 or 2020/2021.

5.2.2 Administrative and Technical Capability

Administrative capability is described as the adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise to effectively execute mitigation activities. Common examples of skillsets and technical personnel needed for hazard mitigation include: planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g., building inspectors), planners or engineers with an understanding of natural and/or human-caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in geographic information systems, resource development staff or grant writers, and fiscal staff to handle complex grant application processes.

Municipalities are further supported by county, regional, state, and federal administrative and technical capabilities. For this HMP, most support agencies and resources have been identified and referenced throughout this plan update.

It is noted that the county and many of its municipalities have identified specific mitigation initiatives described in this plan update, which will help build and enhance mitigation-related administrative and technical capabilities in Delaware County.

Federal and Commonwealth Capabilities

Federal agencies that can provide technical assistance for mitigation activities include, but are not limited to:

- U.S. Army Corp of Engineers
- Department of Housing and Urban Development
- Department of Agriculture
- Economic Development Administration
- Emergency Management Institute
- Environmental Protection Agency
- FEMA
- Small Business Administration

Commonwealth agencies that can provide technical assistance for mitigation activities include, but are not limited to:

- Pennsylvania Department of Community and Economic Development
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Emergency Management Agency
- Pennsylvania Department of Environmental Protection
- Pennsylvania Silver Jackets

Municipal Capabilities

Participating municipalities in this planning effort were provided with a capabilities survey. Table 5-2 summarizes the responses of the municipalities based on administrative and technical capability. Appendix D includes copies of the individual municipal responses.

Table 5-2. Administrative and Technical Capability

Municipality	Planners (with land use/land development knowledge)	Planners or Engineers (with natural and/or human-caused hazards knowledge)	Engineers or Professionals trained in building and/or infrastructure construction practices	Emergency Managers	NFIP Floodplain Administrator	Land Surveyors	Scientists or Staff familiar with the hazards of the community	Personnel skilled in GIS and/or the FEMA HAZUS program	Grant Writers or Fiscal Staff to handle large/complex grants	Other
Delaware County										
Aldan Borough					X					
Aston Township					X					
Bethel Township	X	X	X	X	X	X	-	-	X	-
Brookhaven Borough	-	X	X	X	X	X	X	-	-	-
Chadds Ford Township					X					
Chester City	X	X	X	X	X	-	-	-	X	-
Chester Heights Borough	-	-	X	X	X	X	-	-	-	-
Chester Township					X					
Clifton Heights Borough					X					
Collingdale Borough					X					
Colwyn Borough					X					
Concord Township	X	X	X	X	X	X	X	X	X	-
Darby Borough					X					
Darby Township	X	X	X	X	X	X	-	X	X	-
East Lansdowne Borough					X					
Eddystone Borough					X					
Edgmont Township					X					
Folcroft Borough					X					
Glenolden Borough					X					
Haverford Township					X					
Lansdowne Borough					X					
Lower Chichester Township					X					
Marcus Hook Borough	X	-	X	X	X	-	-	-	-	-
Marple Township	X	X	X	X	X	X	X	X	X	-
Media Borough					X					
Middletown Township	X	-	X	X	X	-	-	X	X	-
Millbourne Borough					X					
Morton Borough					X					
Nether Providence Township					X					
Newtown Township	X	X	X	X	X	X	X	-	X	-
Norwood Borough					X					

Municipality	Planners (with land use/land development knowledge)	Planners or Engineers (with natural and/or human-caused hazards knowledge)	Engineers or Professionals trained in building and/or infrastructure construction practices	Emergency Managers	NFIP Floodplain Administrator	Land Surveyors	Scientists or Staff familiar with the hazards of the community	Personnel skilled in GIS and/or the FEMA HAZUS program	Grant Writers or Fiscal Staff to handle large/complex grants	Other
Parkside Borough					X					
Prospect Park Borough	X	-	X	X	X	X	-	-	-	-
Radnor Township	X	X	X	X	X	-	-	-	X	-
Ridley Park Borough					-					
Ridley Township					X					
Rose Valley Borough					X					
Rutledge Borough					X					
Sharon Hill Borough					X					
Springfield Township					X					
Swarthmore Borough					X					
Thornbury Township	-	-	-	X	X	-	-	-	-	-
Tinicum Township					X					
Trainer Borough					X					
Upland Borough					X					
Upper Chichester Township					X					
Upper Darby Township					X					
Upper Providence Township					X					
Yeadon Borough					X					

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
Blank space indicates no response was received from the municipality.

5.2.3 Financial Capability

Mitigation projects and initiatives are largely or entirely dependent on available funding. As such, it is critical to identify all available sources of funding at the local, county, regional, state, and federal level to support implementation of the mitigation strategies identified in this plan update.

Jurisdictions fund mitigation projects though existing local budgets, local appropriations (including referendums and bonding), and through myriad federal and state loan and grant programs.

Federal mitigation grant funding (Stafford Act 404 and 406) (FEMA 2000) is available to all communities with a current HMP (this plan); however, most of these grants require a "local share" in the range of 10 to 25 percent of the total grant amount.

Federal Hazard Mitigation Funding Opportunities

The Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) (Stafford Act 404 and 406) is a post-disaster mitigation program made available to states by FEMA after each federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures and can be used to fund cost-effective projects to protect public or private property in an area covered by a federal disaster declaration or that projects to reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard-prone areas, flood proofing, or elevation to reduce future damage, minor structural improvements, and development of state or local standards.

Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved HMP. Applicants eligible for the HMGP include state and local governments, certain nonprofit organizations or institutions that perform essential government services, and federally recognized tribes. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to PEMA and ranked order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available.

Sections 404 and 406 hazard mitigation funding are two distinct criteria associated with mitigation funding. Participation in FEMA 404 HMGP may cover mitigation activities, including raising, removing, relocating, or replacing structures within flood hazard areas. FEMA 406 Public Assistance mitigation is applied after a Presidentially Declared Disaster. This assistance covers parts of a facility that were actually damaged and the mitigation measures that provide protection from subsequent events.

Flood Mitigation Assistance Program

Flood Mitigation Assistance (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. FMA is funded annually; no federal disaster declaration is required. Only NFIP-insured homes and businesses are eligible for mitigation in this program. Funding for FMA is limited, and, as with the HMGP, individuals cannot apply directly. Applications must come from local governments or other eligible organizations.

The federal government cost-share for an FMA project is 75 percent. At least 25 percent of the total eligible costs must be provided by a non-federal source. At a minimum, a FEMA-approved local HMP is required before a project can be approved. FMA funds are distributed from FEMA to the Commonwealth. PEMA serves as the grantee and program administrator for FMA.

As of fiscal year 2013, the Severe Repetitive Loss and Repetitive Flood Claims Programs were dismantled and incorporated into the FMA Program. As a result, residential and non-residential properties currently insured with NFIP are eligible to receive FMA funds if they meet either the Repetitive Loss Properties (RLP) or Severe Repetitive Loss (SRL) property definitions, as described in Section 4.3.8 of this plan. These properties are eligible to receive an increased federal cost share.

Building Resilient Infrastructure and Communities Program

The Building Resilient Infrastructure and Communities Program was first implemented in 2020 to replace and expand upon the Pre-Disaster Mitigation (PDM) Program. For FY20, FEMA provided $500 million through the Building Resilient Infrastructure and Communities (BRIC) Program (FEMA 2020). States and territories were allocated $33.6 million. $20 million was set aside for tribal governments. The remaining $446.4 million were included in the competitive portion of the funding program. Similar to the PDM Program, no disaster declaration is required. Federal funds will cover 75 percent of a project's cost up to $50 million per sub application, a substantial increase from the $3 million cap under the PDM Program. As with the HMGP, FMA, and (former) PDM Program, a FEMA-approved local HMP is required to be approved for funding under the BRIC program. An increased federal cost share is available for economically disadvantaged rural communities.

Federal Disaster Assistance Programs

Following a disaster, various types of assistance may be made available by local, state, and federal governments. The types and levels of disaster assistance depend on the severity of the damage and the declarations that result from the disaster event. General types of assistance that may be provided, should the President of the United States declare the event a major disaster, include the following:

- Individual Assistance – Provides help for homeowners, renters, businesses, and some nonprofit entities after disasters occur. This program is largely funded by the U.S. Small Business Administration. For homeowners and renters, those who suffered uninsured or underinsured losses may be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property. Renters are eligible for loans to cover personal property losses. Individuals may borrow up to $200,000 to repair or replace real estate, $40,000 to cover losses to personal property, and an additional 20 percent for mitigation. For businesses, loans may be made to repair or replace disaster damages to property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. Nonprofit organizations, such as charities, churches, private universities, etc., are also eligible. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster. These loans are restricted, by law, to small businesses only.
- Public Assistance – Provides cost reimbursement aid to local governments (state, county, local, municipal authorities, and school districts) and certain nonprofit agencies that were involved in disaster response and recovery programs or that suffered loss or damage to facilities or property used to deliver government-like services.

U.S. Department of Housing and Urban Development Community Development Block Grants

The U.S. Department of Housing and Urban Development (HUD) Community Development Block Grants (CDBG) are federal funds intended to provide low- and moderate-income citizens with decent housing, a suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during times of "urgent need" (for example, post-disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. All municipalities in the county are eligible for CDBG funds through the county, except for the City of Harrisburg, which receives CDBG funding directly from U.S. HUD.

High Hazard Potential Dam (HHPD) Program

Delaware County contains five High Hazard Potential dams. To reduce vulnerability, the county could apply for the FEMA Rehabilitation of HHPD grant program. "The main objective of the HHPD grant program is to provide technical, planning, design, and construction assistance in the form of grants to non-federal sponsors for rehabilitation of eligible high hazard potential dams" (FEMA 2020). New guidance for the HHPD grant program was provided in July 2020.

To receive the HHPD funding, the following are basic outline program eligibility requirements:

1. The applicant must be a non-federal government entity or a nonprofit and work with the State Administrative Agency (SSA) designee, which will serve as the applicant and/or pass-through entity for a sub-recipient.
    a. It is recommended that applicants pursue this grant in coordination with the State Dam Safety Officer and the State Hazard Mitigation Officer (SHMO). For Pennsylvania, Roger Adams is the PA DEP Dam Safety Division Chief, and Tom Hughes is the PA SHMO.

2. The sub-recipient must:
    a. Act in accordance with the state dam safety program, and the project must be regulated by the same program.
    b. Must be a full participant in the NFIP and not suspended.
    c. Must commit to operation and maintenance (O&M) for 50 years in addition to providing an O&M plan and assure that the plan will be carried out.
    d. Must have a floodplain management plan in place.
    e. Must comply with the Stafford Act, Davis-Bacon Act, Copeland Anti-Kickback Act, and the Brook Architect-Engineers Act.
3. Eligibility Requirements, as identified on page 2-7 of the HHPD guidance document, include:
    a. Be located in a state with a state dam safety program.
    b. Be classified as "high hazard potential" by the state dam safety program.
    c. Have an emergency action plan (EAP) approved by the state dam safety program/
    d. Fail to meet minimum state dam safety standards and pose an unacceptable risk to the public/
    e. Eligible project must meet non-federal cost-share requirements of 35% of entire project costs.
    f. Phased projects are allowable in the program/
4. Grant Fund Requirements:
    a. Environmental and Historic Preservation compliance
    b. Non-discrimination compliance
    c. Conflicts of interest compliance
    d. Procurement compliance
    e. Duplication of programs
    f. Duplication of benefits

Additional Federal Resources

Weatherization Assistance Program: Minimizes the adverse effects of high-energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as modifying heating system and adding insulation (US DOE 2011).

Section 108 Loan Guarantee Programs: Provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing (HUD 2011).

U.S. Department of Agriculture: Provides disaster assistance through the following:

- The Emergency Conservation Program provides emergency funding for farmers to rehabilitate farmland damaged by natural disasters and for carrying out emergency water conservation measures during periods of severe drought.
- The Non-Insured Crop Disaster Assistance Program provides financial assistance for non-insurable crop losses and planting prevented by disasters.

Emergency Watershed Protection Program: Undertakes emergency measures, including the purchase of floodplain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood, or any other natural occurrence is causing or has caused a sudden impairment of the watershed (NRCS 2011). It is not necessary for an emergency to be declared by the President for an area to be eligible for assistance. The program objective is to assist sponsors and individuals in implementing emergency measures to relieve imminent hazards to life and property created by a natural disaster. Activities include providing financial and technical assistance to remove debris from streams, protecting destabilized stream banks, establishing cover on critically eroding lands, repairing conservation practices, and purchasing floodplain easements. The program is designed for installation of recovery measures.

Commonwealth Hazard Mitigation Funding Opportunities

Marcellus Shale Legacy Fund - Act 13 of 2012

Watershed Restoration and Protection Program (WRPP): Act 13 of 2012 establishes the Marcellus Legacy Fund and allocates funds to the Commonwealth Financing Authority for watershed restoration and protection projects. The overall goal of this program is to restore and maintain restored stream reaches impaired by the uncontrolled discharge of non-point source polluted runoff, and ultimately to remove these streams from the PA DEP's Impaired Waters list.

Greenways, Trails and Recreation Program (GTRP): In addition, Act 13 of 2012 allocates funds to the Commonwealth Financing Authority (the "Authority") for planning, acquisition, development, rehabilitation, and repair of greenways, recreational trails, open space, parks, and beautification projects. Projects can involve development of or rehabilitation and improvements to public parks, recreation areas, greenways, and trails; and designing river conservation methods.

Flood Mitigation Program: Finally, Act 13 of 2012 allocates funds to the Commonwealth Financing Authority (the "Authority") for funding statewide initiatives to assist with flood mitigation projects.

While most of the identified fiscal capabilities are available to all municipalities in Delaware County, the extent to which communities have leveraged these funding sources varies widely. It is expected that communities familiar with accessing grant programs will continue to pursue those grant sources, as appropriate.

Other Commonwealth Hazard Mitigation Funding Opportunities

Commonwealth programs that may provide financial support for mitigation activities include, but are not limited to:

- Community Conservation Partnerships Program
- Community Revitalization Program
- Floodplain Land Use Assistance Program
- Growing Greener Program
- Keystone Grant Program
- Local Government Capital Projects Loan Program
- Land Use Planning and Technical Assistance Program
- Pennsylvania Heritage Areas Program
- Pennsylvania Recreational Trails Program
- Shared Municipal Services
- Technical Assistance Program
- H2O PA

Delaware County Capabilities

Delco Green Ways

The Delco Green Ways program was established pursuant to the 2016 Open Space Task Force recommendation. The recommendation resulted in the County Council authorizing a $10 million bond allocation to prioritize open space. The program provides grants to municipalities and non-profits to support the County's goals to conserve, enhance, and connect green and open spaces. The grants may be utilized to support planning and project implementation.

Municipal Capabilities

The implementation of mitigation actions requires time and fiscal resources. While some mitigation actions are less costly than others, it is important that funds are available locally to implement policies and projects. Financial resources are particularly important if jurisdictions are trying to take advantage of Commonwealth or federal mitigation grant funding opportunities that require local-match contributions.

Capital Improvement Planning

Capital improvement plans are often recommended by counties to their municipalities because these plans help identify specific capital projects to be funded and completed according to a defined schedule. Some of these projects involve improvements to facilities and infrastructure that provide hazard mitigation benefits. As such, during this update process, the county and its municipalities have been encouraged to consider the mitigation benefits associated with known or anticipated capital projects to help prioritize the execution and to develop awareness that mitigation grants may be available to help fund such projects.

Special Purpose Taxes

Communities may exercise their taxing authority to raise funds for any project they see fit. This includes special taxes to fund mitigation measures. Spreading the cost of a community project among the community's taxpayers helps provide the greatest public good for relatively little individual cost.

Gas/Electric Utility Fees

In the same way that special taxes can be levied to fund mitigation projects, a community can explore another avenue for financing a project that includes dedicating a portion of homeowners' gas and electric utilities' fees to upgrade and maintain the related infrastructure. Projects such as burying transmission lines, thereby mitigating lines from the effects of winds and ice storms, is expensive. These fees help to offset that cost.

Water/Sewer Fees

Water Authorities and Fees

Water authorities are multipurpose authorities that operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage.

The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The PA DEP has a program to assist with consolidation of small individual water systems to make system upgrades more cost-effective.

Sewer Authorities and Fees

Sewer authorities include multipurpose authorities with sewer projects. The authorities issue bonds to finance acquisition of existing systems or to finance construction, extension, and improvements. Sewer authority operating revenues originate from user fees. The fee frequently is based on the amount of water consumed, and payment is enforced by the ability to terminate service or the imposition of liens against real estate. In areas with no public water supply, flat rate charges are calculated on average use per dwelling unit.

Stormwater Utility Fees

Stormwater utility fees are assessed and collected to offset the cost of maintaining and upgrading stormwater management structures, such as drains, retention ponds, and culverts.

Development Impact Fees

Development impact fees are one-time fees assessed to offset the cost of providing public services to a new development. They may be dedicated to providing the related new water or sewer infrastructure, roads, parks and recreational areas, libraries, schools, etc. The new infrastructure may be less vulnerable to hazard impacts.

General Obligation, Revenue, and/or Special Tax Bonds

Jurisdictions may simply decide to dedicate general fund or similar financing to implement hazard mitigation projects.

Partnering Arrangements or Intergovernmental Agreements

Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures. Delaware County contains 49 municipalities and each municipality conducts its daily operations and provides various community services according to local needs and limitations. Each municipality varies in staff size, resource availability, fiscal status, service provision, constituent population, overall size, and vulnerability to the identified hazards.

Circuit Rider Program (Engineer)

The Circuit Rider Program is an example of intergovernmental cooperation. This program offers municipalities with the ability to join together to accomplish a common goal. The Circuit Rider is a municipal engineer who serves several small municipalities simultaneously. These are municipalities that may be too small to hire a professional engineer for their own operations yet need the skills and expertise offered by an engineer. Municipalities can jointly obtain what no single municipality could obtain on its own.

Municipalities participating in this planning effort were provided with a capabilities survey. Table 5-3 summarizes the responses of the municipalities based on financial capabilities. Appendix D includes copies of the individual municipal responses.

Table 5-3. Fiscal Capability

Municipality	Capital Improvements Program	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other
Delaware County										
Aldan Borough										
Aston Township										
Bethel Township	-	-	x	-	-	-	-	-	-	-
Brookhaven Borough	-	-	-	-	X	X	-	-	-	-
Chadds Ford Township										
Chester City	X	X	-	-	-	-	-	X	-	-
Chester Heights Borough	X	X	-	-	-	-	X	X	X	-
Chester Township										
Clifton Heights Borough										
Collingdale Borough										
Colwyn Borough										

Municipality	Capital Improvements Program	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other
Concord Township	X	X	X	-	X	-	X	X	X	-
Darby Borough										
Darby Township	-	X	-	-	X	-	-	X	X	-
East Lansdowne Borough										
Eddystone Borough										
Edgmont Township										
Folcroft Borough										
Glenolden Borough										
Haverford Township										
Lansdowne Borough										
Lower Chichester Township										
Marcus Hook Borough	X	X	X	-	-	-	-	-	X	-
Marple Township	X	X	-	-	X	-	X	-	X	-
Media Borough										
Middletown Township	-	-	-	-	-	-	-	-	-	-
Millbourne Borough										
Morton Borough										
Nether Providence Township										
Newtown Township	X	-	X	-	X	-	-	X	X	-
Norwood Borough										
Parkside Borough										
Prospect Park Borough	-	X	-	-	X	-	X	-	X	-
Radnor Township	X	-	-	-	X	X	X	-	-	-
Ridley Park Borough										
Ridley Township										
Rose Valley Borough										
Rutledge Borough										
Sharon Hill Borough										
Springfield Township										
Swarthmore Borough										
Thornbury Township	X	-	-	-	X	-	-	-	X	-
Tinicum Township										
Trainer Borough										
Upland Borough										
Upper Chichester Township										
Upper Darby Township										

Municipality	Capital Improvements Program	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other
Upper Providence Township										
Yeadon Borough										

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
Blank space indicates no response was received from the municipality.

5.2.4 Education and Outreach

Education and outreach programs and methods are used to implement mitigation activities and communicate hazard-related information. Examples include obtaining certification in programs, such as Firewise and StormReady, and developing and communicating hazard awareness and safety information to residents.

At the municipal level, education and outreach capabilities vary. Some municipalities have the capability to handle outreach initiatives while others rely on county resources. Several municipal websites post local plans and ordinances, and many municipalities post information regarding hazard-related topics. The local fire departments and emergency managers are active in the schools participating in programs, such as fire safety in the fall and attending other community activities to conduct outreach. Appendix D details the outreach and education conducted at the municipal level.

Public Information Programs

Flood Maps

Flood maps and flood data, including new digital maps for Delaware County, are available at the municipal offices for municipalities participating in the NFIP. County and municipality maps, tax maps, and property assessment records are available at the Planning Department and Delaware County's Board of Assessments, and deeds are available at the Recorder of Deeds Office.

Library Education Tools

Libraries have educational materials, available upon request, which are used at public speaking events or county meetings, when appropriate. The following educational materials are available, but are not limited to:

- Various types of training videos
- Pennsylvania emergency preparedness guides
- American Red Cross packets for flash flooding, hurricane, thunder and lightning, tornado, and winter storms
- Family disaster planning guides
- Homeland security information for businesses, family, individuals, neighborhoods, and schools
- Pandemic brochures

Outreach Projects

Several organizations (both public and private sector) have developed outreach projects, educational tools, and training programs. The county promotes both online and traditional in-person programs to appeal to as wide an audience as possible.

- *2020 Delaware County Emergency Preparedness Guide*: This is an in-depth guide for citizen preparedness (individual, family, and community) that provides a step-by-step approach to disaster preparedness by walking the participant through steps to become informed about local emergency plans, identify hazards that affect their area, and develop and maintain an emergency communications plan and disaster supply kit. Other topics include evacuation, emergency public shelters, animal handling during disasters, and information specific to vulnerable populations. The guide includes actions that can be taken before, during, and several hazard types and provides in-depth information on specific hazards, such as the following:
    - Floods
    - Tornadoes
    - Hurricanes
    - Winter storms and extreme cold
    - Extreme heat
    - Fires and wildfires
    - Hazardous materials incidents
    - Terrorism (explosion, biological, chemical, nuclear, and radiological hazards)
- *ReadyPA Campaign*: Established by the Commonwealth of Pennsylvania, www.readypa.org is a website that aims to prepare the public for times of disaster by providing education on the risks within Pennsylvania, template emergency plans and kits, and information on ways to get involved with community organizations to help others.

Local Emergency Planning Committee

The Local Emergency Planning Committee (LEPC) works closely with the business industry community to form a safety net around the chemical industry to protect the general population from the possible outcome of hazardous material incidents. The following features of the LEPC demonstrate the capability of the LEPC to support county emergency management and preparedness initiatives.

- The LEPC shall have a minimum of seven members, with at least one representative from each of the following groups:
    - Group 1 – Elected official representing local government within the county
    - Group 2 – Local law enforcement, first aid, health, environmental, hospital, and transportation personnel
    - Group 3 – Firefighting personnel
    - Group 4 – Civil defense and emergency management personnel
    - Group 5 – Broadcast and print media personnel
    - Group 6 – Community groups not affiliated with emergency service groups
    - Group 7 – Owners and operators of facilities subject to the requirements of SARA Title III
- *Reporting Facilities:* The minimum reporting threshold for which facilities are required to have or prepared a Material Safety Data Sheet is 10,000 pounds of hazardous chemicals. This document provides workers and emergency personnel with procedures for handling or working with hazardous materials in a safe manner. It includes information on the chemicals' physical properties, toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures.
- *Planning Facilities:* The reporting threshold for Extremely Hazardous Substances (as designated under Section 302 of Title III) is 500 pounds or the threshold planning quantity, whichever is lower. Qualifying facilities are subject to additional reports and accident prevention regulations.

Technical Assistance

Delaware County Emergency Services can support local, public, and private entities, as needed, through coordination and provision of information and equipment resources. These include both existing county capabilities and predetermined private and public resources.

Municipalities participating in this planning effort were provided with a Capability Assessment Survey. Table 5-4 summarizes the responses of the municipalities based on education and outreach capabilities. Appendix D includes copies of the individual municipal responses.

Table 5-4. Education and Outreach Capability

Municipality	Firewise Communities Certification	StormReady Certification	Natural Disaster or Safety-Related School Programs	Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	Public-private partnership initiatives addressing disaster-related issues	Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Other
Delaware County							
Aldan Borough							
Aston Township							
Bethel Township	-	-	-	x	-	-	-
Brookhaven Borough	-	-	-	X	X	X	-
Chadds Ford Township							
Chester City	-	-	-		-	X	-
Chester Heights Borough	-	-	-	X	-	X	-
Chester Township							
Clifton Heights Borough							
Collingdale Borough							
Colwyn Borough							
Concord Township	-	-	X	X	-	X	-
Darby Borough							
Darby Township	-	-	X	X	-	-	-
East Lansdowne Borough							
Eddystone Borough							
Edgmont Township							
Folcroft Borough							
Glenolden Borough							
Haverford Township							
Lansdowne Borough							
Lower Chichester Township							
Marcus Hook Borough	-	-	-	X	-	X	-
Marple Township	-	-	-	X	X	X	-
Media Borough							

Municipality	Firewise Communities Certification	StormReady Certification	Natural Disaster or Safety-Related School Programs	Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	Public-private partnership initiatives addressing disaster-related issues	Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Other
Middletown Township	-	-	-	X	-	-	-
Millbourne Borough							
Morton Borough							
Nether Providence Township							
Newtown Township	-	-	-	-	X	-	-
Norwood Borough							
Parkside Borough							
Prospect Park Borough	-	-	-	X	-	-	-
Radnor Township	-	-	X	-	-	X	-
Ridley Park Borough							
Ridley Township							
Rose Valley Borough							
Rutledge Borough							
Sharon Hill Borough							
Springfield Township							
Swarthmore Borough							
Thornbury Township	-	-	-	X	X	X	_
Tinicum Township							
Trainer Borough							
Upland Borough							
Upper Chichester Township							
Upper Darby Township							
Upper Providence Township							
Yeadon Borough							

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
Blank space indicates no response was received from the municipality.

5.2.5 Plan Integration

According to FEMA, plan integration is a process where communities critically review their existing planning framework and align their efforts. Integration of hazard mitigation principles into other local planning mechanisms (comprehensive plans, transportation plans, floodplain ordinances, etc.) and vice versa is vital to build a safer, more resilient community. This two-way exchange of information supports community-wide risk reduction, both before and after disasters occur. Not only will the community's planning efforts be better

integrated, but by going through this process, there is a higher level of interagency coordination, which is just as important as the planning mechanism itself.

Within Delaware County, many existing plans and programs support hazard risk management; thus, it is critical that this HMP integrate and coordinate with, and complement, those mechanisms.

The intention of the Planning Team and participating jurisdictions is to incorporate mitigation planning as an integral component of daily government operations. Planning Team members will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution (located in Section 8 of this HMP) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Team anticipates the following:

1) Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts.
2) Hazard mitigation planning will be formally recognized as an integral part of land use policies and mechanisms.
3) The HMP, the county and municipal comprehensive plans, and the county and municipal EOPs will become mutually supportive documents that work in concert to meet the goals and needs of county residents.
4) Duplication of effort can be minimized.

As noted in Section 6 of this plan, Delaware County has made a concerted effort to reduce its vulnerability to natural and non-natural hazards in its planning and in its daily operations since the Delaware County HMP was last updated in 2016. The county and its jurisdictions have implemented various programs and projects to reduce the impacts of hazards. These projects, programs, and regulations have reduced risk caused by natural and non-natural hazards and support the goals and objectives of this HMP. It is the intent of the county and its participating municipalities to strengthen this focus on mitigation by continuing existing policies and by further implementing the mitigation policies contained in this HMP.

Implementation actions will include incorporating the goals of the HMP into ongoing planning, zoning, building, and engineering activities. Specifically, the county will urge municipalities to take the following actions:

- Fund hazard mitigation projects or actions in operating budgets to the extent possible.
- Notify other municipalities about grant and other funding opportunities as they arise.
- Use data and maps from this HMP as supporting documentation in grant applications.
- Review mitigation actions when allocating funding for the municipal budgets.
- Include hazard mitigation when updating municipal ordinances.
- Identify hazard areas in updates of comprehensive plans to identify land use issues.
- Review the HMP prior to land use or zoning changes and permitting or development decisions.

The information on hazards, risk, vulnerability, and mitigation contained in this HMP is based on the best science and technology available at the time of the plan's preparation. Additionally, plans were incorporated directly into this HMP update. All participating jurisdictions recognize that this information can be invaluable in making decisions under comprehensive, capital improvement, and emergency management plans. Figure 5-1 illustrates the interrelationships between the HMP, the Delaware County comprehensive plan, the Delaware County EOP, and other community planning mechanisms. Existing processes and programs through which the HMP should be implemented are described below.

Delaware County is in the process of developing a countywide Sustainability and Climate Action Plan. The plan is being developed by the Sustainability Commission, which is charged with providing reviews and recommendation to Council and County departments "regarding the preservation and protection of the natural and cultural environment in Delaware County." To carry out these efforts, the county hired a Chief Sustainability Officer and established the Delco Sustainability Office. The information contained in the HMP is critical to the mission of the Delco Sustainability Office.

Plan participants will make every effort to implement the processes described in relevant sections and/or apply data contained in the HMP to use administrative, budgetary, and regulatory processes as well as partnerships to the maximum extent, as described below.

Administrative

Administrative processes include departmental or organizational work plans, policies, or procedural changes that can be addressed by the following departments:

- Facility Maintenance
- Housing Authority
- Human Services
- Solid Waste Management and Recycling
- Public Safety
- Sheriff's Department

Additional administrative measures may include the creation of paid or unpaid internships to assist in HMP maintenance.

Delaware County Emergency Services is responsible for preparing and maintaining the county EOP, including conducting a minimum biennial review. Whenever portions of the plan are implemented in an emergency event or training exercise, a review is performed and changes are made where necessary. Municipalities are notified of changes to the county EOP, which most of Delaware County's municipalities have adopted as their own EOP. The risk assessment information presented in the 2016 HMP was used to update the Hazard Vulnerability Assessment section of the county EOP. The updated risk assessment information will affect subsequent updates to the EOP. Recommended changes to the HMP, based on changes to the EOP, will then be coordinated with the Planning Team.

The Delaware County Planning Commission is responsible for maintaining and updating the county comprehensive plan, which covers all 49 municipalities. The Planning Commission meets monthly to review, discuss, and comment on municipal subdivision and land development plans, municipal floodplain ordinances, municipal stormwater management plans and ordinances, and other community planning and development matters. The Planning Commission's meetings are open to the public and are advertised according to the Pennsylvania Sunshine Act (65 PA C.S.A.).

Budgetary Process

In terms of budgetary processes, the county will review capital budgets and, if funding is available, include a line item for mitigation actions. In addition, the county will maximize mitigation aspects of proposed projects and will encourage municipalities to do likewise.

Regulatory Measures

Regulatory measures—such as the creation of executive orders, ordinances, and other directives—will be considered to support hazard mitigation in the following areas:

- Comprehensive Planning – Institutionalize hazard mitigation for new construction and land use.
- Zoning and Ordinances
- Building Codes – Enforce codes or higher standard in hazard areas.
- Capital Improvements Plan – Ensure that the person responsible for projects under this plan evaluates whether new construction is in a high hazard area (such as a flood plain) so the construction is designed to mitigate the risk. Revise requirements for this plan to include hazard mitigation in the design of new construction.
- NFIP – Continue participation in this program and explore participation in CRS Program.

- Stormwater Management – Continue to implement stormwater management plans.
- HMP Plan Coordination – Prior to formal changes (amendments) to master plans, zoning, ordinances, capital improvement plans, or other mechanisms that control development, all above-mentioned plans must be reviewed to ensure they are consistent with the HMP.

Funding

The county and its jurisdictions will consider multiple grant sources to fund eligible projects. These opportunities may include, but are not limited to:

- Federal
  - FEMA Building Resilient Infrastructure and Communities Program (BRIC)
  - FEMA Flood Mitigation Assistance Program (FMA)
  - FEMA Hazard Mitigation Grant Program (HMGP) – Stafford Act, Section 404
  - U.S. Department of Housing and Urban Development (HUD) – Community Development Block Grant (CDBG)
  - U.S. Department of Agriculture (USDA) – USDA Community Facilities
  - U.S. Economic Development Administration (EDA) Public Works Program
- Commonwealth
  - PennDOT Pennsylvania Infrastructure Bank
  - Act 13 Marcellus Shale Legacy Funds – Flood Mitigation Program
- Nonprofit organizations, foundations, and private sources

Other potential federal funding sources include:

- Stafford Act, Section 406 – Public Assistance Program Mitigation Grants
- Federal Highway Administration
- Catalog of Federal Domestic Assistance
- U.S. Fire Administration – Assistance to Firefighter Grants
- U.S. Small Business Administration Pre- and Post-Disaster Mitigation Loans
- U.S. Department of Economic Development Administration Grants
- U.S. Army Corps of Engineers
- U.S. Department of Interior, Bureau of Land Management
- Other sources to be determined

Partnerships

The following opportunities for partnerships will be encouraged to provide a broader support and understanding of hazard mitigation:

Existing Committees and Councils

- Delaware County Agricultural Land Preservation Board
- Delaware County Conservation District (https://www.delcocd.org/)
- Delaware County Chamber of Commerce (https://www.delcochamber.org/)
- Delaware County Local Emergency Planning Committee
- Delaware County Hospital Authority (https://www.dcha1.org/)
- Municipal Environmental Advisory Councils

- Natural Lands (https://natlands.org/)
- North American Land Trust (https://northamericanlandtrust.org/)

Creative Partnerships for Funding and Incentives

- Public-private partnerships, including utilities and businesses
- Commonwealth of Pennsylvania cooperation
- In-kind resources

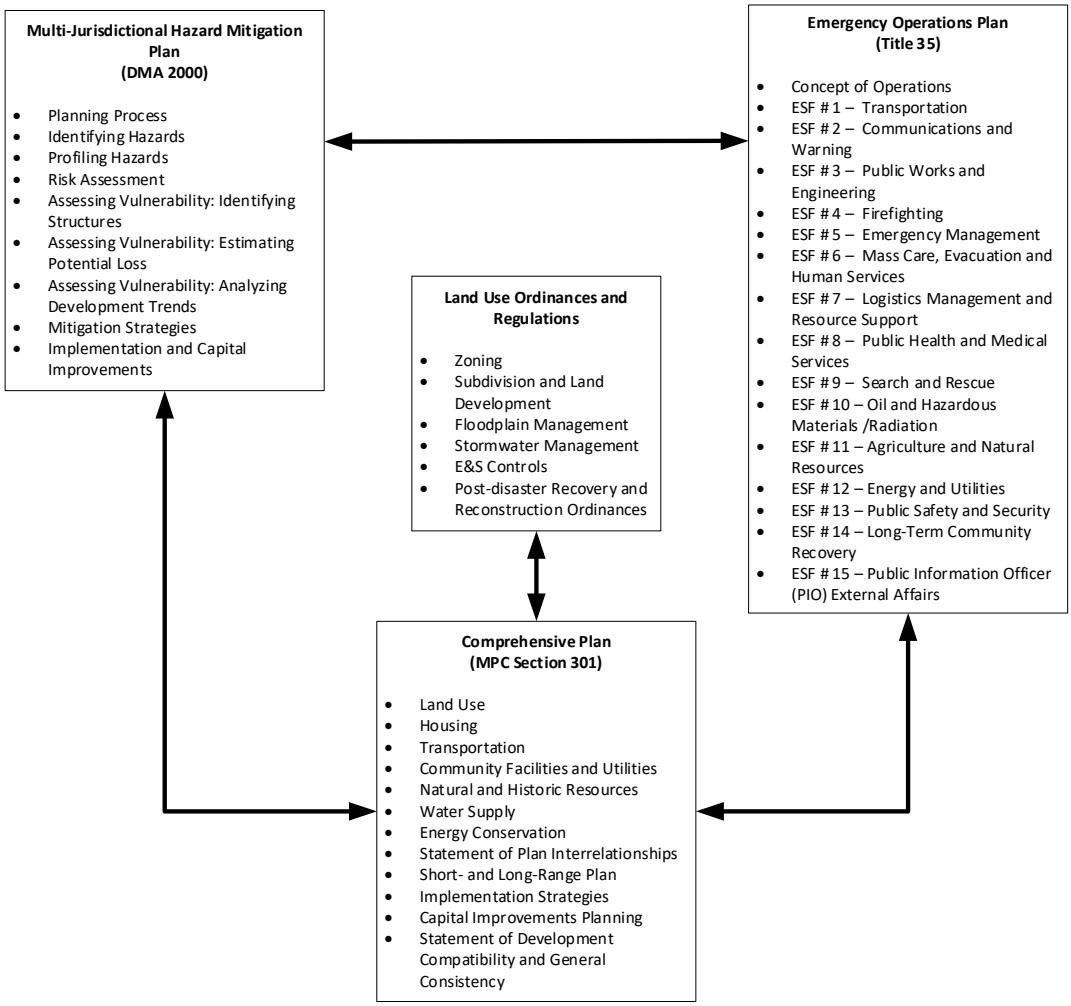
Working with Other Federal and Commonwealth Agencies

- U.S. Army Corps of Engineers (USACE)
- Department of Homeland Security (DHS)
- Federal Emergency Management Agency (FEMA)
- National Oceanic and Atmosphere Administration (NOAA)
- National Weather Service (NWS)
- Pennsylvania Emergency Management Agency (PEMA)
- Pennsylvania Department of Transportation (PennDOT)
- Pennsylvania Department of Environmental Protection (PADEP)
- Pennsylvania State Police (PSP)
- United States Department of Agriculture (USDA)
- United States Department of Transportation (USDOT)
- United States Geological Service (USGS)
- American Red Cross

Watershed Associations

- Alliance for Watershed Education of the Delaware River (https://www.watershedalliance.org/)
- Brandywine Conservancy (https://www.brandywine.org/conservancy)
- Brandywine Red Clay Alliance (http://www.brandywineredclay.org/)
- Chester, Ridley, and Crum Watershed Association (https://www.crcwatersheds.org/)
- Darby Creek Valley Association (https://www.dcva.org/)
- Naamans Creek Watershed Association

Figure 5-1. Plan Interrelationships



Notes:
E&S Erosion and Sedimentation
ESF Emergency support function

During the plan evaluation process, the Planning Team will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and will include these findings and recommendations in the HMP Progress Report.

SECTION 6 MITIGATION STRATEGY

This section describes the process by which the Delaware County Planning Team will reduce or eliminate potential losses from the natural and non-natural hazards identified in Section 4.2 of this Hazard Mitigation Plan (HMP). The mitigation strategy focuses on existing and potential future mitigation actions to alleviate the effects of hazards on Delaware County's population, economy, and general building stock.

This section provides a summary of the 2022 HMP update process, outlines the mitigation goals and objectives set forth in the 2022 HMP update, describes the process for identifying and analyzing mitigation techniques, and provides the mitigation action plan.

6.1 UPDATE PROCESS SUMMARY

The goals and objectives listed in the Delaware County HMP were first examined through the dispersal of the Mitigation Strategy 5-Year Plan Review Worksheet (Mitigation Review Worksheet). During the 5-year review, the Planning Team members were afforded the opportunity to comment on the goals, objectives, and actions that were listed in the existing HMP.

The general mitigation planning approach used to develop this plan is based on (1) the Federal Emergency Management Agency (FEMA) publication, "Local Mitigation Planning Handbook" (FEMA 2013), and (2) the Pennsylvania All-Hazard Mitigation Planning Standard Operating Guide (SOG) (PEMA 2020):

1. **Review of Existing Mitigation Plan Goals, Objectives, and Mitigation Action Plan:** Existing mitigation goals and objectives, and the 2017 HMP mitigation actions were first examined at the Planning Team Kick-Off Meeting and revisited during the Mitigation Strategy Workshop. Both of these meetings were open to members of the Planning Team and stakeholders. The Steering Committee thoroughly reviewed and updated the mitigation goals and objectives utilizing the latest information gathered through the hazard profiles, vulnerability assessments, and the risk assessment; the mitigation goals and objectives were also compared to the State HMP goals and objectives. The updated goals and objectives were then presented at the Mitigation Solutions Workshop for final review and approval. Plan participants continued to review and provide progress on the 2017 mitigation actions throughout the planning process.
2. **Develop and Update Mitigation Strategies:** Mitigation actions were identified based on the risk assessment, mitigation goals and objectives, existing policies, and input from the Planning Team and planning partners.
3. **Mitigation Strategy Prioritization and Implementation:** The potential mitigation actions were qualitatively evaluated and are described in more detail in Section 6.4 of this HMP. Mitigation actions were prioritized into three categories: high, medium, and low. High priority and medium priority mitigation actions are recommended for implementation before low priority actions; however, based on county and municipal-specific needs, cost estimation, and available funding, some low priority mitigation actions may be addressed first.
4. **Document the Mitigation Planning Process:** The entire mitigation planning process is documented throughout this HMP, particularly in Section 3.

This section summarizes past mitigation goals and past mitigation action status and provides an update of mitigation strategies and additional past mitigation accomplishments.

6.1.1 Review of the Past Mitigation Goals

The mitigation goals identified in the 2017 version of the HMP are listed below:

- **Goal 1:** Reduce the possible injury/death and damage to existing community assets due to flooding.

- **Goal 2:** Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.
- **Goal 3:** Increase disaster resistance of facilities and infrastructure in the county.
- **Goal 4:** Promote disaster resistant future development.
- **Goal 5:** Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.
- **Goal 6:** Improve response and recovery capabilities.
- **Goal 7:** Improve long-term response to extreme weather events and other hazards.

Table 6-1 shows the results of the Steering Committee and Planning Team review of the 2017 goals and objectives. The Steering Committee chose to reorganize the goals and objectives by moving away from organizing them by hazard, to reduce redundancy and overlap. Additional information on the Steering Committee's evaluation of each goal and objective is provided in the table.

Table 6-1. Steering and Planning Team Evaluation of 2017 Goals and Objectives

2017 Delaware County Hazard Mitigation Plan Goals and Objectives		Evaluation
Goal 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	• Incorporated into new Goals 1 and 2.
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	• Updated to protecting critical facilities instead of only evaluating protecting them, and expanded to all hazard areas instead of only the 1 percent annual chance floodplain.
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	• Incorporated into new Objective 2C.
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	• Incorporated into new 3A, 3B, 3C, and 3F.
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	• Removed this objective as it does not directly reduce risk, and using better data was incorporated into the planning process.
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	• Incorporated into new Objective 2A.
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	• Incorporated into new Goals 1 and 2.
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	• Vulnerability was identified in the planning process.
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	• Incorporated into new Objective 2A.
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	• Removed this objective. Warning systems are covered in new Objective 4C. Shelters would be resources covered in new Objective 4B.
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	• Incorporated into new Objectives 3B and 3C.

2017 Delaware County Hazard Mitigation Plan Goals and Objectives		Evaluation
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	• Removed this objective as it does not directly reduce risk, and using better data was incorporated into the planning process.
Goal 3	**Increase disaster resistance of facilities and infrastructure in the county.**	• This was updated to new Goal 2.
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	• Incorporated into new Objectives 2A and 2C.
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	• Deleted as it does not protect facilities or infrastructure.
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	• Deleted as it was part of the planning process.
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	• Incorporated into new Objectives 4A and 4B.
Goal 4	**Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).**	• Deleted and incorporated the objectives into new Goals 1 and 3.
Objective 4.1	Direct new development away from high hazard areas.	• Carried over into new Objective 1C.
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	• Carried over into new Objective 3E.
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	• Reworded to be new Goal 3.
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	• Reworded to be new Objective 3A.
Objective 5.2	Promote partnerships between municipalities and the county to continue to develop a countywide approach to identifying and implementing mitigation actions.	• Deleted as it was part of the planning process.
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	• Deleted as it is incorporated in new Objective 3A.
Goal 6	**Improve response and recovery capabilities.**	• Update to new Goal 4.
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	• Incorporated in new Objective 3G.
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of county and municipal fire, police, and emergency services personnel.	• Revised to new Objectives 3E and 4B.
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	• Deleted this hazard-specific goal.
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	• Incorporated into new Objectives 1A and 1B.
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	• Revised to new Objective 1D.

6.1.2 Past Mitigation Action Status and Update of Mitigation Strategies

In the 2017 HMP, Delaware County identified 78 actions and initiatives to support an improved understanding of hazard risk and vulnerability, to enhance mitigation capabilities, and/or to reduce vulnerability of infrastructure. Progress on the 2017 mitigation actions was evaluated during the 2022 update process.

Delaware County, via various representatives on the Steering Committee and Planning Team, was provided with a Mitigation Review Worksheet identifying all of the county and municipal actions and initiatives from the 2017 HMP. The respondents were asked to indicate the status of each action ("No Progress/Unknown," "In Progress/Not Yet Complete," "Continuous," "Completed," or "Discontinued") and provide review comments on each.

The completed Mitigation Action Plan Review Worksheet is provided in Table 6-2. Projects and initiatives identified as "Complete" and "Discontinued" have been removed from this plan update. The actions that the county has identified as "No Progress/Unknown" or "In Progress/Not Yet Complete" have been carried forward in the updated mitigation strategies identified in Table 6-4 (unless otherwise determined by the county to be a discontinued project). Actions from the 2017 HMP that reflect continuously maintaining capabilities have also been removed. The language in some actions being carried over has been adjusted to reflect changes to county needs and capabilities. Some actions were also merged to reduce redundant efforts on behalf of the county and its municipalities.

Table 6-2. Past Mitigation Action Status

Description	Jurisdiction	Status	Review Comments
1. Identify existing critical facilities with the highest relative vulnerability.	Delaware County	Discontinue	This action was completed in the planning process.
2. Conduct cost-benefit analysis of protection of critical facilities.	Delaware County	No Progress	No progress was reported.
3. Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.	Delaware County	Discontinue	This is an ongoing capability of municipal floodplain management programs.
4. Conduct a cost-benefit analysis of protection of repetitive-loss assets.	Delaware County	Discontinue	Updated guidance from FEMA regarding pre-qualified benefits was issued. Benefit-cost analysis will be conducted on a case-by-case basis to protect specific assets.
5. Work with municipal officials to increase awareness among property owners, including informational mailings to property owners in the 1 percent annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Improving property elevation, dry flood proofing, and wet flood-proofing.	Delaware County	No Progress	No progress was reported. The action is being carried over to the 2022 HMP.
6. Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).	Delaware County	No Progress	No progress was reported.
7. Work with PEMA and FEMA to hold a municipal CRS workshop.	Delaware County	No Progress	No progress was reported.
8. Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.	Delaware County	In Progress	County GIS data includes some of this information.
9. Obtain information for all remaining structures in the 1 percent annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information “capture” at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.	Delaware County	Discontinue	Information is gathered and analysis conducted on an ongoing basis.

Description	Jurisdiction	Status	Review Comments
10. Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).	Delaware County	No Progress	No progress was reported, but the planning process included identifying hazardous materials facilities in the floodplain.
11. Evaluate alternative methods to minimize risk from hazardous material existing storage areas.	Delaware County	Discontinue	This is carried out on an ongoing basis.
12. Assess means to prevent future storage of hazardous materials in floodplains.	Delaware County	No Progress	Municipal floodplain management ordinances prohibit new hazardous materials facilities in the SFHA.
13. Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.	Delaware County	Discontinue	This action was completed in the planning process.
14. Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.	Delaware County	Continuous	This action will be performed on a continuous basis.
15. Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).	Delaware County	Discontinue	This action was completed in the planning process.
16. Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.	Delaware County	Discontinue	Additional facilities requiring generators were identified during the planning process.
17. Upgrade backup power resources as necessary at critical facilities.	Delaware County	In Progress	This action will be performed as necessary.
18. Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.	Delaware County	Discontinue	This action was completed in the planning process.
19. Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems	Delaware County	In Progress	Newtown Township has expanded Everbridge and Facebook/neighbor to neighbor usage.
20. Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.	Delaware County	In Progress	Newtown Township has reassessed their high school and sites that volunteer as shelters
21. Work with municipal officials to increase awareness among manufactured homeowners and evaluate how many manufactured homes have been anchored.	Delaware County	In Progress	This action is being carried over into the updated HMP.

Description	Jurisdiction	Status	Review Comments
22. Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.	Delaware County	No Progress	This action is being carried over into the updated HMP.
23. Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.	Delaware County	Discontinue	This action was completed in the planning process.
24. Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.	Delaware County	Discontinue	Updated guidance from FEMA regarding pre-qualified benefits was issued. Benefit-cost analysis will be conducted on a case-by-case basis to protect specific assets.
25. Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.	Delaware County	No Progress	This action will be carried over into the updated HMP.
26. Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.	Delaware County	Discontinue	This is carried out on an ongoing basis.
27. Work closely with assessment office to determine how best to apply current data to the needs of emergency management.	Delaware County	Discontinue	Emergency Services works with the Board of Assessment on an ongoing basis.
28. Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.	Delaware County	Discontinue	Emergency Services personnel and staff from neighboring counties discuss cross-jurisdictional mitigation needs on a regular basis.
29. Develop multi-use trails that can serve evacuation routes in the event of an emergency.	Delaware County	No Progress	This action will be carried over into the updated HMP.
30. Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.	Delaware County	Discontinue	This is conducted on an ongoing basis.
31. Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.	Delaware County	No Progress	No progress was reported.
32. Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.	Delaware County	No Progress	No progress was reported.
33. Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.	Delaware County	No Progress	No progress was reported
34. Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.	Delaware County	No Progress	No progress was reported.
35. Identify and publicize success stories as part of an overall consistent public relations program.	Delaware County	No Progress	This action will be carried over into the updated HMP.

Description	Jurisdiction	Status	Review Comments
36. Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.	Delaware County	Discontinue	This will be carried out annually in accordance with Section 7: Plan Maintenance.
37. Renew and expand commitments to hazard mitigation planning among partner organizations.	Delaware County	Discontinue	This will be carried out annually in accordance with Section 7: Plan Maintenance.
38. Increase resident awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods can include public outreach (i.e., website, mailings, workshops, media coverage) and education.	Delaware County	No Progress	No progress was reported.
39. Identify special populations requiring additional emergency response.	Delaware County	Discontinue	This is performed on an ongoing basis.
40. Evaluate means to enhance response capability for residents.	Delaware County	Discontinue	This is performed on an ongoing basis.
41. Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.	Delaware County	Complete	This was conducted during the COVID-19 pandemic.
42. Update municipal zoning code to strengthen it to promote disaster-resistant development.	Delaware County, Brookhaven Borough, Lower Chichester, Upper Chichester Township	No Progress	No progress was reported.
43. Acquire, elevate, flood-proof, or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook	In Progress	• Newtown Township is purchasing property in wetland areas to create environmental safety and storm water management areas • The Brandywine Conservancy and Museum of Art has applied for grant funds to elevate several structures in its district.

Description	Jurisdiction	Status	Review Comments
	Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.		
44. Reduce urban fire hazard in Colwyn Borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.	Colwyn Borough	No Progress	No progress was reported.
45. Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding.	Chester City, Collingdale Borough, Eddystone Borough, Edgmont Township, Marcus Hook Borough, Norwood Borough, Prospect Park Borough, Trainer Borough, Upland Borough, Upper Darby	In Progress	• Chester City- Delcora has a large storm water project for the next 10 years. • Marcus Hook Borough has completed stormwater improvements in Viscose Village, however there are still stormwater flooding issues at 4th Street and Market/Green Streets which have not been addressed.

Description	Jurisdiction	Status	Review Comments
	Township, Yeadon Borough		
46. Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.	Chadds Ford Township, Edgmont Township, Aston Township, Newtown Township	In Progress	• Newtown Township- Goshen Road/Boot Road stretch needs elevation and has begun exploration of options for this area
47. Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.	Haverford Township, Lansdowne Borough, Trainer Borough, Newtown Township	No Progress	No progress was reported.
48. Explore opportunities to mitigate flooding and drainage problems in the municipality.	Collingdale Borough, Folcroft Borough, Lansdowne Borough, Marple Township, Morton Borough, Newtown Township, Parkside Borough, Radnor Township, Springfield Township	In Progress	• Radnor Township- S Wayne Ave Flood Reduction Project and N Wayne Floodplain Creation Projects in progress
49. Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).	Morton Borough	In Progress	This action is in progress.
50. Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.	Swarthmore Borough	No Progress	No progress was reported.
51. Explore projects to mitigate washout of Farnum Road from flooding.	Upper Providence Township	No Progress	No progress was reported.
52. Clean up debris in streams and along stream banks and bridges in municipality.	Brookhaven Borough; Chester Heights Borough; Darby Borough; Newtown Township; Norwood Borough; Ridley Park Borough	Continuous	This action is being carried over into the updated HMP.
53. Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.	Collingdale Borough	No Progress	No progress was reported.
54. Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.	Darby Borough	No Progress	No progress was reported.

Description	Jurisdiction	Status	Review Comments
55. Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.	Glenolden Borough, Middletown Township, Swarthmore Borough, Upland Borough	In Progress	This action is being carried over into the updated HMP.
56. Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.	Upper Darby Township	No Progress	No progress was reported.
57. Modernize traffic lights at intersections that are hazardous for pedestrian crossing.	Ridley Township	No Progress	No progress was reported.
58. Purchase a backup generator for the police station.	Glenolden Borough, Colwyn Borough	No Progress	No progress was reported.
59. Conduct flood level monitoring along Naylor's Run Creek.	Upper Darby Township	No Progress	No progress was reported.
60. Continue planning of dispersement locations as part of Disaster Relief Drug Distribution Program.	Upper Darby Township	No Progress	No progress was reported.
61. Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.	Media Borough	No Progress	No progress was reported.
62. Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.	Media Borough, Ridley Park Borough	No Progress	No progress was reported.
63. Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.	Aston Township	No Progress	No progress was reported.
64. Conduct emergency planning exercises for high hazard dams in the county to simulate hazard response.	Delaware County,	No Progress	No progress was reported.
65. Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.	Delaware County	No Progress	No progress was reported.
66. Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.	Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough, Upland Borough	No Progress	No progress was reported.
67. Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.	Rutledge Borough	No Progress	No progress was reported.

Description	Jurisdiction	Status	Review Comments
68. Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.	Aldan Borough, Aston Township. Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury	Discontinue	This action is carried out on a regular basis • Radnor Township distributes free fans to COSA/ Wayne Senior Center. • Chester City- Two out of three critical facilities with vulnerable populations are registered with the county as cooling and warming locations • Borough of Marcus Hook does this on a continuous basis.

Description	Jurisdiction	Status	Review Comments
	Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.		
69. Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.	Delaware County	Discontinue	This action is carried out on a regular basis.
70. Dredge silt from Ridley Park Lake.	Ridley Park Borough	No Progress	No progress was reported.
71. Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.	Delaware County, Colwyn Borough, Tinicum Township	No Progress	No progress was reported.
72. Develop and implement a radon exposure prevention program.	Aston Township, East Lansdowne Township, Haverford Township	No Progress	No progress was reported.
73. Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.	Chester Township	No Progress	No progress was reported.
74. Relocate Borough Hall outside of the Marcus Hook Creek floodplain.	Trainer Borough	No Progress	No progress was reported.
75. Develop a climate adaptation plan to identify opportunities to improve resiliency across the county.	Delaware County	No Progress	No progress was reported.
76. Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.	Delaware County	Discontinue	This planning is conducted on a regular basis.
77. Update and complete inventory of domestic wells located in Delaware County.	Delaware County	No Progress	No progress was reported.
78. Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).	Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	In Progress	• Concord Township publishes newsletters and updates their website with information regarding flood risk.

6.2 MITIGATION GOALS AND OBJECTIVES

This section describes the mitigation goals and objectives set forth in the 2022 HMP update.

6.2.1 2022 Mitigation Goals

The Steering Committee reviewed the 2017 HMP goals to determine their continuing applicability to county mitigation needs and decided to update them. The updated goals and objectives were distributed to the Planning Team at the Mitigation Solutions Workshop. The Planning Team reviewed and approved the updated goals for the 2022 HMP. The 2022 Delaware County HMP goals are in line with the State HMP mitigation goals, embody the overarching needs and concerns of the county and participating municipalities, and address both natural and non-natural hazard risk reduction.

The 2022 Delaware County HMP goals are listed below:

1. **Goal 1:** Prevent injury/death, damage, and other impacts from natural and man-made hazards in Delaware County.
2. **Goal 2**: Protect the citizens of Delaware County as well as public and private property from the impacts of natural and human-caused hazards.
3. **Goal 3**: Increase public education and awareness of existing and potential hazards in Delaware County and what people can do to reduce their vulnerability.
4. **Goal 4**: Improve response and recovery capabilities in Delaware County to protect citizens from natural and human-caused hazards.
5. **Goal 5**: Protect and restore existing natural resources.

6.2.2 2022 Mitigation Objectives

The goals listed above were used to develop relevant objectives. The objectives address the results of the vulnerability assessment in more specific terms and reflect the possible effects that can be mitigated for the identified hazards, as well as existing limitations in available data and information. The objectives that were originally identified during the 2017 HMP update process were reviewed by the Steering Committee and updated to reflect changes in county priorities and capabilities since the HMP was written in 2017. Objectives related to each of the goals are listed below, and Table 6-1 summarizes the evaluation of all goals and objectives from the 2017 HMP.

Goal 1: Prevent injury/death, damage, and other impacts from natural and man-made hazards in Delaware County.

Objective 1A: Develop and enhance regulations limiting development in hazard-prone areas.

Objective 1B: Lessen impacts on natural resources and open space from natural and human-caused hazards.

Objective 1C: Direct new growth away from hazard-prone areas.

Objective 1D: Integrate hazard mitigation into other community plans and programs.

Goal 2: Protect the citizens of Delaware County as well as public and private property from the impacts of natural and human-caused hazards.

Objective 2A: Protect existing structures, including critical facilities, historic and cultural resources, and infrastructure, from damage that can be caused by hazards.

Objective 2B: Improve and maintain stormwater management systems to reduce backup and flooding.

Objective 2C: Acquire, relocate, elevate, and/or retrofit existing structures and infrastructure, including repetitive loss properties, located in hazard areas.

Goal 3: Increase public education and awareness of existing and potential hazards in Delaware County and what people can do to reduce their vulnerability.

Objective 3A: Develop public education and outreach programs on hazards and hazard mitigation.

Objective 3B: Educate property owners in hazard risk areas regarding their risks and the precautions they can take.

Objective 3C: Encourage residents to implement hazard mitigation and preparedness measures on their properties.

Objective 3D: Encourage local participation in the Community Rating System (CRS) Program.

Objective 3E Educate local officials regarding their municipalities' risk and the precautions they can take.

Objective 3F: Encourage homeowners, renters, and businesses to insure their properties against all hazards, including flood insurance coverage under the National Flood Insurance Program (NFIP).

Objective 3G: Educate the public on developing individual and family emergency plans and actions they may take during an emergency.

Goal 4: Improve response and recovery capabilities in Delaware County to protect citizens from natural and human-caused hazards.

Objective 4A: Develop and improve emergency plans and ensure stakeholders are trained/educated.

Objective 4B: Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation.

Objective 4C: Ensure adequacy of equipment and technology.

Goal 5: Protect and restore existing natural resources.

Objective 5A: Restore degraded natural resources and open space to reduce vulnerability to hazards.

Objective 5B: Provide appropriate safeguards for the preservation of the quality of water resources, stream corridors, watershed areas, and floodplains.

Objective 5C: Preserve areas where natural hazard potential is high.

6.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

Concerted efforts were made to ensure that the county and its municipalities developed updated mitigation strategies. Updated strategies included activities and initiatives covering the range of mitigation action types described in recent FEMA planning guidance, "Local Mitigation Planning Handbook" (FEMA 2013). Mitigation action types listed in the FEMA guidance include the following:

1. **Local Plans and Regulations:** These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
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. These project types 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.
3. **Natural Systems Protection:** These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.
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, such as NFIP and CRS, StormReady (NOAA), and Firewise (National Fire Protection Association [NFPA]) Communities (FEMA 2013).

The participants of the Mitigation Strategy Workshop and the Planning Team identified actions that relate to the techniques listed above. Table 6-3 identifies which mitigation techniques are applicable for the hazards included in the 2022 HMP. In some cases, the mitigation techniques identified for a particular hazard reflect ongoing mitigation capabilities, not specific projects included in the updated HMP.

Table 6-3. Mitigation Technique Matrix

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Civil Disturbance	X			X
Dam Failure	X	X		X
Drought and Water Supply Deficiencies		X		X
Earthquake				X
Environmental Hazards – Hazardous Materials Releases	X	X		X
Environmental Hazards – Oil and Natural Gas Pipelines		X		X
Extreme Temperature	X			X
Flood, Flash Flood, Ice Jam	X	X	X	X
Hailstorm	X			X
Hurricane, Tropical Storm	X	X		X
Landslide		X		X
Levee Failure	X	X		X
Lightning				X
Pandemic and Infectious Disease	X			X
Radon Exposure				X
Subsidence, Sinkhole		X		X
Terrorism				X
Tornado, Windstorm		X		X
Transportation Accident	X	X		X
Urban Fire and Explosions	X			X
Utility Interruption		X		X
Wildfire	X	X		X
Winter Storm	X			X

6.4 MITIGATION ACTION PLAN

Representatives from the county and all participating municipalities selected mitigation strategies and initiatives to pursue until the next plan update. These actions also include some actions identified during the 2017 update that are still relevant or in progress. This section describes 2022 mitigation initiatives, mitigation strategy prioritization and implementation, and prioritization of mitigation actions.

6.4.1 2022 Mitigation Initiatives

Table 6-4 summarizes the updated mitigation strategies identified by the county and all municipalities, including the following information:

- Mitigation actions for individual and multiple hazards
- Mitigation action type
- Department or agency primarily responsible for project initiation and/or implementation
- Estimated cost for the mitigation action and identification of known or potential sources of funding
- Implementation schedule
- Implementation priority

The updated mitigation actions were documented using the Mitigation Action Worksheet distributed at the Mitigation Solution Workshop. Refer to Appendix G for a blank version of the Mitigation Action Worksheet and to Appendix H for completed worksheets. Specific mitigation actions were identified to prevent future losses; however, current funding is not identified for all of these actions at present, but potential funding sources (see Section 5) are indicated to support future implementation.

Likewise, limited information was available for addressing the long-term vulnerability of Delaware County's residents to pandemic and infectious disease. Though many preparedness actions can be identified for addressing that hazard, Delaware County's mitigation strategy includes few actions that specifically address pandemics and infectious disease. The county will continue to research long-term solutions to the risk from pandemic and infectious disease as part of the annual review process.

The county and municipalities have limited resources to take on new responsibilities or projects. The implementation of these mitigation actions is dependent on the approval of the local elected governing body and the ability of the jurisdiction to obtain funding from local or outside sources.

The Planning Team prioritized proposed mitigation actions during the Mitigation Action Worksheet documentation process. In general, mitigation actions ranked as highest priorities should be addressed first within each jurisdiction, depending upon funding. However, medium- or low priority mitigation actions will be considered for implementation as funding becomes available. Therefore, the ranking levels should be considered as a preliminary ranking, which will evolve based on prevailing priorities and discretion of local governments, the public, the Pennsylvania Emergency Management Agency (PEMA), and FEMA as the plan update is implemented.

Table 6-4. Hazard Mitigation Strategy

Note: Some of the identified mitigation initiatives in Table 6-4 are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in county or municipal priorities. Actions that have been carried over from the 2017 version of the HMP may have been reworded and given a new initiative designation to conform to current needs and procedures. The countywide actions apply to the county as an entity and participating municipalities. For most countywide actions, the action applies to all participating municipalities. See Appendix H for action worksheets that specify to which municipalities other countywide actions apply.

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
DelawareC-1	Assess means to prevent future storage of hazardous materials in floodplains.	Existing	Environmental Hazards (Hazardous Material Release, Gas and Liquid Pipelines); Flood, Flash Flood, and Ice Jam	1,2,4	Emergency Services	LEPC	Low	Med.	DCPD	Short	Low	SIP
DelawareC-2	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	Existing	Dam Failure	3	Emergency Services	Army Corps of Engineers; DEP	Med.	Med.	EMPG; SEPA RTF; Operating Budget	Short	Medium	EAP
DelawareC-3	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values,	Existing	All	2	Emergency Services	Board of Assessment	Med.	Low	Operating Budget	Short	Medium	LPR

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	construction types, etc.											
DelawareC-4	Develop multi-use trails that can serve evacuation routes in the event of an emergency.	Existing	All	1,2,4	Emergency Services	Municipalities; PennDOT	Med.	High	SEPA RTF funding; Operating Budget	Short	Medium	SIP
DelawareC-5	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.	Existing	All	4	Emergency Services		High	Med.	Operating Budget	Short	Medium	LPR
DelawareC-6	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.	Existing	Dam Failure	1,2,4	County Planning	Army Corps of Engineers; PA DEP; Emergency Services	Med.	Med.	Operating Budget	Short	Low	LPR
DelawareC-7	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.	Existing	Pandemic	3	Health	Emergency Services	Med.	Low	Operating Budget	Short	Medium	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
DelawareC-8	Evaluate at the municipal level the suitability of the Community Rating System (CRS) for insurance premium reduction (and flood damage reduction).	Existing	Flood, Flash Flood, & Ice Jam	2,3	Emergency Services	Municipalities	Med.	Med.	Operating Budget	Short	Medium	LPR
DelawareC-9	Explore opportunities to improve poor broadband infrastructure throughout the county for increased remote work and learning.	New	All	1,2,4	Planning	Utilities	Med.	Med.	Operating Budget; PA DCED	Short	Medium	SIP
DelawareC-10	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.	Existing	All	1,2,3	Emergency Services	Municipalities; PEMA	Med.	Low	Operating Budget; PA DCED	Short	Medium	EAP
DelawareC-11	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).	Existing	Environmental Hazards (Hazardous Material Release); Flood, Flash Flood, and Ice Jam	1,2,4	Emergency Services	Municipalities	Med.	Med.	DCPD	Short	High	SIP
DelawareC-12	Identify and publicize success stories as part of an overall consistent public relations program.	Existing	All	3	Public Information	Emergency Services	Med.	Low	Operating Budget	Long	Medium	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
DelawareC-13	Identify areas where healthcare facilities closures have impacted communities and explore mitigation solutions.	New	All	1,2,4	Emergency Services	Health; SEPA RTF; Healthcare Coalition	Med.	Low	Operating Budget	Short	Medium	SIP
DelawareC-14	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.	Existing	Flood, Flash Flood, and Ice Jam; Earthquake; Hurricane, Tropical Storm, and Nor'easter	1,2,3,4	Emergency Services		Med.	Med.	Operating Budget	Short	High	SIP
DelawareC-15	Increase resident awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods can include public outreach (i.e., website, mailings, workshops, media coverage) and education.	Existing	All	3	Emergency Services	Municipalities	High	Low	Operating Budget	Long	High	EAP
DelawareC-16	Promote the use of existing warning systems and implement additional warning systems, including:	Existing	All	3,5	Emergency Services	Municipal EMCs	High	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	• Text-based community warning systems • Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems											
DelawareC-17	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.	Existing	All	1,2	Planning	PA DCED	Med.	Low	Operating Budget	Long	Medium	LPR
DelawareC-18	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.	Existing	All	1,2	Emergency Services		Med.	Low	Operating Budget	Short	Medium	LPR
DelawareC-19	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.	Existing	All	1,2,5	Emergency Services	Planning	Med.	Low	Operating Budget	Short	Medium	LPR
DelawareC-20	Review County EOP to ensure emergency operations are	New	Pandemic	1,3,4	Emergency Services	Health	High	Med.	Operating Budget	Short	High	LRP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	equipped and prepared for logistical needs during a pandemic response event.											
DelawareC-21	Update and complete inventory of domestic wells located in Delaware County.	Existing	Drought; Utility Interruption	4	Planning	PA DEP	Med.	Low	Operating Budget	Short	Medium	SIP
DelawareC-22	Upgrade backup power resources as necessary at critical facilities.	Existing	Utility Interruption	4	Emergency Services	Municipalities	High	High	FEMA HMGP; Operating Budget	Short	Medium	SIP
DelawareC-23	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.	Existing	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado and Windstorm	1,2,3	Emergency Services	Municipalities	High	Low	Operating Budget	Short	High	EAP
DelawareC-24	Work with municipal officials to increase awareness among property owners to clear debris from waterways and drainage infrastructure.	New	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado and Windstorm	1,2,3	Emergency Services	Municipal Floodplain Administrators; PA DEP	High	Low	Operating Budget	Short	High	EAP
DelawareC-25	Work with municipal officials to increase awareness among	Existing	Flood, Flash Flood, & Ice Jam	3	Emergency Services		Med.	Med.	Operating Budget	Long	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	property owners, including informational mailings to property owners in the 1 percent annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Improving property elevation, dry flood proofing, and wet flood-proofing.											
DelawareC-26	Work with PEMA and FEMA to hold a municipal CRS workshop.	Existing	Flood, Flash Flood, & Ice Jam	2,3	Emergency Services	PEMA, FEMA	High	Low	Operating Budget	Short	Medium	LPR
DelawareC-27	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Hazardous Materials Releases	2,3,4	LEPC	Emergency Services; Fire Departments; Municipal EMCs	High	High	Operating Budget	Short	High	EAP
DelawareC-28	Acquire, elevate, flood-proof, or relocate (including the potential use of	Existing	Flood, Flash Flood, and Ice Jam	1,24	Emergency Services	Municipalities; PEMA	High	High	Municipalities	Long	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.											
DelawareC-29	Conduct a training class for first responders for a leak on pipelines transporting HVLs.	New	Environmental Hazards - Hazardous Material Releases, Environmental Hazards - Pipeline	1,2,4	Township, Delaware County ES	County, EMS	Med.	Low	SEPA RTF funding; Act 165 Funds	Short	High	EAP
DelawareC-30	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.	Existing	All	4	Emergency Services	Municipalities; American Red Cross	High	Med.	Operating Budget	Short	Medium	SIP
DelawareC-31	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.	Existing	Drought; Extreme Temperature; Flood, Flash Flood, & Ice Jam; Hailstorm; Hurricane, Tropical Storm, & Nor'easter; Tornado & Windstorm; Wildfire; and Winter Storm	1,2,3,4,5	Planning	Emergency Services; Municipal Planning Boards/Departments	High	Med.	Operating Budget; PA DCED	Short	High	LPR
DelawareC-32	Develop a strategy to inform new residents and	New	All	1,2,3,4	Municipal Floodplain Administrators	Emergency Services	Med.	Low	Operating Budget	Short	Medium	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).											
DelawareC-33	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.	Existing	All	1,2,3,4	Emergency Services	Municipalities; PEMA	High	Med.	Operating Budget	Short	Medium	SIP
DelawareC-34	Develop and implement a radon exposure prevention program.	Existing	Radon Exposure	3	Emergency Services	Health; Municipal EMCs; PA DEP	Med.	Low	Operating Budget	Short	Low	LPR
DelawareC-35	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.	Existing	Flood, Flash Flood, and Ice Jam	1,2,3	Municipal Floodplain Administrators	Emergency Services; PEMA	Med.	Low	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
DelawareC-36	Update municipal zoning code to strengthen it to promote disaster-resistant development.	Existing	All	1,2	Planning		Med.	Low	Operating Budget	Short	Medium	LPR
DelawareC-37	Protect the Delaware County Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	County Engineer		High	High	FEMA HMGP, BRIC, FMA, PA DCED FMP, Operating Budget	Short	High	SIP
DelawareC-38	Implement the Delaware County Regional Water Quality Control Authority (DELCORA) wastewater management tunnel project from Chester to Ridley.	New	Flood, Flash Flood, and Ice Jam	1,2	DELCORA	County Engineer; Municipal Engineers; PA DEP	High	High	DELCORA	Long	High	SIP
DelawareC-39	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.	Existing	Levee Failure	1,2,4	Emergency Services	USACE	Med.	Low	Operating Budget	Short	Medium	LPR
DelawareC-40	Work with the US Army Reserve Base Sewer Treatment Plant to assess the property to determine the risk from wildfires and	New	Wildfire	2	Emergency Services	Fire Department, PA DCNR	Med.	Med.	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	vegetation to be cleared.											
DelawareC-41	Work with the FAA to discuss the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Emergency Services		Med.	Med.	Operating Budget	Short	Medium	SIP
DelawareC-42	Work with Amtrak and PennDOT on cleaning up debris in streams and along the PA-420 bridge.	New	Flood, Flash Flood, and Ice Jam	5	Emergency Services	Floodplain Administrator; PA DEP; PennDOT; Amtrak	Med.	Med.	Operating Budget	Long	Medium	NSP
DelawareC-43	Assess the District Court 32-2-46 property to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Emergency Services	Fire Department, PA DCNR	Med.	Med.	Operating Budget	Short	Medium	SIP
DelawareC-44	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.	Existing	Flood, Flash Flood, and Ice Jam , Levee Failure	1,2	County Planning	USACE	High	High	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
DelawareC-45	Clean up debris in streams and along stream banks and bridges in municipality.	Existing	Flood, Flash Flood, and Ice Jam	5	Municipal Public Works	PA DEP	Med.	Med.	Operating Budget	Long	Medium	NSP
DelawareC-46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Municipal Public Works	PennDOT	High	High	FEMA HMGP, BRIC; PA DCED FMP; DVRPC funding	Short	High	SIP
DelawareC-47	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Highway	Municipalities; PennDOT	High	High	FEMA HMGP, BRIC, FMA; Capital Improvements; PennDOT; DVRPC	Short	High	SIP
DelawareC-48	Conduct Flood Study of Lower Chester Creek.	New	Flood, Flash Flood, and Ice Jam	1,2	Municipalities, Engineer		High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	High	LPR
DelawareC-49	Explore opportunities to mitigate flooding and drainage problems in the municipality.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Municipal Floodplain Administrators	Municipal Public Works	High	High	FEMA BRIC; Operating Budget	Short	High	SIP
DelawareC-50	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Municipal Public Works	PennDOT	High	High	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
DelawareC-51	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.	Existing	Hurricane, Tropical Storm, and Nor'easter, Winter Storm, and Tornado and Windstorm	1,2	Municipal Public Works		High	High	Operating Budget	Short	High	SIP
DelawareC-52	Create a logistical facility to coordinate logistics during public health emergencies.	New	Pandemic	2,4	Emergency Services	Health	High	High	Operating budget; CDBG; RACP	Long	Medium	SIP
DelawareC-53	Create a new Delaware County Emergency Operations Center (EOC).	New	All	2,4	Emergency Services	County Administrator, Information Technology, Public Works, Public Relations	High	High	Operating budget; bond; CDBG; RACP	Long	High	SIP
DelawareC-54	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.	Existing	Flood, Flash Flood, and Ice Jam, Landslides	5	Municipal Public Works	PA DEP; PA DCNR	Med.	Low	FEMA BRIC, FMA; PA DCED FMP; Operating Budget	Short	Medium	NSP
AldanB-1	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Hazardous Materials Releases	2,3,4	Engineer	County LEPC	High	High	Operating Budget	Short	High	EAP
AshtonT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	release the risk and possible protective measures.											
AshtonT-2	Protect the Ashton Beechwood Fire Company to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
AstonT-1	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator		High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
BethelT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
BethelT-2	Work with pipeline owners to make pipeline information accessible online	New	Environmental Hazards - Pipeline	2,3	Delaware County ES	LEPC; Facility Management	Med.	Low	Operating Budget	Short	High	EAP
BethelT-3	Review previous flood occurrences and identify mitigation solutions	New	Flood, Flash Flood, and Ice Jam	1,2,4	Floodplain Administrator	Engineer	High	Med.	FEMA HMGP, BRIC, FMA, Operating Budget	Long	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
BrookhavenB-1	Protect the Brookhaven Treatment Plant to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
BrookhavenB-2	Assess the geology at the Brookhaven Treatment Plant property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Code Enforcement Officer		Med.	Med.	Operating Budget	Short	Medium	SIP
BrookhavenB-3	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
BrookhavenB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
ChaddsFordT-1	Protect the Christian C. Sanderson Museum to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChaddsFordT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ChaddsFordT-3	Assess the property of the Calvary Chapel of Delaware County to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChaddsFordT-4	Assess the property of the Christian C. Sanderson Museum to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChaddsFordT-5	Assess the property of the Ridings Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

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ChaddsFordT-6	Assess the property of the Saint Cornelius School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChesterC-1	Protect the Anthem Propane to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-2	Protect the Apple Pie Christian Academy to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-3	Protect the Evonik Corporation to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-4	Protect the Exelon Chester Generating Station to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-5	Protect the Kimberly Clark PA LLC to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
ChesterC-6	Protect the PECO Front St Sub Station to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-7	Protect the PQ Corporation Chester to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-8	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ChesterC-9	Assess the topography around the Exelon Lamokin Electric Substation to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
ChesterC-10	Assess the topography around the Widener University-Schwartz Century to determine if	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

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	mitigation measures are necessary, and how to implement those measures if they are.											
ChesterC-11	Determine the vulnerability of Chester High School to levee failure and determine appropriate mitigation measures.	New	Dam and Levee Failure	1,2,4	Floodplain Administrator	EMC	High	Med.	FEMA HMGP, BRIC; Operating Budget	Short	Low	SIP
ChesterC-12	Assess the topography around the Evonik Corporation to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
ChesterC-13	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

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ChesterC-14	Assess the property of the Center for Self-Development to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChesterC-15	Assess the property of the Felton Fire Company to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChesterC-16	Assess the property of the NORQUAY, LLC to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChesterC-17	Assess the property of the PECO - Tilghman Street Gas Plant to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChesterC-18	Assess the property of the Saint Daniels U.M. Church to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

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ChesterC-19	Assess the property of the William Penn Landing Site to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ChesterC-20	Assess and determine the best action to prevent flooding of roadways near Ridley Creek. The area east of Route 13/Morton Ave and north of 4th Street is particularly susceptible to flooding.	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Floodplain Administrator; PennDOT	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP
ChesterC-21	Assess and determine the best action to prevent flooding of roadways near 14th St. & Kerlin St.	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP
ChesterC-22	Assess and determine the best action to prevent flooding of roadways near the neighborhood of Parker Manor.	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP
ChesterC-23	Assess and determine the best action to prevent flooding of roadways near the	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP,	Short	High	SIP

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	300â€ block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291.								Operating Budget			
ChesterC-24	Assess and determine the best action to prevent flooding of freight rail line serving the waterfront industries.	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Engineer	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP
ChesterC-25	Assess stormwater management infrastructure at the Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant to determine what improvements need to be made, then implement the improvements.	New	Floods, Flash Floods, and Ice Jams; Hurricane, Tropical Storm, Nor'easter	1,2	DELCORA	Engineer	High	High	FEMA HMGP, BRIC; PA DCED FMP;	Short	High	SIP
ChesterC-26	Assess and determine the best action to mitigate future sea level rise and intense droughts that will cause the saltwater line to extend upstream from the Delaware Bay beyond Chester. Further	New	Floods, Flash Floods, and Ice Jams; Hurricane, Tropical Storm, Nor'easter, Drought	1,2	Engineer	Planning	Med.	Med.	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	investigation is needed to determine the future threat to Chester City industries with Delaware River water intakes.											
ChesterC-27	Protect the Chester City's Department of Streets and Public Improvement garage to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Department of Streets and Public Improvement	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-28	Protect the Chester City prison to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ChesterC-29	Study the City of Chester's levee system, from 13th Street to 9th Street, along 14th Street parallel with Parker Street, and at the high school at 10th Street, just east of Parker Street.	New	Dam and Levee Failure	1,2,4	Engineer	USACE; PA DEP; Floodplain Administrator	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	Low	SIP
ChesterHeightsB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

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	release the risk and possible protective measures.											
ChesterHeightsB-2	Discuss with the property owners located within the flood zone to keep property clear of material	New	Environmental Hazards - Hazardous Material Releases	1,2,3,4	Floodplain Administrator	Emergency Services; PEMA	Med.	Low	Operating Budget	Short	Low	EAP
ChesterT-1	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.	Existing	Flood, Flash Flood, and Ice Jam ; Environmental Hazards (Hazardous Materials Release)	1,2	Facility Operator	Floodplain Administrator; Engineer	High	High	Southwest Delaware County Municipal Authority Capital Fund; FEMA HMGP, BRIC, FMA; PA DCED FMP	Short	High	SIP
ChesterT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
CliftonHeightsB-1	Protect the LifeWorks School to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
CliftonHeightsB-2	Assess the topography around the LifeWorks School to	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

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	determine if mitigation measures are necessary, and how to implement those measures if they are.											
CliftonHeightsB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
CollingdaleB-1	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.	Existing	Urban Fire and Explosion	4	Municipal EMC	Fire Department; Emergency Services	Med.	Med.	Operating Budget	Short	Low	LPR
CollingdaleB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ColwynB-1	Reduce urban fire hazard in Colwyn Borough by adding accessible routes for the handicapped in row home areas without existing	Existing	Urban fire and explosion	1,2,4	Borough Engineer	Code Enforcement Officer	Med.	Low	PA DCED; Operating Budget	Short	Medium	SIP

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	handicap ramps or sidewalks.											
ColwynB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ColwynB-3	Conduct Flood Study at the confluence of Darby Creek and Cobbs Creek.	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; Planning; PEMA	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget **(not currently eligible for FEMA funding – community did not participate in the planning process)**	Short	High	LPR
ColwynB-4	Purchase a backup generator for the police station.	Existing	Utility Interruption	1,2,4	Police Department	Emergency Services	High	High	FEMA HMGP; Operating Budget **(not currently eligible for FEMA funding – community did not participate in**	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									the planning process)			
ConcordT-1	Protect the Concord Twp Sewage Treatment Plant 1 to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ConcordT-2	Protect the Fox Valley Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ConcordT-3	Assess the topography around the Refresco Beverages US INC to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
ConcordT-4	Assess the property of the Aardvark Child Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-5	Assess the property of the Brandywine Youth Club to determine the risk	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	from wildfires and vegetation to be cleared.											
ConcordT-6	Assess the property of the Concord Elementary School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-7	Assess the property of the Concord Township Historical Commission to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-8	Assess the property of the Concord Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-9	Assess the property of the Concord Twp Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-10	Assess the property of the Fox Valley Sewage Treatment	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	Plant to determine the risk from wildfires and vegetation to be cleared.											
ConcordT-11	Assess the property of the Garnet Valley Elementary School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-12	Assess the property of the Garnet Valley Middle School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-13	Assess the property of the KinderCare Learning Center to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-14	Assess the property of the Refresco Beverages Us Inc to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ConcordT-15	Discuss with the owners of the critical facilities	New	Environmental Hazards - Hazardous	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	vulnerable to a hazardous materials release the risk and possible protective measures.		Material Releases									
DarbyB-1	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Engineer	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
DarbyB-2	Discuss with owners of AT&T to protect their property to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator		High	High	Operating Budget	Short	High	SIP
DarbyB-3	Assess the topography around the AT&T property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
DarbyB-4	Assess the topography around the Darby Borough Recreation Center to determine if mitigation	New	Landslide	2	Borough Engineer	Municipal EMC, Code Enforcement	Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	measures are necessary, and how to implement those measures if they are.											
DarbyB-5	Assess the topography around the Park Lane Elementary School to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
DarbyB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
DarbyB-7	Conduct flood study along Darby Creek.	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; Planning; PEMA	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	High	LPR
DarbyB-8	Conduct flood study along Cobbs Creek.	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; Planning; PEMA	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	High	LPR
DarbyT-1	Protect the Darby Twp Sewage Treatment Plant to at least the 0.2	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP;	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	percent annual chance flood level.								Operating Budget			
DarbyT-2	Protect the Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
DarbyT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
EastLansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
EddystoneB-1	Protect the PECO 7TH ST SUB STATION to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
EddystoneB-2	Assess the topography around the PECO - Baldwin Service Building property to determine if	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	mitigation measures are necessary, and how to implement those measures if they are.											
EddystoneB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
EdgemontT-1	Assess the property of the Edgemont Fire Company to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-2	Assess the property of the Edgmont Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-3	Assess the property of the Edgemont USARC to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
EdgemontT-4	Assess the property of the El Buen Samaritano Church to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-5	Assess the property of the Health Care Ctr at White Horse Village to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-6	Assess the property of the Neumann University to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-7	Assess the property of the PECO Graddyville Rd Sub Station to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-8	Assess the property of the Runnymeade Farms Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
EdgemontT-9	Assess the property of the Runnymeade Farms Sewage Treatment Plant 2 to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-10	Assess the property of the Runnymeade Farms Sewage Treatment Plant 4 to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-11	Assess the property of the US Army Reserve Base Sewer Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-12	Assess the property of the Whitehorse Village Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
EdgemontT-13	Assess the topography around the Colonial Pennsylvania Plantation property	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	to determine if mitigation measures are necessary, and how to implement those measures if they are.											
EdgemontT-14	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
FolcroftB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
GlenoldenB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
GlenoldenB-2	Purchase a backup generator for the police station.	Existing	Utility Interruption	1,2,4	Police Department	Emergency Services	High	High	FEMA HMGP; Operating Budget **(not currently eligible for**	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									FEMA funding – community did not participate in the planning process)			
HaverfordT-1	Assess and determine the best action to prevent flooding of roadways near the apartment complex along the Darby Creek at West Chester Pike and Lawrence Road	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Floodplain Administrator; PennDOT	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP
HaverfordT-2	Assess the topography around the Haverford Township Administration Build property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Township Engineer	Municipal EMC, Code Enforcement	Med.	Med.	Operating Budget	Short	High	SIP
HaverfordT-3	Assess the property of the Haverford Twp Community Center to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
HaverfordT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
HaverfordT-5	Develop Flood Mitigation Study for Wynnefield Drive (Cobbs Creek)	New	Flood, Flash Flood, and Ice Jam	1,2,4	Floodplain Administrator	Consultant	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	High	LPR
HaverfordT-6	Discuss and assess with property owner in the flood zone about possible mitigation solutions including elevations and acquisitions	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Municipal EMC; PEMA	High	High	Operating Budget	Short	High	SIP
LansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
LowerChichesterT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
MarcusHookB-1	Protect the Marcus Hook Community Center to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
MarcusHookB-2	Protect the Marcus Hook Energy Center to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
MarcusHookB-3	Protect the Sun Oil Fire Brigader to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
MarcusHookB-4	Protect the Sunoco LLC - Race Fuels to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
MarcusHookB-5	Protect the Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
MarcusHookB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	possible protective measures.											
MarpleT-1	Assess the topography around the Broomall Rehabilitation and Nursing Center property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP
MarpleT-2	Assess the property of the Broomall Presbyterian Village to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MarpleT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
MediaB-1	Provide for operable, storm shutters on portions of municipal government center used for emergency	Existing	Hurricane, Tropical Storm, and Nor'easter; Winter Storm; and Tornado	1,2	Engineer	Municipal EMC; Emergency Services	High	High	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	operations command center and civilian shelter.		and Windstorm									
MediaB-2	Assess the property of the Blue Route Vineyard Community Church to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MediaB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
MiddletownT-1	Assess the property of the Children's Academy to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-2	Assess the property of the Easter Seals of Southeastern Pa to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-3	Assess the property of the Fair Acres Geriatric Center to determine the risk from wildfires and	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	vegetation to be cleared.											
MiddletownT-4	Assess the property of the Glenwood Elementary School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-5	Assess the property of the Hanson Aggregates PA LLC to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-6	Assess the property of the Hunter Street Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-7	Assess the property of the Rocky Run Fire Company to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-8	Assess the property of the Middletown Free Library to determine the risk from wildfires and	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	vegetation to be cleared.											
MiddletownT-9	Assess the property of the Middletown Montessori School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-10	Assess the property of the Middletown Municipal Building to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-12	Assess the property of the Middletown Township Historical Society to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-13	Assess the property of the Middletown Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-14	Assess the property of the Monticello House to determine the risk from wildfires and	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	vegetation to be cleared.											
MiddletownT-15	Assess the property of the Oakbridge Terrace at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-16	Assess the property of the PECO Middletown Rd Sub Station 1 to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-17	Assess the property of the Riddle Hospital to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-18	Assess the property of the Riddle Memorial Hospital to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-19	Assess the property of the Riddle Memorial Hospital-Based SNF to determine the risk	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

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	from wildfires and vegetation to be cleared.											
MiddletownT-20	Assess the property of the Simon Youth Academy to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-21	Assess the property of the Pennsylvania State University-Brandywine Campus to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-22	Assess the property of the Willowbrooke Court at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
MiddletownT-23	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
MillbourneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
MortonB-1	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).	Existing	Transportation Accident	1,2,4	Planning	PennDOT	Med.	Med.	Operating Budget; PA DCED	Short	High	SIP
MortonB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
NetherProvidenceT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
NewtownT-1	Assess the topography around the Melmark School property to determine if	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	mitigation measures are necessary, and how to implement those measures if they are.											
NewtownT-2	Assess the property of the Garretts Way Day Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
NewtownT-3	Assess the property of the Malvern School of Newtown Square to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
NewtownT-4	Assess the property of the Newtown Square Penn Railroad Museum to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
NewtownT-5	Assess the property of the Newtown Twp. Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
NewtownT-6	Assess the property of the SAP AMERICA INC to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
NewtownT-7	Assess the property of the Square Tavern to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
NewtownT-8	Assess the property of the WRNB Radio Tower to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
NewtownT-9	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
NewtownT-10	Develop and maintain local Stormwater Management Plan	New	Flood, Flash Flood, and Ice Jam	1,2,4	Public Works	Floodplain Administrator	Med.	Med.	PA DCED	Short	High	LPR
NewtownT-11	Develop and maintain local Emergency Evacuation Plan	New	All	1,2,5	Municipal EMC	PennDOT; LEPC; Emergency Services	Med.	Med.	Operating Budget	Short	High	LPR

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
NewtownT-11	Explore opportunities to improve pedestrian safety at the intersection of Terazzo Rd. to Chapel Rd.	New	Transportation Accident	1,2,4	Planning	PennDOT	Med.	Med.	Operating Budget; PA DCED	Short	High	SIP
NorwoodB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ParksideB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ProspectParkB-1	Protect the Concord Township Sewer Department to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
ProspectParkB-2	Assess the geology at the Morton Homestead property to determine if mitigation measures are necessary, and how	New	Subsidence and Sinkholes	2	Code Enforcement Officer		Med.	Med.	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	to implement them if they are.											
ProspectParkB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
RadnorT-1	Protect the Main Line Montessori to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RadnorT-2	Assess the topography around the Radnor Police Department property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Township Engineer	Municipal EMC, Code Enforcement	Med.	Med.	Operating Budget	Short	High	SIP
RadnorT-3	Assess the property of the WYBF Radio Tower to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
RadnorT-4	Assess the property of the Saint David's Episcopal Day School to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
RadnorT-5	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
RidleyParkB-1	Dredge silt from Ridley Park Lake.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Municipal Floodplain Administrator; PA DEP; PA DCNR	High	High	Operating Budget	Short	High	SIP
RidleyParkB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
RidleyParkB-3	Upgrade the Ward Street bridge to allow heavier traffic to travel on the road.	New	Transportation Accident	1,2	Engineer		Med.	High	Operating Budget	Long	Medium	SIP
RidleyT-1	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.	Existing	Transportation Accident	1,2,4	Public Works	PennDOT	Med.	Med.	Operating Budget; Capital Improvements	Short	Low	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									Budget; DVRPC			
RidleyT-2	Protect the Boeing Fire Brigade to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RidleyT-3	Protect the Boeing - Philadelphia property to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RidleyT-4	Protect the Eddystone Generating Station to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RidleyT-5	Protect the Eddystone Marine and Rail Terminal Company L.L.C to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
RidleyT-6	Protect the Sellers Ave. Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RidleyT-7	Protect the Sure Power Philadelphia structure to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RidleyT-8	Protect the Water's Edge (Old Rookies River Rm) to at least the 0.2 percent annual chance flood level.	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
RidleyT-9	Assess the geology at the Boeing - Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Code Enforcement Officer		Med.	Med.	Operating Budget	Short	Medium	SIP
RidleyT-10	Assess the geology at the Eddystone Generating Station property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Code Enforcement Officer		Med.	Med.	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
RidleyT-11	Assess the geology at the Eddystone Marine and Rail Terminal Company L.L.C property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Code Enforcement Officer		Med.	Med.	Operating Budget	Short	Medium	SIP
RidleyT-12	Assess the geology at the Sure Power Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Code Enforcement Officer		Med.	Med.	Operating Budget	Short	Medium	SIP
RidleyT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
RoseValleyB-1	Protect the Old Mill Polling Site to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget **(not currently eligible for**	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									FEMA funding – community did not participate in the planning process)			
RoseValleyB-2	Assess the property of the School in Rose Valley to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
RoseValleyB-3	Assess the property of the Rose Valley Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
RoseValleyB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
RutledgeB-1	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.	Existing	All	1,2,4	Engineer		High	High	FEMA HMGP; Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
RutledgeB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
SharonHillB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
SpringfieldT-1	Assess and determine the best action to prevent flooding of roadways from the Darby Creek, particularly West Rolling Road and Doe Run Lane are susceptible to flooding.	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget	Short	High	SIP
SpringfieldT-2	Protect the Littler Friends Child Care to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
SpringfieldT-3	Assess the topography around the Aqua Pa - Crum Creek Water Treatment Plant	New	Landslide	2	Facility Operator	Municipal EMC, Code Enforcement, Engineer	Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	property to determine if mitigation measures are necessary, and how to implement those measures if they are.											
SpringfieldT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
SwarthmoreB-1	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.	Existing	Flood, Flash Flood, and Ice Jam	3	Floodplain Administrator		Med.	Low	Operating Budget	Short	High	EAP
SwarthmoreB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
ThornburyT-1	Discuss and assess with the property owner the topography around	New	Landslide	2	Engineer		Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	the Home Depot Store #4121 property to determine if mitigation measures are necessary, and how to implement those measures if they are.											
ThornburyT-2	Assess the property of the Bethlehem United Methodist Church to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ThornburyT-3	Assess the property of the Stonybank Community Church to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ThornburyT-4	Assess the property of the Home Depot Store #4121 to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ThornburyT-5	Assess the property of the Thornbury Historical Society to determine the risk from wildfires	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP

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	and vegetation to be cleared.											
ThornburyT-6	Assess the property of the Thornbury Twp Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
ThornburyT-7	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
TinicumT-1	Work with the FAA to protect the FAA PHL ALSF at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-2	Work with the FAA to protect the FAA PHL ATCT at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-3	Protect the Lester Fire Company to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
TinicumT-4	Work with the owners to protect the Messina Electric property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-5	Work with the owners to protect the Philadelphia Fuel Facility Inc property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-6	Work with the owners to protect the Philadelphia International Airport property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-7	Work with the owners to protect the PHL-CDF property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-8	Work with the owners to protect the SKC Hangar (Tenants Assoc.) property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
TinicumT-9	Work with the owners to protect the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-10	Protect the Tinicum Police Department to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-11	Protect the Tinicum Public Library to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-12	Protect the Tinicum Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-13	Protect the Tinicum Twp Water Storage Facility to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-14	Work with the owners to protect the UNITED AIRLINES-PHL property to at least	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP;	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	the 0.2 percent annual chance flood level								Operating Budget			
TinicumT-15	Work with the owners to protect the Western Fumigation (B-2) property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
TinicumT-16	Discuss with the owners of the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property their risk and vulnerability to levee failure and possible protective measures.	New	Flood, Flash Flood, Ice Jam, Levee Failure	2,3,4	Floodplain Administrator	Emergency Services; PEMA	Med.	Low	Operating Budget	Short	High	EAP
TinicumT-17	Discuss with the owners the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Floodplain Administrator	Emergency Services; PEMA	Med.	Med.	Operating Budget	Short	Medium	SIP
TinicumT-18	Discuss with the owners the geology at the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to determine if	New	Subsidence and Sinkholes	2	Floodplain Administrator	Emergency Services; PEMA	Med.	Med.	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	mitigation measures are necessary, and how to implement them if they are.											
TinicumT-19	Discuss with the owners the geology at the UNITED AIRLINES-PHL property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Floodplain Administrator	Emergency Services; PEMA	Med.	Med.	Operating Budget	Short	Medium	SIP
TinicumT-20	Assess the property of the Tinicum Township Fire Company to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
TinicumT-21	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
TrainerB-1	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Mayor	Public Works; Floodplain Administrator; Engineer	High	High	FEMA BRIC, HMGP; PA DCED; DVRPC funding;	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									Municipal Bond **(not currently eligible for FEMA funding – community did not participate in the planning process)**			
TrainerB-2	Work with the owners to protect the Monroe Energy, LLC property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget **(not currently eligible for FEMA funding – community did not participate in the planning process)**	Short	High	SIP
TrainerB-3	Work with the owners to protect the PECO - Trainer Substation property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget **(not currently eligible for FEMA**	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									funding – community did not participate in the planning process)			
TrainerB-4	Protect the Trainer Police Department property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Police Department	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget **(not currently eligible for FEMA funding – community did not participate in the planning process)**	Short	High	SIP
TrainerB-5	Protect the Trainer Oil Refinery Sub Station property to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget **(not currently eligible for FEMA funding – community did not participate in the planning process)**	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
TrainerB-6	Assess the Trainer Oil Refinery Sub Station property their risk and vulnerability to levee failure and possible protective measures.	New	Flood, Flash Flood, Ice Jam, Levee Failure	2,3,4	Delaware County ES	DPS, LEPC	Med.	Low	Operating Budget	Short	High	EAP
TrainerB-7	Discuss with the owners of the PECO - Trainer Substation property their risk and vulnerability to levee failure and possible protective measures.	New	Flood, Flash Flood, Ice Jam, Levee Failure	2,3,4	Floodplain Administrator	Emergency Services; PEMA	Med.	Low	Operating Budget	Short	High	EAP
TrainerB-8	Assess the property of the Trainer Fire Company to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
TrainerB-9	Assess the property of the Conoco Phillips Fire and Rescue to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
TrainerB-10	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	possible protective measures.											
UplandB-1	Protect the Caleb Pusey House to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
UplandB-2	Protect the Landingford Plantation to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
UplandB-3	Discuss and assess with the property owner the topography around the Upland Fire Company property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Engineer		Med.	Med.	Operating Budget	Short	High	SIP
UplandB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
UplandB-5	Upgrade the Kerlin Street Bridge in Upland Borough to allow more water to flow under it.	New	Flood, Flash Flood, and Ice Jam	1,1	Engineer		High	High	FEMA HMGP, FMA, BRIC; PennDOT; DVRPC; Operating Budget; Municipal Bond	Long	High	SIP
UplandB-6	Evaluate and repair undermining of Upland Avenue near the Kerlin Street Bridge in Upland Borough.	New	Flood, Flash Flood, and Ice Jam	1,2	Engineer	Public Works	High	High	FEMA HMGP, BRIC; Operating Budget	Long	High	SIP
UplandB-7	Evaluate and upgrade the Maris Run culvert under 4th Street.	Existing	Flood, Flash Flood, Ice Jam	1,2	Borough Public Safety Official	Borough Public Works; Engineer	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	Medium	SIP
UpperChichesterT-1	Work with PennDOT to mitigate flooding on I-95 at PA-452 (Exit 2)	New	Flood, Flash Flood, and Ice Jam	1,2	Engineer		High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
UpperChichesterT-2	Assess the need to repair or replace the culvert along Spring Run under Larkin Road that is experiencing flooding.	New	Flood, Flash Flood, and Ice Jam	1,2	Engineer	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
UpperChichesterT-3	Assess the need to repair or replace the culvert along East Branch of	New	Flood, Flash Flood, and Ice Jam	1,2	Engineer	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP;	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	Naaman Creek under Larkin Road that is experience flooding.								Operating Budget			
UpperChichesterT-4	Discuss with the owners of the Gehr Plastics Inc. property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; PEMA	High	High	Operating Budget	Short	High	SIP
UpperChichesterT-5	Discuss and assess with the property owner the topography around the Verizon CHESTER HEIGHTS CO property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Engineer		Med.	Med.	Operating Budget	Short	High	SIP
UpperChichesterT-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
UpperDarbyT-1	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	PEMA; FEMA; PA DEP	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
UpperDarbyT-2	Conduct flood level monitoring along Naylor's Run Creek.	Existing	Flood, Flash Flood, and Ice Jam; Dam Failure	1,2	Floodplain Administrator	Emergency Services; Planning; PEMA	High	High	Operating Budget	Short	High	SIP
UpperDarbyT-3	Continue planning of dispersement locations as part of Disaster Relief Drug Distribution Program.	Existing	Pandemic	1,4	Township Manager	Health; Emergency Services	Med.	Low	Operating Budget	Short	Low	LPR
UpperDarbyT-4	Discuss with the owners of the Idle Hour Tennis Club property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; PEMA	High	High	Operating Budget	Short	High	SIP
UpperDarbyT-5	Assess the need to repair or replace the Naylors Run culvert	New	Flood, Flash Flood, and Ice Jam	1,2	Engineer	Floodplain Administrator	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
UpperDarbyT-6	Discuss with the owners of the PECO Marshall Rd Sub Station property their risk	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; PEMA	High	High	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level											
UpperDarbyT-7	Discuss with the owners of the PECO - Upper Darby Substation property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; PEMA	High	High	Operating Budget	Short	High	SIP
UpperDarbyT-8	Discuss with the owners of the Speedway 6806 property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; PEMA	High	High	Operating Budget	Short	High	SIP
UpperDarbyT-9	Discuss with the owners of the Swedish Cabin property their risk and vulnerability to flooding and possible protective measures to at least	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; PEMA	High	High	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	the 0.2 percent annual chance flood level											
UpperDarbyT-10	Discuss and assess with the Upper Darby School District the topography around the Charles Kelly Elementary School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Engineer	Upper Darby School District	Med.	Med.	Operating Budget	Short	High	SIP
UpperDarbyT-11	Discuss and assess with the property owner the topography around the PECO MARSHALL RD SUB STATION property to determine if mitigation measures are necessary, and how to implement those measures if they are.	New	Landslide	2	Engineer		Med.	Med.	Operating Budget	Short	High	SIP
UpperDarbyT-12	Discuss and assess with the property owner the topography around the SEPTA	New	Landslide	2	Engineer		Med.	Med.	Operating Budget	Short	High	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	VICTORY SHOP property to determine if mitigation measures are necessary, and how to implement those measures if they are.											
UpperDarbyT-13	Assess the property of the Upper Darby Historical Society to determine the risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Municipal EMC	Fire Department	Med.	Low	Operating Budget	Short	Medium	SIP
UpperDarbyT-14	Discuss and assess with property owners of the Speedway 6806 their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperDarbyT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
UpperDarbyT-16	Conduct flood study along Nailors Run.	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; Planning; PEMA	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	High	LPR

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
UpperProvidenceT-1	Explore projects to mitigate washout of Farnum Road from flooding.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Public Works	Engineer; Floodplain Administrator	High	High	FEMA BRIC; Operating Budget	Short	High	SIP
UpperProvidenceT-2	Discuss with PennDOT flooding concerns at Crum Creek Road off of State Road at the US-1-overpass and possible protective actions.	New	Flood, Flash Flood, and Ice Jam	1,2	Public Works	PennDOT; Floodplain Administrator	High	High	Operating Budget	Short	High	SIP
UpperProvidenceT-3	Discuss with the property owners of the Rose Tree Early Learning Center the geology of the property to determine if mitigation measures are necessary, and how to implement them if they are.	New	Subsidence and Sinkholes	2	Engineer	Facility Management	Med.	Med.	Operating Budget	Short	Medium	SIP
UpperProvidenceT-4	Discuss and assess with property owners of the Benchmark School their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-5	Assess property with District Court 32-2-46 and determine its risk from wildfires and	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	vegetation to be cleared.											
UpperProvidenceT-6	Discuss and assess with property owners of the Reformation Lutheran Church their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-7	Discuss and assess with property owners of the RMH-HB/SNF nursing home their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-8	Discuss and assess with property owners of the Rose Tree Early Learning Center their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-9	Discuss and assess with property owners of the Rose Tree Elementary School their risk from wildfires and	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	determine vegetation to be cleared.											
UpperProvidenceT-10	Discuss and assess with property owners of the Rose Tree Fire Company their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-11	Assess with Upper Providence Police Department property and determine its risk from wildfires and vegetation to be cleared.	New	Wildfire	2	Fire Department	Police Department; Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-12	Discuss and assess with property owners of the Walden School their risk from wildfires and determine vegetation to be cleared.	New	Wildfire	2	Fire Department	Municipal EMC	Med.	Low	Operating Budget	Short	Medium	SIP
UpperProvidenceT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
YeadonB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	New	Environmental Hazards - Hazardous Material Releases	2,3,4	Municipal EMC	Emergency Services; LEPC	Med.	Low	Operating Budget	Short	High	EAP
YeadonB-2	Conduct Flood Study along Cobbs Creek	New	Flood, Flash Flood, and Ice Jam	1,2	Floodplain Administrator	Emergency Services; Planning; PEMA	High	Med.	FEMA HMGP, BRIC; USACE; Operating Budget	Short	High	LPR
Brandywine-1	Protect the Brandywine Conservancy & Environmental Management Center to at least the 0.2 percent annual chance flood level.	Existing	Flood, Flash Flood, and Ice Jam	1,2	Facility Operator	Township Floodplain Administrator; Municipal EMC; Emergency Services	High	High	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget	Short	High	SIP
Brandywine-2	Develop Brandywine Conservancy & Museum of Art flood study and determine all streams and tributaries with flow regimes that contribute to flood major flood events; evaluate the study areas soils, climate, population, land use, water quality, natural areas, and	Existing	Flood, Flash Flood, and Ice Jam	1,2	Conservancy Management	Township Floodplain Administrator	Med.	Med.	PEMA, FEMA HMGP, BRIC; Operating Budget	Short	Medium	SIP

Initiative*	Mitigation Initiative	Applies to New and/or Existing Structures**	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	cultural resources; evaluate the historical and present flooding; and develop a hydrological model using the US Army Corps of Engineers HEC-RAS program. Using study area data, begin site selection and assessment for improvements to the study area to mitigation flooding.											

Notes:

** The letters associated with the initiative number indicate the lead agency (i.e., county or municipality)*

*** Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (N/A) is inserted if this does not apply.*

EMA = Emergency Management Agency
EMS = Emergency Medical Services
FEMA = Federal Emergency Management Agency
FPA = Floodplain Administrator
PA DEP = Pennsylvania Department of Environmental Protection
PDM = Pre-Disaster Mitigation Program
PEMA = Pennsylvania Emergency Management Agency
WWTP = Wastewater Treatment Plant

Costs:
These rough estimates should be used where actual project costs cannot reasonably be established at this time:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000

DOF = Depending on funding
HMGP = Hazard Mitigation Grant Program

Timeline:
Short Term = 1 to 5 years. Long Term = 5 years or greater.

Mitigation Category:

- Education and Awareness Programs (EAP) - 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, such as StormReady and Firewise Communities.
- Local Plans and Regulations (LPR) - Actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.

- Natural Systems Protection (NSP) - Actions that minimize damage and losses, and also preserve or restore the functions of natural systems.
- Structure and Infrastructure Project (SIP) - Actions that 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.

6.4.2 Mitigation Strategy Prioritization and Implementation

Section 201.6(c) (3) (iii) of Title 44 Code of Federal Regulations (44 CFR) requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs. This allows the jurisdictions to select the most cost-effective actions for implementation first, not only to use resources efficiently, but also to make a realistic start toward mitigating risks.

Mitigation benefits are defined as future damages and losses that would be eliminated and/or reduced by implementing the proposed mitigation project, and include physical damage to structures and infrastructure, loss of service or function, and emergency management costs. Particularly for physical ("shovel-in-the-ground") mitigation projects, jurisdictions were encouraged to estimate project costs as well as to identify the anticipated benefits. Where exact project costs and potential benefits were not available, ranges were identified (high, medium, low) for each, allowing a qualitative evaluation of project cost-effectiveness.

PEMA has developed a mitigation actions evaluation and prioritization process to provide a consistent, uniform approach for counties and jurisdictions to use to consider, in a systematic way, the best mitigation strategies for their communities (PEMA 2020). Jurisdictions first evaluate feasibility of mitigation actions by using the following ten evaluation criteria:

- **Life Safety:** The Planning Team assesses to what extent a mitigation action will protect individuals from being injured or killed by a hazard.
- **Property Protection:** The Planning Team assesses to what extent the action will protect property, including homes, businesses, and critical infrastructure.
- **Technical:** It is important to determine whether the proposed action is technically feasible, will help to reduce losses in the long term, and has minimal secondary impacts. Here, the Planning Team determines whether the alternative action is a whole or partial solution, or not a solution at all.
- **Political:** Understanding current opinions of community and state political leadership regarding issues related to the environment, economic development, safety, and emergency management will provide valuable insight into the level of political support offered for mitigation activities and programs. Proposed mitigation objectives sometimes fail because of a lack of political acceptability.
- **Legal:** Without the appropriate legal authority, the action cannot lawfully be undertaken. When considering this criterion, the Planning Team determines whether a jurisdiction has the legal authority at the state, tribal, or local level to implement the action, or whether the jurisdiction must pass new laws or regulations. Each level of government operates under a specific source of delegated authority. As a general rule, most local governments operate under enabling legislation that gives them the power to engage in different activities. Jurisdictions should identify the unit of government undertaking the mitigation action and include an analysis of the inter-relationships between local, regional, state, and federal governments. Legal authority is likely to have a significant role later in the process when the state, tribe, or community determines the ways in which mitigation activities can best be carried out, and the extent to which mitigation policies and programs can be enforced.
- **Environmental:** Impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. In addition, many statutory considerations, such as the National Environmental Policy Act (NEPA), should be counted when using federal funds. Jurisdictions need to evaluate whether, when implementing mitigation actions, the potential negative consequences to environmental assets such as threatened and endangered species, wetlands, and other protected natural resources.
- **Social:** The public must support the overall implementation strategy and specific mitigation actions. Therefore, the projects have to be evaluated in terms of community acceptance. Likewise, the Planning Team should determine if implementing a mitigation action will have a beneficial or negative effect on a particular segment of the population.

- **Administrative:** Under this part of the evaluation criteria, the Planning Team examines the anticipated staffing, funding, and maintenance requirements for the mitigation action to determine whether the jurisdiction has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.
- **Local Champion:** Having an individual who will lead the implementation of a project, particularly a complex project, is essential for implementing it.
- **Other Community Objectives:** The Planning Team evaluates to what extent implementing the mitigation action supports other community objectives, such as increasing parks and recreation, quality of life, and economic development.

Table 6-5 shows the feasibility evaluation for each identified mitigation action. For each criterion, how feasible or effective the action is in the above criteria was indicated with a "+" (highly effective or feasible), "N" (neutral or not applicable), or a "-" (ineffective or not feasible). All actions were deemed feasible.

Table 6-5. Evaluation of Mitigation Actions

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
DelawareC-1	Assess means to prevent future storage of hazardous materials in floodplains.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
DelawareC-2	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	+	+	+	+	N	N	+	-	+	N	6 (+) 3 (N) 1 (-)
DelawareC-3	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-4	Develop multi-use trails that can serve evacuation routes in the event of an emergency.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
DelawareC-5	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.	+	+	+	+	N	+	+	+	+	+	9 (+) 1 (N) 0 (-)
DelawareC-6	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)
DelawareC-7	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
DelawareC-8	Evaluate at the municipal level the suitability of the Community Rating System (CRS) for insurance premium reduction (and flood damage reduction).	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
DelawareC-9	Explore opportunities to improve poor broadband infrastructure throughout the county for increased remote work and learning.	N	N	+	N	N	N	+	+	+	+	5 (+) 5 (N) 0 (-)
DelawareC-10	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-11	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
DelawareC-12	Identify and publicize success stories as part of an overall consistent public relations program.	+	+	+	+	N	N	+	+	+	+	8 (+) 2 (N) 0 (-)
DelawareC-13	Identify areas where healthcare facilities closures have impacted communities and explore mitigation solutions.	+	+	+	+	-	N	N	-	-	N	4 (+) 3 (N) 3 (-)
DelawareC-14	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.	+	+	+	+	N	N	+	+	N	+	7 (+) 3 (N) 0 (-)
DelawareC-15	Increase resident awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods can include public outreach (i.e., website, mailings, workshops, media coverage) and education.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)
DelawareC-16	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems • Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
DelawareC-17	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
DelawareC-18	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-19	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-20	Review County EOP to ensure emergency operations are equipped and prepared for logistical needs during a pandemic response event.	+	+	+	+	N	+	+	+	+	+	9 (+) 1 (N) 0 (-)
DelawareC-21	Update and complete inventory of domestic wells located in Delaware County.	+	+	+	+	+	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DelawareC-22	Upgrade backup power resources as necessary at critical facilities.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
DelawareC-23	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-24	Work with municipal officials to increase awareness among property owners to clear debris from waterways and drainage infrastructure.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-25	Work with municipal officials to increase awareness among property owners, including informational mailings to property owners in the 1 percent annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Improving property elevation, dry flood proofing, and wet flood-proofing.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
DelawareC-26	Work with PEMA and FEMA to hold a municipal CRS workshop.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
DelawareC-27	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DelawareC-28	Acquire, elevate, flood-proof, or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	+	+	+	+	-	+	-	-	+	+	7 (+) 0 (N) 3 (-)
DelawareC-29	Conduct a training class for first responders for a leak on pipelines transporting HVLs.	+	+	+	+	N	N	+	+	+	N	7 (+) 3 (N) 0 (-)
DelawareC-30	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)
DelawareC-31	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.	+	+	+	+	+	N	+	N	N	+	7 (+) 3 (N) 0 (-)
DelawareC-32	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).	+	+	+	+	+	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DelawareC-33	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
DelawareC-34	Develop and implement a radon exposure prevention program.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)
DelawareC-35	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
DelawareC-36	Update municipal zoning code to strengthen it to promote disaster-resistant development.	+	+	+	+	N	N	+	+	+	+	8 (+) 2 (N) 0 (-)
DelawareC-37	Protect the Delaware County Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DelawareC-38	Implement the Delaware County Regional Water Quality Control Authority (DELCORA) wastewater management tunnel project from Chester to Ridley.	+	+	+	+	-	+	-	+	+	+	8 (+) 0 (N) 2 (-)
DelawareC-39	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.	+	+	+	N	N	+	+	-	N	N	5 (+) 4 (N) 1 (-)
DelawareC-40	Work with the US Army Reserve Base Sewer Treatment Plant to assess the property to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
DelawareC-41	Work with the FAA to discuss the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	N	6 (+) 4 (N) 0 (-)
DelawareC-42	Work with Amtrak and PennDOT on cleaning up debris in streams and along the PA-420 bridge.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-43	Assess the District Court 32-2-46 property to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
DelawareC-44	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.	+	+	+	+	N	+	+	-	+	N	7 (+) 2 (N)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
												1 (-)
DelawareC-45	Clean up debris in streams and along stream banks and bridges in municipality.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.	+	+	+	+	N	+	-	-	+	+	7 (+) 1 (N) 2 (-)
DelawareC-47	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-48	Conduct Flood Study of Lower Chester Creek.	+	+	+	+	+	+	N	+	+	+	9 (+) 1 (N) 0 (-)
DelawareC-49	Explore opportunities to mitigate flooding and drainage problems in the municipality.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
DelawareC-50	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-51	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.	+	+	+	+	N	-	-	-	-	+	5 (+) 1 (N) 4 (-)
DelawareC-52	Create a logistical facility to coordinate logistics during public health emergencies.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (N) 0 (-)
DelawareC-53	Create a new Delaware County Emergency Operations Center (EOC).	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DelawareC-54	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
AldanB-1	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
AshtonT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
												0 (-)
AshtonT-2	Protect the Ashton Beechwood Fire Company to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
AstonT-1	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
BethelT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
BethelT-2	Work with pipeline owners to make pipeline information accessible online	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
BethelT-3	Review previous flood occurrences and identify mitigation solutions	+	+	+	+	+	+	+	+	+	N	9 (+) 1 (N) 0 (-)
BrookhavenB-1	Protect the Brookhaven Treatment Plant to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
BrookhavenB-2	Assess the geology at the Brookhaven Treatment Plant property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	N	6 (+) 4 (N) 0 (-)
BrookhavenB-3	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
BrookhavenB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChaddsFordT-1	Protect the Christian C. Sanderson Museum to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChaddsFordT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChaddsFordT-3	Assess the property of the Calvary Chapel of Delaware County to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
												0 (-)
ChaddsFordT-4	Assess the property of the Christian C. Sanderson Museum to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChaddsFordT-5	Assess the property of the Ridings Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChaddsFordT-6	Assess the property of the Saint Cornelius School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-1	Protect the Anthem Propane to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-2	Protect the Apple Pie Christian Academy to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-3	Protect the Evonik Corporation to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-4	Protect the Exelon Chester Generating Station to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-5	Protect the Kimberly Clark PA LLC to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-6	Protect the PECO Front St Sub Station to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-7	Protect the PQ Corporation Chester to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-8	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
ChesterC-9	Assess the topography around the Exelon Lamokin Electric Substation to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
ChesterC-10	Assess the topography around the Widener University- Schwartz Century to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
ChesterC-11	Determine the vulnerability of Chester High School to levee failure and determine appropriate mitigation measures.	+	+	+	+	+	N	+	+	N	N	7 (+) 3 (N) 0 (-)
ChesterC-12	Assess the topography around the Evonik Corporation to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
ChesterC-13	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
ChesterC-14	Assess the property of the Center for Self-Development to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-15	Assess the property of the Felton Fire Company to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-16	Assess the property of the NORQUAY, LLC to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-17	Assess the property of the PECO - Tilghman Street Gas Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-18	Assess the property of the Saint Daniels U.M. Church to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-19	Assess the property of the William Penn Landing Site to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ChesterC-20	Assess and determine the best action to prevent flooding of roadways near Ridley Creek. The area east of Route 13/Morton Ave and north of 4th Street is particularly susceptible to flooding.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
ChesterC-21	Assess and determine the best action to prevent flooding of roadways near 14th St. & Kerlin St.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-22	Assess and determine the best action to prevent flooding of roadways near the neighborhood of Parker Manor.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-23	Assess and determine the best action to prevent flooding of roadways near the 300â€ block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-24	Assess and determine the best action to prevent flooding of freight rail line serving the waterfront industries.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-25	Assess stormwater management infrastructure at the Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant to determine what improvements need to be made, then implement the improvements.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
ChesterC-26	Assess and determine the best action to mitigate future sea level rise and intense droughts that will cause the saltwater line to extend upstream from the Delaware Bay beyond Chester. Further investigation is needed to determine the future threat to Chester City industries with Delaware River water intakes.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
ChesterC-27	Protect the Chester City's Department of Streets and Public Improvement garage to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-28	Protect the Chester City prison to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterC-29	Study the City of Chester's levee system, from 13th Street to 9th Street, along 14th Street parallel with Parker Street, and at the high school at 10th Street, just east of Parker Street.	+	+	+	+	+	N	+	+	N	N	7 (+) 3 (N) 0 (-)
ChesterHeightsB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ChesterHeightsB-2	Discuss with the property owners located within the flood zone to keep property clear of material	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

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ChesterT-1	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
ChesterT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
CliftonHeightsB-1	Protect the LifeWorks School to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
CliftonHeightsB-2	Assess the topography around the LifeWorks School to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
CliftonHeightsB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
CollingdaleB-1	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
CollingdaleB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ColwynB-1	Reduce urban fire hazard in Colwyn Borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)
ColwynB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ColwynB-3*	Conduct Flood Study at the confluence of Darby Creek and Cobbs Creek.	+	+	+	+	+	+	N	+	+	+	9 (+) 1 (N) 0 (-)
ColwynB-4*	Purchase a backup generator for the police station.	+	+	+	+	N	N	N	N	+	+	6 (+) 4 (N) 0 (-)
ConcordT-1	Protect the Concord Twp Sewage Treatment Plant 1 to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
ConcordT-2	Protect the Fox Valley Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ConcordT-3	Assess the topography around the Refresco Beverages US INC to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
ConcordT-4	Assess the property of the Aardvark Child Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-5	Assess the property of the Brandywine Youth Club to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-6	Assess the property of the Concord Elementary School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-7	Assess the property of the Concord Township Historical Commission to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-8	Assess the property of the Concord Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-9	Assess the property of the Concord Twp Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-10	Assess the property of the Fox Valley Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-11	Assess the property of the Garnet Valley Elementary School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-12	Assess the property of the Garnet Valley Middle School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-13	Assess the property of the KinderCare Learning Center to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
ConcordT-14	Assess the property of the Refresco Beverages Us Inc to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ConcordT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DarbyB-1	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
DarbyB-2	Discuss with owners of AT&T to protect their property to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DarbyB-3	Assess the topography around the AT&T property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
DarbyB-4	Assess the topography around the Darby Borough Recreation Center to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
DarbyB-5	Assess the topography around the Park Lane Elementary School to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
DarbyB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DarbyB-7	Conduct flood study along Darby Creek.	+	+	+	+	+	+	N	+	+	+	9 (+) 1 (N) 0 (-)
DarbyB-8	Conduct flood study along Cobbs Creek.	+	+	+	+	+	+	N	+	+	+	9 (+) 1 (N) 0 (-)
DarbyT-1	Protect the Darby Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
DarbyT-2	Protect the Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
DarbyT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
EastLansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
EddystoneB-1	Protect the PECO 7TH ST SUB STATION to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
EddystoneB-2	Assess the topography around the PECO - Baldwin Service Building property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
EddystoneB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
EdgemontT-1	Assess the property of the Edgemont Fire Company to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-2	Assess the property of the Edgmont Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-3	Assess the property of the Edgemont USARC to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-4	Assess the property of the El Buen Samaritano Church to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-5	Assess the property of the Health Care Ctr at White Horse Village to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-6	Assess the property of the Neumann University to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-7	Assess the property of the PECO Graddyville Rd Sub Station to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
EdgemontT-8	Assess the property of the Runnymeade Farms Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-9	Assess the property of the Runnymeade Farms Sewage Treatment Plant 2 to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-10	Assess the property of the Runnymeade Farms Sewage Treatment Plant 4 to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-11	Assess the property of the US Army Reserve Base Sewer Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-12	Assess the property of the Whitehorse Village Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
EdgemontT-13	Assess the topography around the Colonial Pennsylvania Plantation property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
EdgemontT-14	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
FolcroftB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
GlenoldenB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
GlenoldenB-2*	Purchase a backup generator for the police station.	+	+	+	+	N	N	N	N	+	+	6 (+) 4 (N) 0 (-)
HaverfordT-1	Assess and determine the best action to prevent flooding of roadways near the apartment complex along the Darby Creek at West Chester Pike and Lawrence Road	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
HaverfordT-2	Assess the topography around the Haverford Township Administration Build property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
HaverfordT-3	Assess the property of the Haverford Twp Community Center to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
HaverfordT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
HaverfordT-5	Develop Flood Mitigation Study for Wynnefield Drive (Cobbs Creek)	+	+	+	+	+	N	+	N	N	+	7 (+) 3 (N) 0 (-)
HaverfordT-6	Discuss and assess with property owner in the flood zone about possible mitigation solutions including elevations and acquisitions	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (N) 0 (-)
LansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
LowerChichesterT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MarcusHookB-1	Protect the Marcus Hook Community Center to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MarcusHookB-2	Protect the Marcus Hook Energy Center to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MarcusHookB-3	Protect the Sun Oil Fire Brigader to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MarcusHookB-4	Protect the Sunoco LLC - Race Fuels to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MarcusHookB-5	Protect the Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MarcusHookB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

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MarpleT-1	Assess the topography around the Broomall Rehabilitation and Nursing Center property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
MarpleT-2	Assess the property of the Broomall Presbyterian Village to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MarpleT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MediaB-1	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.	+	+	+	+	N	N	N	N	+	+	6 (+) 4 (N) 0 (-)
MediaB-2	Assess the property of the Blue Route Vineyard Community Church to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MediaB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MiddletownT-1	Assess the property of the Children's Academy to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-2	Assess the property of the Easter Seals of Southeastern Pa to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-3	Assess the property of the Fair Acres Geriatric Center to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-4	Assess the property of the Glenwood Elementary School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-5	Assess the property of the Hanson Aggregates PA LLC to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-6	Assess the property of the Hunter Street Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

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MiddletownT-7	Assess the property of the Rocky Run Fire Company to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-8	Assess the property of the Middletown Free Library to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-9	Assess the property of the Middletown Montessori School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-10	Assess the property of the Middletown Municipal Building to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-12	Assess the property of the Middletown Township Historical Society to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-13	Assess the property of the Middletown Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-14	Assess the property of the Monticello House to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-15	Assess the property of the Oakbridge Terrace at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-16	Assess the property of the PECO Middletown Rd Sub Station 1 to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-17	Assess the property of the Riddle Hospital to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-18	Assess the property of the Riddle Memorial Hospital to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-19	Assess the property of the Riddle Memorial Hospital-Based SNF to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

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MiddletownT-20	Assess the property of the Simon Youth Academy to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-21	Assess the property of the Pennsylvania State University-Brandywine Campus to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-22	Assess the property of the Willowbrooke Court at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
MiddletownT-23	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MillbourneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
MortonB-1	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
MortonB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
NetherProvidenceT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
NewtownT-1	Assess the topography around the Melmark School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
NewtownT-2	Assess the property of the Garretts Way Day Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
NewtownT-3	Assess the property of the Malvern School of Newtown Square to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
NewtownT-4	Assess the property of the Newtown Square Penn Railroad Museum to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

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NewtownT-5	Assess the property of the Newtown Twp. Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
NewtownT-6	Assess the property of the SAP AMERICA INC to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
NewtownT-7	Assess the property of the Square Tavern to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
NewtownT-8	Assess the property of the WRNB Radio Tower to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
NewtownT-9	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
NewtownT-10	Develop and maintain local Stormwater Management Plan	+	N	+	N	N	+	N	+	+	+	6 (+) 4 (N) 0 (-)
NewtownT-11	Develop and maintain local Emergency Evacuation Plan	+	N	+	N	N	N	N	+	+	+	5 (+) 5 (N) 0 (-)
NewtownT-11	Explore opportunities to improve pedestrian safety at the intersection of Terazzo Rd. to Chapel Rd.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
NorwoodB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ParksideB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ProspectParkB-1	Protect the Concord Township Sewer Department to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ProspectParkB-2	Assess the geology at the Morton Homestead property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)

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ProspectParkB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RadnorT-1	Protect the Main Line Montessori to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RadnorT-2	Assess the topography around the Radnor Police Department property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
RadnorT-3	Assess the property of the WYBF Radio Tower to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
RadnorT-4	Assess the property of the Saint David's Episcopal Day School to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
RadnorT-5	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyParkB-1	Dredge silt from Ridley Park Lake.	+	+	-	+	-	-	-	N	-	-	3 (+) 1 (N) 6 (-)
RidleyParkB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyParkB-3	Upgrade the Ward Street bridge to allow heavier traffic to travel on the road.	+	+	+		+	+	+	+	+	+	9 (+) 0 (N) 0 (-)
RidleyT-1	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.	+	+	+	+	N	N	+	-	+	+	7 (+) 2 (N) 1 (-)
RidleyT-2	Protect the Boeing Fire Brigade to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-3	Protect the Boeing - Philadelphia property to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

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RidleyT-4	Protect the Eddystone Generating Station to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-5	Protect the Eddystone Marine and Rail Terminal Company L.L.C to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-6	Protect the Sellers Ave. Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-7	Protect the Sure Power Philadelphia structure to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-8	Protect the Water's Edge (Old Rookies River Rm) to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-9	Assess the geology at the Boeing - Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-10	Assess the geology at the Eddystone Generating Station property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-11	Assess the geology at the Eddystone Marine and Rail Terminal Company L.L.C property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-12	Assess the geology at the Sure Power Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
RidleyT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RoseValleyB-1*	Protect the Old Mill Polling Site to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RoseValleyB-2	Assess the property of the School in Rose Valley to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

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RoseValleyB-3	Assess the property of the Rose Valley Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
RoseValleyB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
RutledgeB-1	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.	+	+	+	+	N	N	+	N	+	N	6 (+) 4 (N) 0 (-)
RutledgeB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
SharonHillB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
SpringfieldT-1	Assess and determine the best action to prevent flooding of roadways from the Darby Creek, particularly West Rolling Road and Doe Run Lane are susceptible to flooding.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
SpringfieldT-2	Protect the Littler Friends Child Care to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
SpringfieldT-3	Assess the topography around the Aqua Pa - Crum Creek Water Treatment Plant property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
SpringfieldT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
SwarthmoreB-1	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.	+	+	+	+	N	+	+	N	+	+	8 (+) 2 (N) 0 (-)
SwarthmoreB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
ThornburyT-1	Discuss and assess with the property owner the topography around the Home Depot Store #4121 property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)

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ThornburyT-2	Assess the property of the Bethlehem United Methodist Church to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ThornburyT-3	Assess the property of the Stonybank Community Church to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ThornburyT-4	Assess the property of the Home Depot Store #4121 to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ThornburyT-5	Assess the property of the Thornbury Historical Society to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ThornburyT-6	Assess the property of the Thornbury Twp Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
ThornburyT-7	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-1	Work with the FAA to protect the FAA PHL ALSF at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-2	Work with the FAA to protect the FAA PHL ATCT at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-3	Protect the Lester Fire Company to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-4	Work with the owners to protect the Messina Electric property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-5	Work with the owners to protect the Philadelphia Fuel Facility Inc property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-6	Work with the owners to protect the Philadelphia International Airport property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
TinicumT-7	Work with the owners to protect the PHL-CDF property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-8	Work with the owners to protect the SKC Hangar (Tenants Assoc.) property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-9	Work with the owners to protect the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-10	Protect the Tinicum Police Department to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-11	Protect the Tinicum Public Library to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-12	Protect the Tinicum Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-13	Protect the Tinicum Twp Water Storage Facility to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-14	Work with the owners to protect the UNITED AIRLINES-PHL property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-15	Work with the owners to protect the Western Fumigation (B-2) property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-16	Discuss with the owners of the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property their risk and vulnerability to levee failure and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-17	Discuss with the owners the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-18	Discuss with the owners the geology at the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
TinicumT-19	Discuss with the owners the geology at the UNITED AIRLINES-PHL property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
TinicumT-20	Assess the property of the Tinicum Township Fire Company to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
TinicumT-21	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-1*	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.	+	+	+	+	N	+	+	N	+	N	7 (+) 3 (N) 0 (-)
TrainerB-2*	Work with the owners to protect the Monroe Energy, LLC property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-3*	Work with the owners to protect the PECO - Trainer Substation property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-4*	Protect the Trainer Police Department property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-5*	Protect the Trainer Oil Refinery Sub Station property to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-6	Assess the Trainer Oil Refinery Sub Station property their risk and vulnerability to levee failure and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-7	Discuss with the owners of the PECO - Trainer Substation property their risk and vulnerability to levee failure and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
TrainerB-8	Assess the property of the Trainer Fire Company to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
TrainerB-9	Assess the property of the Conoco Phillips Fire and Rescue to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
TrainerB-10	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UplandB-1	Protect the Caleb Pusey House to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UplandB-2	Protect the Landingford Plantation to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UplandB-3	Discuss and assess with the property owner the topography around the Upland Fire Company property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
UplandB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UplandB-5	Upgrade the Kerlin Street Bridge in Upland Borough to allow more water to flow under it.	+	+	+	+	+	+	+	+	+	N	9 (+) 1 (N) 0 (-)
UplandB-6	Evaluate and repair undermining of Upland Avenue near the Kerlin Street Bridge in Upland Borough.	+	+	+	+	+	+	+	+	+	N	9 (+) 1 (N) 0 (-)
UplandB-7	Evaluate and upgrade the Maris Run culvert under 4th Street.	+	+	+	+	+	+	+	N	+	N	8 (+) 2 (N) 0 (-)
UpperChichesterT-1	Work with PennDOT to mitigate flooding on I-95 at PA-452 (Exit 2)	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperChichesterT-2	Assess the need to repair or replace the culvert along Spring Run under Larkin Road that is experiencing flooding.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperChichesterT-3	Assess the need to repair or replace the culvert along East Branch of Naaman Creek under Larkin Road that is experience flooding.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperChichesterT-4	Discuss with the owners of the Gehr Plastics Inc. property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
UpperChichesterT-5	Discuss and assess with the property owner the topography around the Verizon CHESTER HEIGHTS CO property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
UpperChichesterT-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-1	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.	+	+	-	+	N	+	+	-	+	+	7 (+) 1 (N) 2 (-)
UpperDarbyT-2	Conduct flood level monitoring along Naylor's Run Creek.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
UpperDarbyT-3	Continue planning of dispersement locations as part of Disaster Relief Drug Distribution Program.	+	+	+	+	N	N	+	N	+	+	7 (+) 3 (N) 0 (-)
UpperDarbyT-4	Discuss with the owners of the Idle Hour Tennis Club property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-5	Assess the need to repair or replace the Naylors Run culvert	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-6	Discuss with the owners of the PECO Marshall Rd Sub Station property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-7	Discuss with the owners of the PECO - Upper Darby Substation property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-8	Discuss with the owners of the Speedway 6806 property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-9	Discuss with the owners of the Swedish Cabin property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-10	Discuss and assess with the Upper Darby School District the topography around the Charles Kelly Elementary School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
UpperDarbyT-11	Discuss and assess with the property owner the topography around the PECO MARSHALL RD SUB STATION property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
UpperDarbyT-12	Discuss and assess with the property owner the topography around the SEPTA VICTORY SHOP property to determine if mitigation measures are necessary, and how to implement those measures if they are.	+	+	+	+	+	N	N	N	N	+	6 (+) 4 (N) 0 (-)
UpperDarbyT-13	Assess the property of the Upper Darby Historical Society to determine the risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperDarbyT-14	Discuss and assess with property owners of the Speedway 6806 their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperDarbyT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperDarbyT-16	Conduct flood study along Nailors Run.	+	+	+	+	+	+	N	+	+	+	9 (+) 1 (N) 0 (-)
UpperProvidenceT-1	Explore projects to mitigate washout of Farnum Road from flooding.	+	+	+	+	N	+	+	-	+	+	8 (+) 1 (N) 1 (-)
UpperProvidenceT-2	Discuss with PennDOT flooding concerns at Crum Creek Road off of State Road at the US-1-overpass and possible protective actions.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
UpperProvidenceT-3	Discuss with the property owners of the Rose Tree Early Learning Center the geology of the property to determine if mitigation measures are necessary, and how to implement them if they are.	+	+	+	+	+	+	N	N	N	+	8 (+) 2 (N) 0 (-)
UpperProvidenceT-4	Discuss and assess with property owners of the Benchmark School their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-5	Assess property with District Court 32-2-46 and determine its risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-6	Discuss and assess with property owners of the Reformation Lutheran Church their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
UpperProvidenceT-7	Discuss and assess with property owners of the RMH-HB/SNF nursing home their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-8	Discuss and assess with property owners of the Rose Tree Early Learning Center their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-9	Discuss and assess with property owners of the Rose Tree Elementary School their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-10	Discuss and assess with property owners of the Rose Tree Fire Company their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-11	Assess with Upper Providence Police Department property and determine its risk from wildfires and vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-12	Discuss and assess with property owners of the Walden School their risk from wildfires and determine vegetation to be cleared.	+	+	+	+	+	+	+	N	N	N	7 (+) 3 (N) 0 (-)
UpperProvidenceT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
YeadonB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
YeadonB-2	Conduct Flood Study along Cobbs Creek	+	+	+	+	+	+	N	+	+	+	9 (+) 1 (N) 0 (-)
Brandywine-1	Protect the Brandywine Conservancy & Environmental Management Center to at least the 0.2 percent annual chance flood level.	+	+	+	+	N	+	+	N	N	+	8 (+) 2 (N) 0 (-)
Brandywine-2	Develop Brandywine Conservancy & Museum of Art flood study and determine all streams and tributaries with flow regimes that contribute to flood major flood events; evaluate the study areas soils, climate, population, land use, water quality, natural areas, and cultural resources; evaluate the historical and present flooding; and develop a hydrological model using the US Army Corps of Engineers HEC-	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (N) 0 (-)

Initiative	Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	RAS program. Using study area data, begin site selection and assessment for improvements to the study area to mitigation flooding.											

* Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.

6.4.3 Prioritization of Mitigation Actions

Actions that are deemed feasible (i.e., receive a positive evaluation score) were then compared and prioritized using another set of criteria (PEMA 2020):

- Effectiveness (20% of score) – The extent to which an action reduces the vulnerability of people and property.
- Efficiency (30% of score) – The extent to which time, effort, and cost is well used as a means of reducing vulnerability. This criterion assesses the benefits of an action versus the cost of the action's implementation.
- Multi-Hazard Mitigation (20% of score) – The action reduces vulnerability for more than one hazard.
- Addresses High-Risk Hazard (15% of score) – The action reduces vulnerability for people and property from a hazard(s) identified as high-risk.
- Addresses Critical Communications/Critical Infrastructure (15% of score) – The action pertains to the maintenance of critical functions and structures such as transportation, supply chain management, data circuits, etc.

Scores in each criterion range from 0 to 3. The action's priority is determined by using a formula based on the criteria values and weights. Priority values range from 0 to 3 as well. An action's priority is then determined using the following scale (PEMA 2020):

- Low priority = 0 – 1.8
- Medium priority = 1.9 – 2.4
- High priority = 2.5 – 3

Table 6-6 shows the prioritization scores for the identified, feasible mitigation actions. Municipal officials reviewed and updated the prioritization values based on local needs.

Table 6-6. Prioritization Scoring of Mitigation Actions

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
DelawareC-1	Assess means to prevent future storage of hazardous materials in floodplains.	2	2	1	2	2	Low
DelawareC-2	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	2	2	2	3	3	Medium
DelawareC-3	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.	2	3	3	1	1	Medium
DelawareC-4	Develop multi-use trails that can serve evacuation routes in the event of an emergency.	3	3	2	2	1	Medium
DelawareC-5	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.	2	2	3	2	1	Medium
DelawareC-6	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.	2	2	1	2	2	Low
DelawareC-7	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.	2	3	1	2	1	Medium
DelawareC-8	Evaluate at the municipal level the suitability of the Community Rating System (CRS) for insurance premium reduction (and flood damage reduction).	2	2	2	2	2	Medium
DelawareC-9	Explore opportunities to improve poor broadband infrastructure throughout the county for increased remote work and learning.	2	2	2	2	3	Medium
DelawareC-10	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.	2	2	2	3	3	Medium
DelawareC-11	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).	3	3	2	3	3	High
DelawareC-12	Identify and publicize success stories as part of an overall consistent public relations program.	2	2	2	3	3	Medium
DelawareC-13	Identify areas where healthcare facilities closures have impacted communities and explore mitigation solutions.	2	2	2	2	3	Medium
DelawareC-14	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.	3	3	1	3	3	High
DelawareC-15	Increase resident awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods can include public outreach (i.e., website, mailings, workshops, media coverage) and education.	3	3	3	2	1	High
DelawareC-16	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems	3	2	3	2	3	High
DelawareC-17	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.	2	2	3	2	2	Medium
DelawareC-18	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.	2	2	3	2	2	Medium

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
DelawareC-19	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.	2	2	3	2	2	Medium
DelawareC-20	Review County EOP to ensure emergency operations are equipped and prepared for logistical needs during a pandemic response event.	3	3	1	3	3	High
DelawareC-21	Update and complete inventory of domestic wells located in Delaware County.	2	2	1	3	3	Medium
DelawareC-22	Upgrade backup power resources as necessary at critical facilities.	2	2	1	3	2	Medium
DelawareC-23	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.	3	3	1	3	3	High
DelawareC-24	Work with municipal officials to increase awareness among property owners to clear debris from waterways and drainage infrastructure.	3	3	1	3	3	High
DelawareC-25	Work with municipal officials to increase awareness among property owners, including informational mailings to property owners in the 1 percent annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Improving property elevation, dry flood proofing, and wet flood-proofing.	3	3	1	3	3	High
DelawareC-26	Work with PEMA and FEMA to hold a municipal CRS workshop.	2	2	2	2	2	Medium
DelawareC-27	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
DelawareC-28	Acquire, elevate, flood-proof, or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	3	3	1	3	3	High
DelawareC-29	Conduct a training class for first responders for a leak on pipelines transporting HVLs.	3	3	2	3	3	High
DelawareC-30	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.	2	2	2	2	2	Medium
DelawareC-31	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.	2	2	3	3	3	High
DelawareC-32	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).	2	2	3	3	2	Medium
DelawareC-33	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.	2	3	1	3	3	Medium
DelawareC-34	Develop and implement a radon exposure prevention program.	2	2	1	3	1	Low
DelawareC-35	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.	3	3	1	3	3	High
DelawareC-36	Update municipal zoning code to strengthen it to promote disaster-resistant development.	2	2	3	2	2	Medium
DelawareC-37	Protect the Delaware County Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
DelawareC-38	Implement the Delaware County Regional Water Quality Control Authority (DELCORA) wastewater management tunnel project from Chester to Ridley.	3	3	2	2	3	High
DelawareC-39	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.	2	2	1	3	3	Medium
DelawareC-40	Work with the US Army Reserve Base Sewer Treatment Plant to assess the property to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
DelawareC-41	Work with the FAA to discuss the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
DelawareC-42	Work with Amtrak and PennDOT on cleaning up debris in streams and along the PA-420 bridge.	3	3	1	3	2	Medium
DelawareC-43	Assess the District Court 32-2-46 property to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
DelawareC-44	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.	3	3	1	3	3	High
DelawareC-45	Clean up debris in streams and along stream banks and bridges in municipality.	3	3	1	3	2	Medium
DelawareC-46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.	3	3	1	3	3	High
DelawareC-47	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding.	3	3	1	3	3	High
DelawareC-48	Conduct Flood Study of Lower Chester Creek.	3	3	1	3	3	High
DelawareC-49	Explore opportunities to mitigate flooding and drainage problems in the municipality.	3	3	1	3	3	High
DelawareC-50	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.	3	3	1	3	3	High
DelawareC-51	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.	3	3	1	3	3	High
DelawareC-52	Create a logistical facility to coordinate logistics during public health emergencies.	3	2	3	3	3	Medium
DelawareC-53	Create a new Delaware County Emergency Operations Center (EOC).	3	3	1	3	2	High
DelawareC-54	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.	3	3	1	3	2	Medium
AldanB-1	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
AshtonT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
AshtonT-2	Protect the Ashton Beechwood Fire Company to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
AstonT-1	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.	3	3	1	3	3	High
BethelT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
BethelT-2	Work with pipeline owners to make pipeline information accessible online	3	3	1	3	3	High
BethelT-3	Review previous flood occurrences and identify mitigation solutions	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
BrookhavenB-1	Protect the Brookhaven Treatment Plant to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
BrookhavenB-2	Assess the geology at the Brookhaven Treatment Plant property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
BrookhavenB-3	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
BrookhavenB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ChaddsFordT-1	Protect the Christian C. Sanderson Museum to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChaddsFordT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ChaddsFordT-3	Assess the property of the Calvary Chapel of Delaware County to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChaddsFordT-4	Assess the property of the Christian C. Sanderson Museum to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChaddsFordT-5	Assess the property of the Ridings Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChaddsFordT-6	Assess the property of the Saint Cornelius School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-1	Protect the Anthem Propane to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-2	Protect the Apple Pie Christian Academy to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-3	Protect the Evonik Corporation to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-4	Protect the Exelon Chester Generating Station to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-5	Protect the Kimberly Clark PA LLC to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-6	Protect the PECO Front St Sub Station to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-7	Protect the PQ Corporation Chester to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-8	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ChesterC-9	Assess the topography around the Exelon Lamokin Electric Substation to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
ChesterC-10	Assess the topography around the Widener University- Schwartz Century to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
ChesterC-11	Determine the vulnerability of Chester High School to levee failure and determine appropriate mitigation measures.	2	2	1	2	2	Low
ChesterC-12	Assess the topography around the Evonik Corporation to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High

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ChesterC-13	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
ChesterC-14	Assess the property of the Center for Self-Development to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-15	Assess the property of the Felton Fire Company to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-16	Assess the property of the NORQUAY, LLC to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-17	Assess the property of the PECO - Tilghman Street Gas Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-18	Assess the property of the Saint Daniels U.M. Church to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-19	Assess the property of the William Penn Landing Site to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ChesterC-20	Assess and determine the best action to prevent flooding of roadways near Ridley Creek. The area east of Route 13/Morton Ave and north of 4th Street is particularly susceptible to flooding.	3	3	1	3	3	High
ChesterC-21	Assess and determine the best action to prevent flooding of roadways near 14th St. & Kerlin St.	3	3	1	3	3	High
ChesterC-22	Assess and determine the best action to prevent flooding of roadways near the neighborhood of Parker Manor.	3	3	1	3	3	High
ChesterC-23	Assess and determine the best action to prevent flooding of roadways near the 300-block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291.	3	3	1	3	3	High
ChesterC-24	Assess and determine the best action to prevent flooding of freight rail line serving the waterfront industries.	3	3	1	3	3	High
ChesterC-25	Assess stormwater management infrastructure at the Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant to determine what improvements need to be made, then implement the improvements.	3	3	1	3	3	High
ChesterC-26	Assess and determine the best action to mitigate future sea level rise and intense droughts that will cause the saltwater line to extend upstream from the Delaware Bay beyond Chester. Further investigation is needed to determine the future threat to Chester City industries with Delaware River water intakes.	3	3	1	3	3	High
ChesterC-27	Protect the Chester City's Department of Streets and Public Improvement garage to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-28	Protect the Chester City prison to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ChesterC-29	Study the City of Chester's levee system, from 13th Street to 9th Street, along 14th Street parallel with Parker Street, and at the high school at 10th Street, just east of Parker Street.	2	2	1	2	2	Low
ChesterHeightsB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High

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ChesterHeightsB-2	Discuss with the property owners located within the flood zone to keep property clear of material	2	2	1	3	1	Low
ChesterT-1	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.	3	3	1	3	3	High
ChesterT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
CliftonHeightsB-1	Protect the LifeWorks School to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
CliftonHeightsB-2	Assess the topography around the LifeWorks School to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
CliftonHeightsB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
CollingdaleB-1	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.	2	2	1	2	2	Low
CollingdaleB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ColwynB-1	Reduce urban fire hazard in Colwyn Borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.	3	2	1	2	2	Medium
ColwynB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ColwynB-3*	Conduct Flood Study at the confluence of Darby Creek and Cobbs Creek.	3	3	1	3	3	High
ColwynB-4*	Purchase a backup generator for the police station.	3	3	3	3	3	High
ConcordT-1	Protect the Concord Twp Sewage Treatment Plant 1 to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ConcordT-2	Protect the Fox Valley Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ConcordT-3	Assess the topography around the Refresco Beverages US INC to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
ConcordT-4	Assess the property of the Aardvark Child Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-5	Assess the property of the Brandywine Youth Club to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-6	Assess the property of the Concord Elementary School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-7	Assess the property of the Concord Township Historical Commission to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-8	Assess the property of the Concord Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium

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ConcordT-9	Assess the property of the Concord Twp Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-10	Assess the property of the Fox Valley Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-11	Assess the property of the Garnet Valley Elementary School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-12	Assess the property of the Garnet Valley Middle School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-13	Assess the property of the KinderCare Learning Center to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-14	Assess the property of the Refresco Beverages Us Inc to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ConcordT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
DarbyB-1	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.	3	3	1	3	3	High
DarbyB-2	Discuss with owners of AT&T to protect their property to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
DarbyB-3	Assess the topography around the AT&T property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
DarbyB-4	Assess the topography around the Darby Borough Recreation Center to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
DarbyB-5	Assess the topography around the Park Lane Elementary School to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
DarbyB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
DarbyB-7	Conduct flood study along Darby Creek.	3	3	1	3	3	High
DarbyB-8	Conduct flood study along Cobbs Creek.	3	3	1	3	3	High
DarbyT-1	Protect the Darby Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
DarbyT-2	Protect the Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
DarbyT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
EastLansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
EddystoneB-1	Protect the PECO 7TH ST SUB STATION to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High

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EddystoneB-2	Assess the topography around the PECO - Baldwin Service Building property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
EddystoneB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
EdgemontT-1	Assess the property of the Edgemont Fire Company to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-2	Assess the property of the Edgmont Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-3	Assess the property of the Edgemont USARC to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-4	Assess the property of the El Buen Samaritano Church to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-5	Assess the property of the Health Care Ctr at White Horse Village to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-6	Assess the property of the Neumann University to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-7	Assess the property of the PECO Graddyville Rd Sub Station to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-8	Assess the property of the Runnymeade Farms Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-9	Assess the property of the Runnymeade Farms Sewage Treatment Plant 2 to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-10	Assess the property of the Runnymeade Farms Sewage Treatment Plant 4 to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-11	Assess the property of the US Army Reserve Base Sewer Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-12	Assess the property of the Whitehorse Village Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
EdgemontT-13	Assess the topography around the Colonial Pennsylvania Plantation property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
EdgemontT-14	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
FolcroftB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
GlenoldenB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High

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GlenoldenB-2*	Purchase a backup generator for the police station.	3	3	3	3	3	High
HaverfordT-1	Assess and determine the best action to prevent flooding of roadways near the apartment complex along the Darby Creek at West Chester Pike and Lawrence Road	3	3	1	3	3	High
HaverfordT-2	Assess the topography around the Haverford Township Administration Build property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
HaverfordT-3	Assess the property of the Haverford Twp Community Center to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
HaverfordT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
HaverfordT-5	Develop Flood Mitigation Study for Wynnefield Drive (Cobbs Creek)	3	3	1	3	3	High
HaverfordT-6	Discuss and assess with property owner in the flood zone about possible mitigation solutions including elevations and acquisitions	3	3	1	3	3	High
LansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
LowerChichesterT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
MarcusHookB-1	Protect the Marcus Hook Community Center to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
MarcusHookB-2	Protect the Marcus Hook Energy Center to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
MarcusHookB-3	Protect the Sun Oil Fire Brigader to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
MarcusHookB-4	Protect the Sunoco LLC - Race Fuels to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
MarcusHookB-5	Protect the Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
MarcusHookB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
MarpleT-1	Assess the topography around the Broomall Rehabilitation and Nursing Center property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
MarpleT-2	Assess the property of the Broomall Presbyterian Village to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MarpleT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
MediaB-1	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.	3	3	1	3	3	High
MediaB-2	Assess the property of the Blue Route Vineyard Community Church to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium

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MediaB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
MiddletownT-1	Assess the property of the Children's Academy to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-2	Assess the property of the Easter Seals of Southeastern Pa to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-3	Assess the property of the Fair Acres Geriatric Center to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-4	Assess the property of the Glenwood Elementary School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-5	Assess the property of the Hanson Aggregates PA LLC to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-6	Assess the property of the Hunter Street Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-7	Assess the property of the Rocky Run Fire Company to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-8	Assess the property of the Middletown Free Library to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-9	Assess the property of the Middletown Montessori School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-10	Assess the property of the Middletown Municipal Building to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-12	Assess the property of the Middletown Township Historical Society to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-13	Assess the property of the Middletown Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-14	Assess the property of the Monticello House to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-15	Assess the property of the Oakbridge Terrace at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-16	Assess the property of the PECO Middletown Rd Sub Station 1 to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-17	Assess the property of the Riddle Hospital to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-18	Assess the property of the Riddle Memorial Hospital to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium

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MiddletownT-19	Assess the property of the Riddle Memorial Hospital-Based SNF to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-20	Assess the property of the Simon Youth Academy to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-21	Assess the property of the Pennsylvania State University-Brandywine Campus to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-22	Assess the property of the Willowbrooke Court at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
MiddletownT-23	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
MillbourneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
MortonB-1	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).	3	3	1	3	3	High
MortonB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
NetherProvidence T-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
NewtownT-1	Assess the topography around the Melmark School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
NewtownT-2	Assess the property of the Garretts Way Day Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-3	Assess the property of the Malvern School of Newtown Square to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-4	Assess the property of the Newtown Square Penn Railroad Museum to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-5	Assess the property of the Newtown Twp. Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-6	Assess the property of the SAP AMERICA INC to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-7	Assess the property of the Square Tavern to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-8	Assess the property of the WRNB Radio Tower to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
NewtownT-9	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
NewtownT-10	Develop and maintain local Stormwater Management Plan	3	3	1	3	3	High
NewtownT-11	Develop and maintain local Emergency Evacuation Plan	3	3	1	3	3	High
NewtownT-11	Explore opportunities to improve pedestrian safety at the intersection of Terazzo Rd. to Chapel Rd.	3	3	1	3	3	High
NorwoodB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ParksideB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
ProspectParkB-1	Protect the Concord Township Sewer Department to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
ProspectParkB-2	Assess the geology at the Morton Homestead property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
ProspectParkB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
RadnorT-1	Protect the Main Line Montessori to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
RadnorT-2	Assess the topography around the Radnor Police Department property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
RadnorT-3	Assess the property of the WYBF Radio Tower to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
RadnorT-4	Assess the property of the Saint David's Episcopal Day School to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
RadnorT-5	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
RidleyParkB-1	Dredge silt from Ridley Park Lake.	3	3	1	3	3	High
RidleyParkB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
RidleyParkB-3	Upgrade the Ward Street bridge to allow heavier traffic to travel on the road.	3	2	1	2	3	Medium
RidleyT-1	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.	2	2	1	2	2	Low
RidleyT-2	Protect the Boeing Fire Brigade to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
RidleyT-3	Protect the Boeing - Philadelphia property to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	3	3	1	3	3	High
RidleyT-4	Protect the Eddystone Generating Station to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	3	3	1	3	3	High
RidleyT-5	Protect the Eddystone Marine and Rail Terminal Company L.L.C to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	3	3	1	3	3	High
RidleyT-6	Protect the Sellers Ave. Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
RidleyT-7	Protect the Sure Power Philadelphia structure to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
RidleyT-8	Protect the Water's Edge (Old Rookies River Rm) to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
RidleyT-9	Assess the geology at the Boeing - Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
RidleyT-10	Assess the geology at the Eddystone Generating Station property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
RidleyT-11	Assess the geology at the Eddystone Marine and Rail Terminal Company L.L.C property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
RidleyT-12	Assess the geology at the Sure Power Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
RidleyT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
RoseValleyB-1*	Protect the Old Mill Polling Site to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
RoseValleyB-2	Assess the property of the School in Rose Valley to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
RoseValleyB-3	Assess the property of the Rose Valley Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
RoseValleyB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
RutledgeB-1	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.	3	3	3	3	3	High
RutledgeB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
SharonHillB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
SpringfieldT-1	Assess and determine the best action to prevent flooding of roadways from the Darby Creek, particularly West Rolling Road and Doe Run Lane are susceptible to flooding.	3	3	1	3	3	High
SpringfieldT-2	Protect the Littler Friends Child Care to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
SpringfieldT-3	Assess the topography around the Aqua Pa - Crum Creek Water Treatment Plant property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
SpringfieldT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
SwarthmoreB-1	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.	3	3	1	3	3	High
SwarthmoreB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
ThornburyT-1	Discuss and assess with the property owner the topography around the Home Depot Store #4121 property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
ThornburyT-2	Assess the property of the Bethlehem United Methodist Church to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ThornburyT-3	Assess the property of the Stonybank Community Church to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ThornburyT-4	Assess the property of the Home Depot Store #4121 to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ThornburyT-5	Assess the property of the Thornbury Historical Society to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ThornburyT-6	Assess the property of the Thornbury Twp Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
ThornburyT-7	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
TinicumT-1	Work with the FAA to protect the FAA PHL ALSF at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-2	Work with the FAA to protect the FAA PHL ATCT at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-3	Protect the Lester Fire Company to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-4	Work with the owners to protect the Messina Electric property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-5	Work with the owners to protect the Philadelphia Fuel Facility Inc property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-6	Work with the owners to protect the Philadelphia International Airport property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-7	Work with the owners to protect the PHL-CDF property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-8	Work with the owners to protect the SKC Hangar (Tenants Assoc.) property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-9	Work with the owners to protect the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-10	Protect the Tinicum Police Department to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-11	Protect the Tinicum Public Library to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-12	Protect the Tinicum Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-13	Protect the Tinicum Twp Water Storage Facility to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-14	Work with the owners to protect the UNITED AIRLINES-PHL property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
TinicumT-15	Work with the owners to protect the Western Fumigation (B-2) property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TinicumT-16	Discuss with the owners of the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property their risk and vulnerability to levee failure and possible protective measures.	3	3	1	3	3	High
TinicumT-17	Discuss with the owners the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
TinicumT-18	Discuss with the owners the geology at the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
TinicumT-19	Discuss with the owners the geology at the UNITED AIRLINES-PHL property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
TinicumT-20	Assess the property of the Tinicum Township Fire Company to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
TinicumT-21	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
TrainerB-1*	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.	3	3	1	3	3	High
TrainerB-2*	Work with the owners to protect the Monroe Energy, LLC property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TrainerB-3*	Work with the owners to protect the PECO - Trainer Substation property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TrainerB-4*	Protect the Trainer Police Department property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TrainerB-5*	Protect the Trainer Oil Refinery Sub Station property to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
TrainerB-6	Assess the Trainer Oil Refinery Sub Station property their risk and vulnerability to levee failure and possible protective measures.	3	3	1	3	3	High
TrainerB-7	Discuss with the owners of the PECO - Trainer Substation property their risk and vulnerability to levee failure and possible protective measures.	3	3	1	3	3	High
TrainerB-8	Assess the property of the Trainer Fire Company to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
TrainerB-9	Assess the property of the Conoco Phillips Fire and Rescue to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
TrainerB-10	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
UplandB-1	Protect the Caleb Pusey House to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UplandB-2	Protect the Landingford Plantation to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UplandB-3	Discuss and assess with the property owner the topography around the Upland Fire Company property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
UplandB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
UplandB-5	Upgrade the Kerlin Street Bridge in Upland Borough to allow more water to flow under it.	3	3	1	3	3	High
UplandB-6	Evaluate and repair undermining of Upland Avenue near the Kerlin Street Bridge in Upland Borough.	3	3	1	3	3	High
UplandB-7	Evaluate and upgrade the Maris Run culvert under 4th Street.	2	2	1	3	3	Medium
UpperChichesterT-1	Work with PennDOT to mitigate flooding on I-95 at PA-452 (Exit 2)	3	3	1	3	3	High
UpperChichesterT-2	Assess the need to repair or replace the culvert along Spring Run under Larkin Road that is experiencing flooding.	3	3	1	3	3	High
UpperChichesterT-3	Assess the need to repair or replace the culvert along East Branch of Naaman Creek under Larkin Road that is experience flooding.	3	3	1	3	3	High
UpperChichesterT-4	Discuss with the owners of the Gehr Plastics Inc. property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UpperChichesterT-5	Discuss and assess with the property owner the topography around the Verizon CHESTER HEIGHTS CO property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
UpperChichesterT-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
UpperDarbyT-1	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.	3	3	1	3	3	High
UpperDarbyT-2	Conduct flood level monitoring along Naylor's Run Creek.	3	3	1	3	3	High
UpperDarbyT-3	Continue planning of dispersement locations as part of Disaster Relief Drug Distribution Program.	2	2	1	2	1	Low
UpperDarbyT-4	Discuss with the owners of the Idle Hour Tennis Club property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UpperDarbyT-5	Assess the need to repair or replace the Naylors Run culvert	3	3	1	3	3	High
UpperDarbyT-6	Discuss with the owners of the PECO Marshall Rd Sub Station property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UpperDarbyT-7	Discuss with the owners of the PECO - Upper Darby Substation property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UpperDarbyT-8	Discuss with the owners of the Speedway 6806 property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UpperDarbyT-9	Discuss with the owners of the Swedish Cabin property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	3	3	1	3	3	High
UpperDarbyT-10	Discuss and assess with the Upper Darby School District the topography around the Charles Kelly Elementary School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
UpperDarbyT-11	Discuss and assess with the property owner the topography around the PECO MARSHALL RD SUB STATION property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
UpperDarbyT-12	Discuss and assess with the property owner the topography around the SEPTA VICTORY SHOP property to determine if mitigation measures are necessary, and how to implement those measures if they are.	3	3	1	3	3	High
UpperDarbyT-13	Assess the property of the Upper Darby Historical Society to determine the risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
UpperDarbyT-14	Discuss and assess with property owners of the Speedway 6806 their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperDarbyT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
UpperDarbyT-16	Conduct flood study along Nailors Run.	3	3	1	3	3	High
UpperProvidenceT-1	Explore projects to mitigate washout of Farnum Road from flooding.	3	3	1	3	3	High
UpperProvidenceT-2	Discuss with PennDOT flooding concerns at Crum Creek Road off of State Road at the US-1-overpass and possible protective actions.	3	3	1	3	3	High
UpperProvidenceT-3	Discuss with the property owners of the Rose Tree Early Learning Center the geology of the property to determine if mitigation measures are necessary, and how to implement them if they are.	2	3	2	3	1	Medium
UpperProvidenceT-4	Discuss and assess with property owners of the Benchmark School their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-5	Assess property with District Court 32-2-46 and determine its risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-6	Discuss and assess with property owners of the Reformation Lutheran Church their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-7	Discuss and assess with property owners of the RMH-HB/SNF nursing home their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-8	Discuss and assess with property owners of the Rose Tree Early Learning Center their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-9	Discuss and assess with property owners of the Rose Tree Elementary School their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-10	Discuss and assess with property owners of the Rose Tree Fire Company their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-11	Assess with Upper Providence Police Department property and determine its risk from wildfires and vegetation to be cleared.	2	2	1	3	2	Medium
UpperProvidenceT-12	Discuss and assess with property owners of the Walden School their risk from wildfires and determine vegetation to be cleared.	2	2	1	3	2	Medium

Initiative	Mitigation Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High-Risk Hazard	Addresses Critical Communications/ Critical Infrastructure	Priority
UpperProvidenceT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
YeadonB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	3	3	1	3	3	High
YeadonB-2	Conduct Flood Study along Cobbs Creek	3	3	1	3	3	High
Brandywine-1	Protect the Brandywine Conservancy & Environmental Management Center to at least the 0.2 percent annual chance flood level.	3	3	1	3	3	High
Brandywine-2	Develop Brandywine Conservancy & Museum of Art flood study and determine all streams and tributaries with flow regimes that contribute to flood major flood events; evaluate the study areas soils, climate, population, land use, water quality, natural areas, and cultural resources; evaluate the historical and present flooding; and develop a hydrological model using the US Army Corps of Engineers HEC-RAS program. Using study area data, begin site selection and assessment for improvements to the study area to mitigation flooding.	3	3	1	1	1	Medium

* Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.

The actions in Table 6-7 are listed in order of priority, with the high priority actions first. This list of actions is the result of the planning effort led by the Planning Team and represents what the county and municipalities consider most important. Any actions, including projects, to be implemented will have benefits outweighing their associated costs (i.e., the benefit-cost ratio would be greater than 1).

A blank Mitigation Action Worksheet template is included in Appendix G. The set of completed action worksheets and a table summarizing the worksheets by jurisdiction are presented in Appendix H.

Table 6-7. Prioritized Mitigation Actions

Mitigation Action		Priority
High Priority		
DelawareC-11	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).	High
DelawareC-14	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.	High
DelawareC-15	Increase resident awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods can include public outreach (i.e., website, mailings, workshops, media coverage) and education.	High
DelawareC-16	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems	High
DelawareC-20	Review County EOP to ensure emergency operations are equipped and prepared for logistical needs during a pandemic response event.	High
DelawareC-23	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.	High
DelawareC-24	Work with municipal officials to increase awareness among property owners to clear debris from waterways and drainage infrastructure.	High
DelawareC-25	Work with municipal officials to increase awareness among property owners, including informational mailings to property owners in the 1 percent annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Improving property elevation, dry flood proofing, and wet flood-proofing.	High
DelawareC-27	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
DelawareC-28	Acquire, elevate, flood-proof, or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	High
DelawareC-29	Conduct a training class for first responders for a leak on pipelines transporting HVLs.	High
DelawareC-31	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.	High
DelawareC-35	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.	High
DelawareC-37	Protect the Delaware County Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	High
DelawareC-38	Implement the Delaware County Regional Water Quality Control Authority (DELCORA) wastewater management tunnel project from Chester to Ridley.	High
DelawareC-44	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.	High
DelawareC-46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.	High
DelawareC-47	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding.	High

Mitigation Action		Priority
DelawareC-48	Conduct Flood Study of Lower Chester Creek.	High
DelawareC-49	Explore opportunities to mitigate flooding and drainage problems in the municipality.	High
DelawareC-50	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.	High
DelawareC-51	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.	High
DelawareC-53	Create a new Delaware County Emergency Operations Center (EOC).	High
AldanB-1	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
AshtonT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
AshtonT-2	Protect the Ashton Beechwood Fire Company to at least the 0.2 percent annual chance flood level.	High
AstonT-1	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.	High
BethelT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
BethelT-2	Work with pipeline owners to make pipeline information accessible online	High
BethelT-3	Review previous flood occurrences and identify mitigation solutions	High
BrookhavenB-1	Protect the Brookhaven Treatment Plant to at least the 0.2 percent annual chance flood level.	High
BrookhavenB-3	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
BrookhavenB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ChaddsFordT-1	Protect the Christian C. Sanderson Museum to at least the 0.2 percent annual chance flood level.	High
ChaddsFordT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ChesterC-1	Protect the Anthem Propane to at least the 0.2 percent annual chance flood level.	High
ChesterC-2	Protect the Apple Pie Christian Academy to at least the 0.2 percent annual chance flood level.	High
ChesterC-3	Protect the Evonik Corporation to at least the 0.2 percent annual chance flood level.	High
ChesterC-4	Protect the Exelon Chester Generating Station to at least the 0.2 percent annual chance flood level.	High
ChesterC-5	Protect the Kimberly Clark PA LLC to at least the 0.2 percent annual chance flood level.	High
ChesterC-6	Protect the PECO Front St Sub Station to at least the 0.2 percent annual chance flood level.	High
ChesterC-7	Protect the PQ Corporation Chester to at least the 0.2 percent annual chance flood level.	High
ChesterC-8	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ChesterC-9	Assess the topography around the Exelon Lamokin Electric Substation to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
ChesterC-10	Assess the topography around the Widener University- Schwartz Century to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
ChesterC-12	Assess the topography around the Evonik Corporation to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
ChesterC-13	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.	High

Mitigation Action		Priority
ChesterC-20	Assess and determine the best action to prevent flooding of roadways near Ridley Creek. The area east of Route 13/Morton Ave and north of 4th Street is particularly susceptible to flooding.	High
ChesterC-21	Assess and determine the best action to prevent flooding of roadways near 14th St. & Kerlin St.	High
ChesterC-22	Assess and determine the best action to prevent flooding of roadways near the neighborhood of Parker Manor.	High
ChesterC-23	Assess and determine the best action to prevent flooding of roadways near the 300-block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291.	High
ChesterC-24	Assess and determine the best action to prevent flooding of freight rail line serving the waterfront industries.	High
ChesterC-25	Assess stormwater management infrastructure at the Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant to determine what improvements need to be made, then implement the improvements.	High
ChesterC-26	Assess and determine the best action to mitigate future sea level rise and intense droughts that will cause the saltwater line to extend upstream from the Delaware Bay beyond Chester. Further investigation is needed to determine the future threat to Chester City industries with Delaware River water intakes.	High
ChesterC-27	Protect the Chester City's Department of Streets and Public Improvement garage to at least the 0.2 percent annual chance flood level.	High
ChesterC-28	Protect the Chester City prison to at least the 0.2 percent annual chance flood level.	High
ChesterHeightsB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ChesterT-1	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.	High
ChesterT-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
CliftonHeightsB-1	Protect the LifeWorks School to at least the 0.2 percent annual chance flood level.	High
CliftonHeightsB-2	Assess the topography around the LifeWorks School to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
CliftonHeightsB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
CollingdaleB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ColwynB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ColwynB-3*	Conduct Flood Study at the confluence of Darby Creek and Cobbs Creek.	High
ColwynB-4*	Purchase a backup generator for the police station.	High
ConcordT-1	Protect the Concord Twp Sewage Treatment Plant 1 to at least the 0.2 percent annual chance flood level.	High
ConcordT-2	Protect the Fox Valley Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	High
ConcordT-3	Assess the topography around the Refresco Beverages US INC to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
ConcordT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
DarbyB-1	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.	High
DarbyB-2	Discuss with owners of AT&T to protect their property to at least the 0.2 percent annual chance flood level.	High
DarbyB-3	Assess the topography around the AT&T property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
DarbyB-4	Assess the topography around the Darby Borough Recreation Center to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
DarbyB-5	Assess the topography around the Park Lane Elementary School to determine if mitigation measures are necessary, and how to implement those measures if they are.	High

Mitigation Action		Priority
DarbyB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
DarbyB-7	Conduct flood study along Darby Creek.	High
DarbyB-8	Conduct flood study along Cobbs Creek.	High
DarbyT-1	Protect the Darby Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	High
DarbyT-2	Protect the Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm to at least the 0.2 percent annual chance flood level.	High
DarbyT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
EastLansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
EddystoneB-1	Protect the PECO 7TH ST SUB STATION to at least the 0.2 percent annual chance flood level.	High
EddystoneB-2	Assess the topography around the PECO - Baldwin Service Building property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
EddystoneB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
EdgemontT-13	Assess the topography around the Colonial Pennsylvania Plantation property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
EdgemontT-14	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
FolcroftB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
GlenoldenB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
GlenoldenB-2*	Purchase a backup generator for the police station.	High
HaverfordT-1	Assess and determine the best action to prevent flooding of roadways near the apartment complex along the Darby Creek at West Chester Pike and Lawrence Road	High
HaverfordT-2	Assess the topography around the Haverford Township Administration Build property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
HaverfordT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
HaverfordT-5	Develop Flood Mitigation Study for Wynnefield Drive (Cobbs Creek)	High
HaverfordT-6	Discuss and assess with property owner in the flood zone about possible mitigation solutions including elevations and acquisitions	High
LansdowneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
LowerChichesterT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
MarcusHookB-1	Protect the Marcus Hook Community Center to at least the 0.2 percent annual chance flood level.	High
MarcusHookB-2	Protect the Marcus Hook Energy Center to at least the 0.2 percent annual chance flood level.	High
MarcusHookB-3	Protect the Sun Oil Fire Brigader to at least the 0.2 percent annual chance flood level.	High
MarcusHookB-4	Protect the Sunoco LLC - Race Fuels to at least the 0.2 percent annual chance flood level.	High
MarcusHookB-5	Protect the Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex to at least the 0.2 percent annual chance flood level.	High
MarcusHookB-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
MarpleT-1	Assess the topography around the Broomall Rehabilitation and Nursing Center property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High

Mitigation Action		Priority
MarpleT-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
MediaB-1	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.	High
MediaB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
MiddletownT-23	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
MillbourneB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
MortonB-1	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).	High
MortonB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
NetherProvidenceT-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
NewtownT-1	Assess the topography around the Melmark School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
NewtownT-9	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
NewtownT-10	Develop and maintain local Stormwater Management Plan	High
NewtownT-11	Develop and maintain local Emergency Evacuation Plan	High
NewtownT-11	Explore opportunities to improve pedestrian safety at the intersection of Terazzo Rd. to Chapel Rd.	High
NorwoodB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ParksideB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ProspectParkB-1	Protect the Concord Township Sewer Department to at least the 0.2 percent annual chance flood level.	High
ProspectParkB-3	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
RadnorT-1	Protect the Main Line Montessori to at least the 0.2 percent annual chance flood level.	High
RadnorT-2	Assess the topography around the Radnor Police Department property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
RadnorT-5	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
RidleyParkB-1	Dredge silt from Ridley Park Lake.	High
RidleyParkB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
RidleyT-2	Protect the Boeing Fire Brigade to at least the 0.2 percent annual chance flood level	High
RidleyT-3	Protect the Boeing - Philadelphia property to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	High
RidleyT-4	Protect the Eddystone Generating Station to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	High
RidleyT-5	Protect the Eddystone Marine and Rail Terminal Company L.L.C to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.	High
RidleyT-6	Protect the Sellers Ave. Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.	High
RidleyT-7	Protect the Sure Power Philadelphia structure to at least the 0.2 percent annual chance flood level.	High
RidleyT-8	Protect the Water's Edge (Old Rookies River Rm) to at least the 0.2 percent annual chance flood level.	High
RidleyT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
RoseValleyB-1*	Protect the Old Mill Polling Site to at least the 0.2 percent annual chance flood level	High

Mitigation Action		Priority
RoseValleyB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
RutledgeB-1	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.	High
RutledgeB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
SharonHillB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
SpringfieldT-1	Assess and determine the best action to prevent flooding of roadways from the Darby Creek, particularly West Rolling Road and Doe Run Lane are susceptible to flooding.	High
SpringfieldT-2	Protect the Littler Friends Child Care to at least the 0.2 percent annual chance flood level	High
SpringfieldT-3	Assess the topography around the Aqua Pa - Crum Creek Water Treatment Plant property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
SpringfieldT-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
SwarthmoreB-1	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.	High
SwarthmoreB-2	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
ThornburyT-1	Discuss and assess with the property owner the topography around the Home Depot Store #4121 property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
ThornburyT-7	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
TinicumT-1	Work with the FAA to protect the FAA PHL ALSF at least the 0.2 percent annual chance flood level	High
TinicumT-2	Work with the FAA to protect the FAA PHL ATCT at least the 0.2 percent annual chance flood level	High
TinicumT-3	Protect the Lester Fire Company to at least the 0.2 percent annual chance flood level	High
TinicumT-4	Work with the owners to protect the Messina Electric property to at least the 0.2 percent annual chance flood level	High
TinicumT-5	Work with the owners to protect the Philadelphia Fuel Facility Inc property to at least the 0.2 percent annual chance flood level	High
TinicumT-6	Work with the owners to protect the Philadelphia International Airport property to at least the 0.2 percent annual chance flood level	High
TinicumT-7	Work with the owners to protect the PHL-CDF property to at least the 0.2 percent annual chance flood level	High
TinicumT-8	Work with the owners to protect the SKC Hangar (Tenants Assoc.) property to at least the 0.2 percent annual chance flood level	High
TinicumT-9	Work with the owners to protect the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to at least the 0.2 percent annual chance flood level	High
TinicumT-10	Protect the Tinicum Police Department to at least the 0.2 percent annual chance flood level	High
TinicumT-11	Protect the Tinicum Public Library to at least the 0.2 percent annual chance flood level	High
TinicumT-12	Protect the Tinicum Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level	High
TinicumT-13	Protect the Tinicum Twp Water Storage Facility to at least the 0.2 percent annual chance flood level	High
TinicumT-14	Work with the owners to protect the UNITED AIRLINES-PHL property to at least the 0.2 percent annual chance flood level	High
TinicumT-15	Work with the owners to protect the Western Fumigation (B-2) property to at least the 0.2 percent annual chance flood level	High
TinicumT-16	Discuss with the owners of the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property their risk and vulnerability to levee failure and possible protective measures.	High
TinicumT-21	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High

Mitigation Action		Priority
TrainerB-1*	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.	High
TrainerB-2*	Work with the owners to protect the Monroe Energy, LLC property to at least the 0.2 percent annual chance flood level	High
TrainerB-3*	Work with the owners to protect the PECO - Trainer Substation property to at least the 0.2 percent annual chance flood level	High
TrainerB-4*	Protect the Trainer Police Department property to at least the 0.2 percent annual chance flood level	High
TrainerB-5*	Protect the Trainer Oil Refinery Sub Station property to at least the 0.2 percent annual chance flood level	High
TrainerB-6	Assess the Trainer Oil Refinery Sub Station property their risk and vulnerability to levee failure and possible protective measures.	High
TrainerB-7	Discuss with the owners of the PECO - Trainer Substation property their risk and vulnerability to levee failure and possible protective measures.	High
TrainerB-10	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
UplandB-1	Protect the Caleb Pusey House to at least the 0.2 percent annual chance flood level	High
UplandB-2	Protect the Landingford Plantation to at least the 0.2 percent annual chance flood level	High
UplandB-3	Discuss and assess with the property owner the topography around the Upland Fire Company property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
UplandB-4	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
UplandB-5	Upgrade the Kerlin Street Bridge in Upland Borough to allow more water to flow under it.	High
UplandB-6	Evaluate and repair undermining of Upland Avenue near the Kerlin Street Bridge in Upland Borough.	High
UpperChichesterT-1	Work with PennDOT to mitigate flooding on I-95 at PA-452 (Exit 2)	High
UpperChichesterT-2	Assess the need to repair or replace the culvert along Spring Run under Larkin Road that is experiencing flooding.	High
UpperChichesterT-3	Assess the need to repair or replace the culvert along East Branch of Naaman Creek under Larkin Road that is experience flooding.	High
UpperChichesterT-4	Discuss with the owners of the Gehr Plastics Inc. property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	High
UpperChichesterT-5	Discuss and assess with the property owner the topography around the Verizon CHESTER HEIGHTS CO property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
UpperChichesterT-6	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
UpperDarbyT-1	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.	High
UpperDarbyT-2	Conduct flood level monitoring along Naylor's Run Creek.	High
UpperDarbyT-4	Discuss with the owners of the Idle Hour Tennis Club property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	High
UpperDarbyT-5	Assess the need to repair or replace the Naylors Run culvert	High
UpperDarbyT-6	Discuss with the owners of the PECO Marshall Rd Sub Station property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	High
UpperDarbyT-7	Discuss with the owners of the PECO - Upper Darby Substation property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	High
UpperDarbyT-8	Discuss with the owners of the Speedway 6806 property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	High

Mitigation Action		Priority
UpperDarbyT-9	Discuss with the owners of the Swedish Cabin property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level	High
UpperDarbyT-10	Discuss and assess with the Upper Darby School District the topography around the Charles Kelly Elementary School property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
UpperDarbyT-11	Discuss and assess with the property owner the topography around the PECO MARSHALL RD SUB STATION property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
UpperDarbyT-12	Discuss and assess with the property owner the topography around the SEPTA VICTORY SHOP property to determine if mitigation measures are necessary, and how to implement those measures if they are.	High
UpperDarbyT-15	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
UpperDarbyT-16	Conduct flood study along Nailors Run.	High
UpperProvidenceT-1	Explore projects to mitigate washout of Farnum Road from flooding.	High
UpperProvidenceT-2	Discuss with PennDOT flooding concerns at Crum Creek Road off of State Road at the US-1-overpass and possible protective actions.	High
UpperProvidenceT-13	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
YeadonB-1	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.	High
YeadonB-2	Conduct Flood Study along Cobbs Creek	High
Brandywine-1	Protect the Brandywine Conservancy & Environmental Management Center to at least the 0.2 percent annual chance flood level.	High
Medium Priority		
DelawareC-2	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	Medium
DelawareC-3	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.	Medium
DelawareC-4	Develop multi-use trails that can serve evacuation routes in the event of an emergency.	Medium
DelawareC-5	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.	Medium
DelawareC-7	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.	Medium
DelawareC-8	Evaluate at the municipal level the suitability of the Community Rating System (CRS) for insurance premium reduction (and flood damage reduction).	Medium
DelawareC-9	Explore opportunities to improve poor broadband infrastructure throughout the county for increased remote work and learning.	Medium
DelawareC-10	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.	Medium
DelawareC-12	Identify and publicize success stories as part of an overall consistent public relations program.	Medium
DelawareC-13	Identify areas where healthcare facilities closures have impacted communities and explore mitigation solutions.	Medium
DelawareC-17	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.	Medium
DelawareC-18	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.	Medium
DelawareC-19	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.	Medium
DelawareC-21	Update and complete inventory of domestic wells located in Delaware County.	Medium
DelawareC-22	Upgrade backup power resources as necessary at critical facilities.	Medium
DelawareC-26	Work with PEMA and FEMA to hold a municipal CRS workshop.	Medium

Mitigation Action		Priority
DelawareC-30	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.	Medium
DelawareC-32	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).	Medium
DelawareC-33	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.	Medium
DelawareC-36	Update municipal zoning code to strengthen it to promote disaster-resistant development.	Medium
DelawareC-39	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.	Medium
DelawareC-40	Work with the US Army Reserve Base Sewer Treatment Plant to assess the property to determine the risk from wildfires and vegetation to be cleared.	Medium
DelawareC-41	Work with the FAA to discuss the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
DelawareC-42	Work with Amtrak and PennDOT on cleaning up debris in streams and along the PA-420 bridge.	Medium
DelawareC-43	Assess the District Court 32-2-46 property to determine the risk from wildfires and vegetation to be cleared.	Medium
DelawareC-45	Clean up debris in streams and along stream banks and bridges in municipality.	Medium
DelawareC-52	Create a logistical facility to coordinate logistics during public health emergencies.	Medium
DelawareC-54	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.	Medium
BrookhavenB-2	Assess the geology at the Brookhaven Treatment Plant property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
ChaddsFordT-3	Assess the property of the Calvary Chapel of Delaware County to determine the risk from wildfires and vegetation to be cleared.	Medium
ChaddsFordT-4	Assess the property of the Christian C. Sanderson Museum to determine the risk from wildfires and vegetation to be cleared.	Medium
ChaddsFordT-5	Assess the property of the Ridings Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
ChaddsFordT-6	Assess the property of the Saint Cornelius School to determine the risk from wildfires and vegetation to be cleared.	Medium
ChesterC-14	Assess the property of the Center for Self-Development to determine the risk from wildfires and vegetation to be cleared.	Medium
ChesterC-15	Assess the property of the Felton Fire Company to determine the risk from wildfires and vegetation to be cleared.	Medium
ChesterC-16	Assess the property of the NORQUAY, LLC to determine the risk from wildfires and vegetation to be cleared.	Medium
ChesterC-17	Assess the property of the PECO - Tilghman Street Gas Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
ChesterC-18	Assess the property of the Saint Daniels U.M. Church to determine the risk from wildfires and vegetation to be cleared.	Medium
ChesterC-19	Assess the property of the William Penn Landing Site to determine the risk from wildfires and vegetation to be cleared.	Medium
ColwynB-1	Reduce urban fire hazard in Colwyn Borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.	Medium
ConcordT-4	Assess the property of the Aardvark Child Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-5	Assess the property of the Brandywine Youth Club to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-6	Assess the property of the Concord Elementary School to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-7	Assess the property of the Concord Township Historical Commission to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-8	Assess the property of the Concord Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	Medium

Mitigation Action		Priority
ConcordT-9	Assess the property of the Concord Twp Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-10	Assess the property of the Fox Valley Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-11	Assess the property of the Garnet Valley Elementary School to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-12	Assess the property of the Garnet Valley Middle School to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-13	Assess the property of the KinderCare Learning Center to determine the risk from wildfires and vegetation to be cleared.	Medium
ConcordT-14	Assess the property of the Refresco Beverages Us Inc to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-1	Assess the property of the Edgemont Fire Company to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-2	Assess the property of the Edgmont Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-3	Assess the property of the Edgemont USARC to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-4	Assess the property of the El Buen Samaritano Church to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-5	Assess the property of the Health Care Ctr at White Horse Village to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-6	Assess the property of the Neumann University to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-7	Assess the property of the PECO Graddyville Rd Sub Station to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-8	Assess the property of the Runnymeade Farms Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-9	Assess the property of the Runnymeade Farms Sewage Treatment Plant 2 to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-10	Assess the property of the Runnymeade Farms Sewage Treatment Plant 4 to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-11	Assess the property of the US Army Reserve Base Sewer Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
EdgemontT-12	Assess the property of the Whitehorse Village Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
HaverfordT-3	Assess the property of the Haverford Twp Community Center to determine the risk from wildfires and vegetation to be cleared.	Medium
MarpleT-2	Assess the property of the Broomall Presbyterian Village to determine the risk from wildfires and vegetation to be cleared.	Medium
MediaB-2	Assess the property of the Blue Route Vineyard Community Church to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-1	Assess the property of the Children's Academy to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-2	Assess the property of the Easter Seals of Southeastern Pa to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-3	Assess the property of the Fair Acres Geriatric Center to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-4	Assess the property of the Glenwood Elementary School to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-5	Assess the property of the Hanson Aggregates PA LLC to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-6	Assess the property of the Hunter Street Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-7	Assess the property of the Rocky Run Fire Company to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-8	Assess the property of the Middletown Free Library to determine the risk from wildfires and vegetation to be cleared.	Medium

	Mitigation Action	Priority
MiddletownT-9	Assess the property of the Middletown Montessori School to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-10	Assess the property of the Middletown Municipal Building to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-12	Assess the property of the Middletown Township Historical Society to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-13	Assess the property of the Middletown Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-14	Assess the property of the Monticello House to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-15	Assess the property of the Oakbridge Terrace at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-16	Assess the property of the PECO Middletown Rd Sub Station 1 to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-17	Assess the property of the Riddle Hospital to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-18	Assess the property of the Riddle Memorial Hospital to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-19	Assess the property of the Riddle Memorial Hospital-Based SNF to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-20	Assess the property of the Simon Youth Academy to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-21	Assess the property of the Pennsylvania State University-Brandywine Campus to determine the risk from wildfires and vegetation to be cleared.	Medium
MiddletownT-22	Assess the property of the Willowbrooke Court at Lima Estates to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-2	Assess the property of the Garretts Way Day Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-3	Assess the property of the Malvern School of Newtown Square to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-4	Assess the property of the Newtown Square Penn Railroad Museum to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-5	Assess the property of the Newtown Twp. Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-6	Assess the property of the SAP AMERICA INC to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-7	Assess the property of the Square Tavern to determine the risk from wildfires and vegetation to be cleared.	Medium
NewtownT-8	Assess the property of the WRNB Radio Tower to determine the risk from wildfires and vegetation to be cleared.	Medium
ProspectParkB-2	Assess the geology at the Morton Homestead property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
RadnorT-3	Assess the property of the WYBF Radio Tower to determine the risk from wildfires and vegetation to be cleared.	Medium
RadnorT-4	Assess the property of the Saint David's Episcopal Day School to determine the risk from wildfires and vegetation to be cleared.	Medium
RidleyParkB-3	Upgrade the Ward Street bridge to allow heavier traffic to travel on the road.	Medium
RidleyT-9	Assess the geology at the Boeing - Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
RidleyT-10	Assess the geology at the Eddystone Generating Station property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
RidleyT-11	Assess the geology at the Eddystone Marine and Rail Terminal Company L.L.C property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
RidleyT-12	Assess the geology at the Sure Power Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
RoseValleyB-2	Assess the property of the School in Rose Valley to determine the risk from wildfires and vegetation to be cleared.	Medium

Mitigation Action		Priority
RoseValleyB-3	Assess the property of the Rose Valley Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
ThornburyT-2	Assess the property of the Bethlehem United Methodist Church to determine the risk from wildfires and vegetation to be cleared.	Medium
ThornburyT-3	Assess the property of the Stonybank Community Church to determine the risk from wildfires and vegetation to be cleared.	Medium
ThornburyT-4	Assess the property of the Home Depot Store #4121 to determine the risk from wildfires and vegetation to be cleared.	Medium
ThornburyT-5	Assess the property of the Thornbury Historical Society to determine the risk from wildfires and vegetation to be cleared.	Medium
ThornburyT-6	Assess the property of the Thornbury Twp Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.	Medium
TinicumT-17	Discuss with the owners the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
TinicumT-18	Discuss with the owners the geology at the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
TinicumT-19	Discuss with the owners the geology at the UNITED AIRLINES-PHL property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
TinicumT-20	Assess the property of the Tinicum Township Fire Company to determine the risk from wildfires and vegetation to be cleared.	Medium
TrainerB-8	Assess the property of the Trainer Fire Company to determine the risk from wildfires and vegetation to be cleared.	Medium
TrainerB-9	Assess the property of the Conoco Phillips Fire and Rescue to determine the risk from wildfires and vegetation to be cleared.	Medium
UplandB-7	Evaluate and upgrade the Maris Run culvert under 4th Street.	Medium
UpperDarbyT-13	Assess the property of the Upper Darby Historical Society to determine the risk from wildfires and vegetation to be cleared.	Medium
UpperDarbyT-14	Discuss and assess with property owners of the Speedway 6806 their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-3	Discuss with the property owners of the Rose Tree Early Learning Center the geology of the property to determine if mitigation measures are necessary, and how to implement them if they are.	Medium
UpperProvidenceT-4	Discuss and assess with property owners of the Benchmark School their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-5	Assess property with District Court 32-2-46 and determine its risk from wildfires and vegetation to be cleared.	Medium
UpperProvidenceT-6	Discuss and assess with property owners of the Reformation Lutheran Church their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-7	Discuss and assess with property owners of the RMH-HB/SNF nursing home their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-8	Discuss and assess with property owners of the Rose Tree Early Learning Center their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-9	Discuss and assess with property owners of the Rose Tree Elementary School their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-10	Discuss and assess with property owners of the Rose Tree Fire Company their risk from wildfires and determine vegetation to be cleared.	Medium
UpperProvidenceT-11	Assess with Upper Providence Police Department property and determine its risk from wildfires and vegetation to be cleared.	Medium
UpperProvidenceT-12	Discuss and assess with property owners of the Walden School their risk from wildfires and determine vegetation to be cleared.	Medium
Brandywine-2	Develop Brandywine Conservancy & Museum of Art flood study and determine all streams and tributaries with flow regimes that contribute to flood major flood events; evaluate the study areas soils, climate, population, land use, water quality, natural areas, and cultural resources; evaluate the historical and present flooding; and develop a hydrological model using the US Army Corps of Engineers HEC-RAS program. Using study area data, begin site selection and assessment for improvements to the study area to mitigation flooding.	Medium

Mitigation Action		Priority
Low Priority		
DelawareC-1	Assess means to prevent future storage of hazardous materials in floodplains.	Low
DelawareC-6	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.	Low
DelawareC-34	Develop and implement a radon exposure prevention program.	Low
ChesterC-11	Determine the vulnerability of Chester High School to levee failure and determine appropriate mitigation measures.	Low
ChesterC-29	Study the City of Chester's levee system, from 13th Street to 9th Street, along 14th Street parallel with Parker Street, and at the high school at 10th Street, just east of Parker Street.	Low
ChesterHeightsB-2	Discuss with the property owners located within the flood zone to keep property clear of material	Low
CollingdaleB-1	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.	Low
RidleyT-1	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.	Low
UpperDarbyT-3	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.	Low

* Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.

SECTION 7 PLAN MAINTENANCE PROCEDURES

This section describes how the Delaware County Hazard Mitigation Plan (HMP) was updated since 2016 (Section 7.1); the system that Delaware County and all participating jurisdictions have established to monitor, evaluate, and update the HMP (Section 7.2); and the strategy to continue public involvement for plan maintenance (Section 7.3).

7.1 UPDATE PROCESS SUMMARY

The process of monitoring, evaluating, and updating the HMP is critical to maintaining its value and supporting the success of Delaware County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and supports future resiliency.

The Steering Committee reviewed the 2016 plan maintenance procedures and carried them forward to the current HMP update, as described in the sections below. Going forward, the plan will be available on the Delaware County Emergency Services website. The 2022 plan maintenance procedures also describe the ways in which this plan may be integrated into other planning mechanisms in the county.

7.2 MONITORING, EVALUATING, AND UPDATING THE PLAN

The Delaware County HMP Planning Team intends to remain intact as the organization responsible for monitoring, evaluating, and updating this plan. The Deputy Director, Emergency Management for Delaware County Emergency Services will serve as HMP Coordinator for the Planning Team. Each participating jurisdiction is expected to retain a hazard mitigation representative to support the jurisdiction's input to monitor, evaluate, and update the responsibilities identified in this section. Section 3 lists the Planning Team members.

Individual commitments change over time; therefore, each jurisdiction and its representatives will be responsible for informing the Delaware County HMP Coordinator of any changes in representation by formal letter. The HMP Coordinator will strive to ensure the Planning Team represents planning partners and stakeholders within the county. The HMP Coordinator will maintain the membership of the Planning Team on the Delaware County Emergency Services website (https://www.delcopa.gov/departments/emergencyservices.html) or in publicly accessible county records.

Delaware County contains 49 municipalities and one special district; 16 of the municipalities did not participate in the 2022 HMP update process and are therefore not currently eligible for federal mitigation funding to implement their projects. Each of these municipalities can elect to join the 2022 HMP by working with the Delaware County HMP Coordinator to complete the following steps:

1. Provide information on the hazards and risks that can affect its operations, residents, businesses, property, and environment.
2. Provide information on its capabilities.
3. Provide an update on the status of its mitigation actions from the 2016 version of the HMP.
4. Identify mitigation actions to include in the current HMP.
5. Adopt the current HMP by resolution (see Section 8).

Steps 1 to 3 above can be accomplished by completing the information gathering worksheets that were used during the planning process. Any municipality or district that has adopted the 2022 HMP will not have to re-adopt the 2022 HMP if the HMP is updated by another municipality's information.

The following sections describe the monitoring, evaluating, and updating processes and protocols for the Delaware County HMP.

7.2.1 Monitoring

The Planning Team will be responsible for monitoring implementation and evaluating the effectiveness of the HMP and documenting this information in a progress report. Prior to Planning Team progress meetings (detailed below), Planning Team representatives may collect information from departments, agencies, and organizations involved with the mitigation activities identified in Section 6 of this plan. The representatives will make phone calls and conduct meetings with persons responsible for initiating and/or overseeing the mitigation projects to obtain progress information. Copies of any grant applications filed on behalf of any of the participating jurisdictions will be provided to the Planning Team. The Delaware County HMP Coordinator will work with municipal representatives to provide additional opportunities for members of the public to learn about the hazards they face, and to provide information to be incorporated into the HMP. FEMA's National Flood Hazard Layer interactive tools can be used to facilitate this process. Further, the representatives will obtain from their municipal supervisor, mayor, or councilperson any public comments made on the plan, and provide them to the Planning Team for inclusion in the progress report.

The Planning Team representatives will be expected to document the following, as needed and as appropriate:

- Additional stakeholders (such as planning agencies and business representatives) who should be invited to participate in the planning process
- Additional local assets (such as major employers, local points of interest, residential areas, etc.) to consider in the risk assessment and mitigation strategy to ensure that items considered vital by each municipality can be included in the HMP
- Hazard events and losses occurring in their jurisdiction, including their nature and extent, and the effects that hazard mitigation actions have had on impacts and losses
- Progress on the implementation of mitigation actions, including efforts to obtain outside funding for mitigation actions
- Any obstacles or impediments to the implementation of actions
- Additional mitigation actions believed to be appropriate and feasible
- How floodplain management, in accordance with the National Flood Insurance Program (NFIP), is carried out in the municipality (through completion of the NFIP Survey worksheet)
- Public and stakeholder input and comments on the plan

Local Planning Team representatives may use the progress reporting forms (Worksheets #1 and #3 in the Federal Emergency Management Agency [FEMA] 386-4 guidance document) to facilitate collection of progress data and information on specific mitigation actions.

7.2.2 Evaluating

The evaluation of the HMP is an assessment of whether (1) the planning process and actions have been effective, (2) the plan's goals are being reached, and (3) changes are needed. The plan will be evaluated on an annual basis to determine the effectiveness of the programs, and to reflect changes that may affect mitigation priorities or available funding.

After information is gathered on the status of the HMP, as described in Section 7.2.1, the information will be discussed and documented at an annual plan review meeting of the Hazard Mitigation Planning Team. At least 1 month before the progress plan review meeting, the Delaware County HMP Coordinator will advise Planning Team members of the meeting date, agenda, and expectations of the members. The Delaware County HMP Coordinator may also distribute additional flood mitigation surveys and mitigation project opportunity forms for jurisdictions with new information or for those that did not participate in the update process.

The Delaware County HMP Coordinator will be responsible for calling and coordinating the progress plan review meeting and assessing progress toward achieving plan goals and objectives. These evaluations will assess whether:

- Goals and objectives address current and expected conditions
- The nature or magnitude of the risks has changed
- The HMP has been implemented into land-use processes on the county and municipal levels
- Current resources are appropriate for implementing the HMP and if different or additional resources are now available
- Actions are cost effective
- Schedules and budgets are feasible
- Implementation problems exist—such as technical, political, legal, or coordination issues with other agencies
- Outcomes have occurred as expected
- Changes in county or municipal resources have impacted plan implementation (for example, funding, personnel, and equipment)
- New agencies, departments, or staff should be included, including other local governments, as defined under 44 *Code of Federal Regulations* (CFR), Section 201.6
- Documentation has been completed for any hazards that occurred during the last year

Specifically, the Planning Team will review the mitigation goals, objectives, activities, and projects using the following performance-based indicators:

- New agencies or departments created that have authority to implement mitigation actions or are required to meet goals, objectives, and actions
- Project evaluation based on current needs of the mitigation plan
- Project completion regarding progress of proposed or ongoing actions
- Underspending or overspending regarding proposed mitigation action budgets
- Achievement of the goals and objectives
- Resource allocation records to note whether resources are required to implement mitigation activities
- Timeframe comments on whether proposed schedules are sufficient to address actions
- Budget notes (if budget basis should be changed or is sufficient)
- Lead or support agency commitment notes (if there is a lack of commitment on the part of lead or support agencies)
- Resource comments on whether resources are available to implement actions
- Feasibility comments to determine whether certain goals, objectives, or actions prove to be unfeasible

Finally, the Planning Team will evaluate the ways other programs and policies have conflicted or augmented planned or implemented measures, and will identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions (described further in Section 5.2.5). These other programs and policies can include those that address the following:

- Economic development
- Environmental preservation and permitting
- Historic preservation
- Redevelopment
- Health and/or safety

- Recreation
- Land use and zoning
- Public education and outreach
- Transportation

The Planning Team may refer to the evaluation forms (Worksheets #2 and #4 in the FEMA 386-4 guidance document) to assist in the evaluation process.

The Delaware County HMP Coordinator will be responsible for preparing an annual HMP progress report based on the annual local progress reports provided by each jurisdiction, information presented at the Planning Team meeting, and other information as appropriate and relevant. These HMP annual county progress reports will provide data for the 5-year update of this HMP and will assist in pinpointing implementation challenges. By monitoring the implementation of the plan, the Planning Team will assess which projects are completed, are no longer feasible, or may require additional funding.

The annual HMP progress report will apply to all planning partners who have provided input, and as such, will be developed according to an agreed-upon format and with adequate allowance for input and comment of each planning partner prior to completion and submission to the State Hazard Mitigation Officer. Each planning partner will be responsible for providing this report to its governing body for their review.

During the Planning Team meeting, the planning partners will establish a schedule for the development, review, comment, amendment, and submittal of the annual HMP progress report to the State Hazard Mitigation Officer. The HMP Coordinator will ensure that the reports are submitted to the State Hazard Mitigation Officer and FEMA Region III.

The plan will also be evaluated and revised following any major disasters to determine whether the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to determine whether any changes are necessary based on the pattern of disaster damage or if data listed in Section 4.3 (Hazard Profiles) have been collected to facilitate the risk assessment. Revisiting the risk assessment is an opportunity to increase the community's disaster resistance and build a better and stronger community.

7.2.3 Updating

Section 44 CFR 201.6.d.3 requires that local hazard mitigation plans be reviewed, revised (as appropriate), and resubmitted for approval to remain eligible for benefits awarded under the Disaster Mitigation Act of 2000 (DMA 2000). The Delaware County Hazard Mitigation Planning Team will update this plan on a 5-year cycle from the date of plan adoption.

To facilitate the update process, the Delaware County HMP Coordinator (with support from the Planning Team) will hold a meeting 3 years from the date of plan approval to develop and commence with the implementation of a detailed plan update program. The Delaware County HMP Coordinator will invite representatives from the Pennsylvania Emergency Management Agency (PEMA) to this meeting to provide guidance on plan update procedures. This program will, at a minimum, establish (1) the parties responsible for managing and completing the plan update effort, (2) features needed to be included in the updated plan, and (3) a detailed timeline with milestones to ensure that the update is completed according to regulatory requirements.

At this meeting, the Planning Team will determine the resources needed to complete the update. The Delaware County HMP Coordinator will be responsible for ensuring that needed resources are secured.

The Delaware County HMP Coordinator will also be responsible for coordinating the plan evaluation portion of the meeting, soliciting feedback, collecting and reviewing the comments, and ensuring their incorporation in the 5-year plan update, as appropriate. Additional meetings may also be held, as deemed necessary by the Planning Team. These meetings will provide an opportunity for the public to express concerns, opinions, and ideas about the HMP.

7.3 CONTINUED PUBLIC INVOLVEMENT

Delaware County and participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. Therefore, the plan will be posted on the Emergency Services website https://www.delcopa.gov/departments/emergencyservices.html, and copies of the plan will be made available for review during normal business hours at the main office in Lima (information provided below). Delaware County will make electronic copies of the plan available for local municipalies to provide to the public.

Following each 5-year update of the HMP, the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all Planning Team members and the Pennsylvania State Hazard Mitigation Officer.

The Delaware County HMP Coordinator will be responsible for receiving, tracking, and filing public comments on the HMP. The public will have an opportunity to comment on the plan at the review meeting for the HMP and during the 5-year plan update. Delaware County will maintain an active link on the Emergency Services website to collect public comments.

The Planning Team representatives will be responsible for ensuring the following:

- Public comment and input on the HMP (and hazard mitigation in general) are recorded and addressed, as appropriate. An opportunity to comment on the plan will be provided directly on the Emergency Services website, and provisions will be made for public comments submitted in writing. All public comments should be addressed to:

  Mr. Larry Bak
  Deputy Director, Emergency Management
  Delaware County Emergency Services
  360 N. Middletown Road
  Lima, PA 19063

- Copies of the latest approved version of the plan will be available for review at the municipal buildings along with instructions to facilitate public input and comment on the plan.
- Appropriate links to the Delaware County website will be maintained. The website will be monitored throughout the course of the HMP update process, and a draft copy of the plan will be posted for public comment. Upon conclusion of the update, appropriate links to the County HMP will be maintained on the Emergency Services website (https://www.delcopa.gov/departments/emergencyservices.html).
- Public notices will be made, as appropriate, to inform the public of the availability of the plan, particularly during plan update cycles.

The Delaware County HMP Coordinator will ensure the following:

- Public comment and input on the HMP (and hazard mitigation in general) will be recorded and addressed, as appropriate.
- The Emergency Services website's HMP content will be maintained and updated, as appropriate.
- All public and stakeholder comments received will be documented and maintained.
- Copies of the latest approved plan will be available for review at the Delaware County Emergency Services office, along with instructions to facilitate public input and comment on the plan.
- Public notices, including media releases, will be developed (as appropriate) to inform the public of the availability of the plan, particularly during plan update cycles.

SECTION 8 PLAN ADOPTION

By adopting the Delaware County Hazard Mitigation Plan (HMP), local governing bodies demonstrate their commitment to fulfill the mitigation goals and objectives outlined in the plan. Adoption of the HMP by Delaware County and each participating jurisdiction legitimizes the HMP and authorizes responsible agencies to execute their responsibilities.

Each participating jurisdiction in Delaware County will continue with formal adoption proceedings upon conditional approval of this HMP from the Federal Emergency Management Agency (FEMA), known as "Approval Pending Adoption (APA)." Each participating jurisdiction understands that conditional approval of the HMP will be provided for those municipalities that meet the planning requirements with the exception of the adoption requirement, as stated above.

Following adoption or formal action on the HMP, each participating jurisdiction must submit a copy of the resolution or other legal instrument showing formal adoption (acceptance) of the HMP to the Delaware County Hazard Mitigation Coordinator. Delaware County will forward the executed resolutions to the Pennsylvania Emergency Management Agency (PEMA), which will subsequently forward the resolutions to FEMA. Each participating jurisdiction understands that FEMA will transmit acknowledgement of verification of formal HMP adoption and the official approval of the HMP to the Hazard Mitigation Coordinator. Resolutions reflecting the formal adoption of this HMP by the county and participating jurisdictions are included in Appendix F of this HMP. A sample resolution to be used by the county and its jurisdictions is provided on the following pages.

Delaware County Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Delaware County, Pennsylvania

WHEREAS, the municipalities of Delaware County, Pennsylvania, are most vulnerable to natural and human-made hazards, which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, Delaware County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Delaware County Hazard Mitigation Plan has been developed by Delaware County Emergency Services in cooperation with other county departments, local municipal officials, and the citizens of Delaware County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Delaware County Hazard Mitigation Plan, and

WHEREAS, the Delaware County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments.

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Delaware that:

- The 2022 Delaware County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the county, and
- The respective officials and agencies of Delaware County identified in the implementation strategy of the 2022 Delaware County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2022

ATTEST:

_____

DELAWARE COUNTY COUNCIL

By _____

By _____

By _____

By _____

By _____

Delaware County Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

< *Municipality Name*>, Delaware County, Pennsylvania

WHEREAS, the <*Municipality Name*>, Delaware County, Pennsylvania, is most vulnerable to natural and human-made hazards, which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the <*Municipality Name*> acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Delaware County Hazard Mitigation Plan has been developed by Delaware County Emergency Services in cooperation with other county departments, and officials and citizens of <*Municipality Name*>, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Delaware County Hazard Mitigation Plan, and

WHEREAS, the Delaware County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments.

NOW THEREFORE BE IT RESOLVED by the governing body for the <*Municipality Name*>:

- The 2022 Delaware County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the <*Municipality Name*>, and
- The respective officials and agencies identified in the implementation strategy of the 2022 Delaware County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2022

ATTEST:

_____

< *MUNICIPALITY NAME*> REPRESENTATIVES

By _____

By _____

By _____

ACRONYMS AND ABBREVIATIONS

This resource identifies acronyms and abbreviations used in or supporting the Delaware County Hazard Mitigation Plan (HMP). The acronyms and abbreviations listed below are based on documents included in the reference section, with modifications as appropriate to address the Delaware County-specific identifications and requirements.

%	Percent
%g	Percent acceleration force of gravity
°F	Degrees Fahrenheit
65 PA C.S.A	Pennsylvania Sunshine Act
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APA	Approval Pending Adoption
APPA	American Public Power Association
ARC	American Red Cross
BFE	Base flood elevation
BOCA	Building Officials Code Administration
BRFPW	Pennsylvania Bureau of Rail Freight, Ports, and Waterways
BRIC	Building Resilient Infrastructure and Communities
B-Scale	Beaufort Wind Scales
CDBG	Community Development Block Grant
CDC	Centers for Disease Control and Prevention
CERT	Community Emergency Response Team
cfs	Cubic feet per second
CFR	*Code of Federal Regulations*
COG	Continuity of government
COOP	Continuity of operations
CPC	Climate Prediction Center
CPR	Cardiopulmonary Resuscitation
CRREL	Cold Regions Research and Engineering Laboratory
CRS	Community Rating System
CSB	Chemical Safety Board
CSXT	CSX Transportation
DART	Demand and Response Transit
DCED	Department of Community and Economic Development
DCNR	Department of Conservation and Natural Resources

DEM	Digital Elevation Model
DFIRM	Digital Flood Insurance Rate Map
DHHS	U.S. Department of Health and Human Services
DHS	U.S. Department of Homeland Security
DI	Damage Indicators
DMA 2000	Disaster Mitigation Act of 2000
DOD	Degrees of Damage
DOE	U.S. Department of Energy
DOF	Dependent on funding
DOT	Department of Transportation
DR	Disaster Declarations
EAL	Emergency Action Levels
EAP	Education and Awareness Program
EAP	Emergency action plan
EDA	Economic Development Administration
EF Scale	Enhanced Fujita Scale
EM	Emergency management
EMA	Emergency Management Agency
EMC	Emergency Management Coordinator
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
EPZ	Emergency planning zone
ESF	Emergency Support Function
FAA	Federal Aviation Administration
FARS	Fatality Analysis Reporting System
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIA	Flood Insurance Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
Flu	Influenza
FMA	Flood Mitigation Assistance
F-Scale	Fujita Scale

g	Gravity
GBS	General building stock
GIS	Geographic Information System
HazMat	Hazardous materials
HAZUS	Hazards U.S.
HAZUS-MH	Hazards U.S. – Multi-Hazard
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	Department of Housing and Urban Development
HVAC	Heating, ventilation, and air conditioning
IA	Individual Assistance
I-	Interstate
ILI	Influenza-like illnesses
ISO	Insurance Services Office, Inc.
K	Thousand ($)
Km	Kilometer
Kts	Knots
LCSN	Lamont-Doherty Cooperative Seismographic Network
LEPC	Local Emergency Planning Committee
LPR	Local Plans and Regulations
M	Million ($)
MESO	Multi-Community Environmental Storm Observatory
mi	Mile
MMI	Modified Mercalli Intensity
MPC	Municipal Planning Code
mph	Miles per hour
MPO	Metropolitan Planning Organization
MRP	Mean return period
mw	Megawatts
N/A	Not applicable
NA	Not available
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NCEI	National Centers for Environmental Information
NDMC	National Drought Mitigation Center

NDSP	National Dam Safety Program
NEHRP	National Earthquake Hazard Reduction Program
NEPA	National Environmental Policy Act
NESEC	Northeast States Emergency Consortium
NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NGO	Nongovernmental organization
NHTSA	National Highway Traffic Safety Administration
NID	National Inventory of Dams
NIH	National Institute of Health
NIMS	National Incident Management System
NLCD	National Land Cover Data
NLD	National Levee Database
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
NRCC	Northeast Regional Climate Center
NRCS	Natural Resource Conservation Service
NS	Norfolk-Southern Corporation
NSP	Natural Systems Protection
NSSL	National Severe Storms Library
NTAS	National Terrorism Advisory System
NTSB	National Transit Safety Board
NWI	National Wind Institute
NWS	National Weather Service
OEM	Office of Emergency Management
PA	Pennsylvania
PA DCED	Pennsylvania Department of Community and Economic Development
PA DCNR	Pennsylvania Department of Conservation and Natural Resources
PA DEP	Pennsylvania Department of Environmental Protection
PA HMP	Commonwealth of Pennsylvania 2018 All-Hazard Mitigation Plan
PA-	Pennsylvania State Route ##
PAG	Protective Action Guide
PaGWIS	Pennsylvania Groundwater Information System

PaSTAR	Pennsylvania Statewide Telecommunication Alerting and Reporting [Network]
pCi/L	picoCuries per liter
PDM	Pre-disaster Mitigation Grant Program
PDSI	Palmer Drought Severity Index
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PGA	Peak ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIO	Public Information Officer
ppm	Parts per million
PRA	Probabilistic risk assessment
PSAP	Public Safety Answering Point
PSP	Pennsylvania State Police
PSU	Pennsylvania State University/Penn State University
PUC	Public Utilities Commission
Ra-226	Radium-226
RACES	Radio Amateur Civil Emergency Services
RCV	Replacement cost value
RF	Risk factor
RFC	Repetitive flood claims
RLP	Repetitive loss property
Rn-222	Radon-222
RSI	Regional Snowfall Index
S-waves	Shear waves
SA	Spectral Association
SARA	Superfund Amendments and Reauthorization Act
SBA	Small Business Administration
SEPA RTF	Southeastern Pennsylvania Regional Task Force
SEVAN	Satellite Emergency Voice Alerting Network
SF	Summary file
SFHA	Special Flood Hazard Area
SHSP	State Homeland Security Program
SIP	Structure and Infrastructure Project
SOG	Standard Operating Guide
SPC	Storm Prediction Center

SPI	Standardized Precipitation Index
Sq. Mi.	Square mile
SRL	Severe repetitive loss
TBD	To be determined
TDD	Telecommunications device for the deaf
Tetra Tech	Tetra Tech, Inc.
TOD	Transit-oriented development
TRI	Toxic Release Inventory
US-	U.S. Route ##
USACE	U.S. Army Corps of Engineers
USAR	Urban Search and Rescue
USC	*U.S. Code*
USD	U.S. dollar
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
VIP	Very important person
WHO	World Health Organization
WMD	Weapons of mass destruction
WUI	Wildland urban interface

AUTHORITIES AND REFERENCES

This section lists references used to prepare the Delaware County HMP. Existing plans and studies were reviewed and integrated into the HMP. Each reference is cited where its information or data was used in developing the HMP. Technical data and information, such as the locations of critical facilities and geographic information systems (GIS) data on hazard areas, was incorporated into the vulnerability assessment in each of the hazard profiles in Section 4.3. Section 4.4 details how GIS analysis, including HAZUS-MH, was performed and incorporated.

1. 44 CFR Parts 201 and 206 (including Feb. 26, 2002, Oct. 1, 2002; Oct. 28, 2003; and Sept. 13, 2004 Interim Final Rules).
2. Association of State Dam Safety Officials. 2022. "Dams 101." Accessed 2022. https://damsafety.org/dams101.
3. Belvederesi et al. 2018. Statistical analysis of environmental consequences of hazardous liquid pipeline accidents. Online address: https://linkinghub.elsevier.com/retrieve/pii/S2405844018356020.
4. The Center for Rural Pennsylvania. 2013. "Population Projections". Accessed 2022. Online Address: https://www.rural.palegislature.us/demographics_population_projections.html.
5. Centers for Disease Control. 2009 H1N1 Pandemic. 2010. Accessed 2022. https://www.cdc.gov/flu/pandemic-resources/2009-h1n1-pandemic.html.
6. Center for Disease Control (CDC). 2013. "About Winter Weather." 6 December. U.S. Department of Health and Human Services. On-Line Address: http://emergency.cdc.gov/disasters/winter/about.asp.
7. Centers for Disease Control. Culture and Language. 2021. https://www.cdc.gov/healthliteracy/culture.html.
8. Centers for Disease Control. Disability and Health Overview. 2020. https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html.
9. CDC. 2007. "Extreme Cold: A Prevention Guide to Promote Your Personal Health and Safety." U.S. Department of Health and Human Services. On-Line Address: http://emergency.cdc.gov/disasters/winter/pdf/extreme-cold-guide.pdf.
10. CDC. 2009. "Extreme Heat: A Prevention Guide to Promote Your Personal Health and Safety." On-Line Address: http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp.
11. Federal Emergency Management Agency (FEMA). 1997. Windstorms. In: Multi-hazard identification and risk assessment. FEMA, Washington, DC, pp 49–56.
12. Centers for Disease Control. Influenza (Flu). 2015. Accessed 2022. https://www.cdc.gov/flu/.
13. Centers for Disease Control. 2009 H1N1 Pandemic. 2010. Accessed 2022. https://www.cdc.gov/flu/pandemic-resources/2009-h1n1-pandemic.html.
14. Centers of Disease Control (CDC). 2015. "Diseases Carried by Vectors." On-Line Address: https://www.cdc.gov/climateandhealth/effects/vectors.htm.
15. Centers for Disease Control. Symptoms of Coronavirus. May 2020. Date accessed 2022. https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html

16. CDC. 2020. "You Can Control Flood." Accessed 2022. Online address: https://www.cdc.gov/mold/control_mold.htm.

17. Centers for Disease Control. 2016. Accessed 2022. Weekly U.S. Influenza Surveillance. https://www.cdc.gov/flu/weekly/index.htm.

18. CISA. 2019. "National Emergency Communications Plan." Accessed 2022. https://www.cisa.gov/sites/default/files/publications/19_0924_CISA_ECD-NECP-2019_1_0.pdf.

19. Cova, T.J. and Conger, S. 2004. *Handbook of Transportation Engineering*. "Transportation Hazards." M. Kutz (ed.), McGraw Hill, New York, pp. 17.1 – 17.24.

20. Delaware County. "Government Structure."

21. Delaware County. "Your County at a Glance: History."

22. Delaware County. 2013. "Delaware County 2035 Land Use Framework Plan." Online address: https://www.delcopa.gov/planning/pubs/delco2035/LandUseFrameworkPlan.pdf.

23. Delaware County Department of Planning. 2016. "2016 Delaware County Hazard Mitigation Plan."

24. Delaware County Department of Planning. 2017. "Delaware County 2035: Transportation Plan." Accessed 2022. https://www.delcopa.gov/planning/pubs/delco2035/TransportationPlan.pdf.

25. Department of Homeland Security. 2022. "Hazardous Materials Release." https://www.dhs.gov/hazardous-materials-release.

26. Dragonpipe Diary. 2019. "Fourth sinkhole at Sleighton Park—it's in the middle of the road, and it's vast." https://dragonpipediary.com/2019/11/19/fourth-sinkhole-at-sleighton-park-its-in-the-middle-of-the-road-and-its-vast/.

27. Fairleigh Dickinson University. 2022. "Cybersecurity and Cyber Terrorism." Accessed 2022. https://online.fdu.edu/program-resources/cybersecurity-and-cyber-terrorism/.

28. Federal Alliance for Safe Homes. 2013. Hail. http://www.blueprintforsafety.org/doc.php?d=Hail_Introduction.

29. Federal Railroad Administration. Train Accidents by Railroad Groups. 2020. Accessed 2022. https://safetydata.fra.dot.gov/officeofsafety/publicsite/query/inctally3.aspx.

30. Federal Emergency Management Agency (FEMA). 2002. "Managing the Emergency Consequences of Terrorist Incidents." Accessed 2022. https://www.fema.gov/pdf/plan/managingemerconseq.pdf.

31. FEMA. 2004. "Federal Guidelines for Dam Safety – Hazard Potential Classification Systems for Dams." http://www.fema.gov/media-library-data/20130726-1516-20490-7951/fema-333.pdf.

32. FEMA. 2009. "Terrorism." Accessed 2022. https://www.fema.gov/pdf/areyouready/terrorism.pdf.

33. FEMA. 2012. "FEMA 428: Primer to Design Safe School Projects in Case of Terrorist Attacks." Accessed 2022. https://www.dhs.gov/xlibrary/assets/st/bips07_428_schools.pdf.

34. FEMA. 2013. Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards.

35. FEMA. 2017. "Delaware County, PA Flood Insurance Study."

36. FEMA. 2018. Dam Awareness. Accessed 2022. https://www.fema.gov/sites/default/files/2020-08/fact-sheet_dam-awareness.pdf

37. FEMA. 2020. "Are You Ready? An In-Depth Guide to Citizen Preparedness." Accessed 2022. https://www.ready.gov/sites/default/files/2021-11/are-you-ready-guide.pdf.

38. FEMA. 2020. Building Resilient Infrastructure and Communities. https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.

39. FEMA. 2020. Hazard Mitigation Assistance Grants. https://www.fema.gov/grants/mitigation.

40. FEMA. 2020. Rehabilitation of High Hazard Potential Dams Grant Program Guidance and Resources. https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants/resources.

41. FEMA. 2021. FEMA National Dam Safety Program Overview. Accessed 2022. https://www.fema.gov/sites/default/files/documents/fema_nsdp-overview-fact-sheet.pdf

42. FEMA. 2022. "Data Visualization: Disaster Declarations for States and Counties". Accessed 2022. https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties

43. FEMA Ready.gov. 2013. "Earthquakes." Online address: http://www.ready.gov/earthquakes.

44. FERC. 2022. Dam Safety and Inspections. Accessed 2022. https://www.ferc.gov/dam-safety-and-inspections

45. FERC. 2017. Guidance Manual for Environmental Report Preparation. Accessed 2022. https://www.ferc.gov/sites/default/files/2020-04/guidance-manual-volume-1.pdf

46. Fractracker Alliance. 2022. "Fractracter." Online address: Mariner East Pipeline Inadvertent Returns (arcgis.com)

47. Global Security. 1968 Hong Kong Flu. 2009. Accessed 2022. https://www.globalsecurity.org/security/ops/hsc-scen-3_pandemic-1968.htm

48. Harmon. 2010. "Climate change will impact infectious diseases worldwide, but questions remain as to how." Accessed 2022. Online Address: https://blogs.scientificamerican.com/observations/climate-change-will-impact-infectious-diseases-worldwide-but-questions-remain-as-to-how/.

49. Harris, T. 2008. "How Floods Work." On-Line Address: http://science.howstuffworks.com/flood.htm

50. Hensen, B. "New Study: Larger, More Intense U.S. Storm Complexes on the Way." 2017. Accessed 2022. https://www.wunderground.com/cat6/new-study-larger-more-intense-us-storm-complexes-way

51. Illinois Emergency Management Agency (IEMA). 2012. Hazardous Materials. 2015. http://www.illinois.gov/ready/hazards/Pages/HazardousMaterials.aspx.

52. International Civic Aviation Organization. 2015. International Standards and Recommended Practices Aircraft Accident and Incident Investigation Annex 13 to the Convention in International Civil Aviation (Annex 13). http://www.iprr.org/manuals/Annex13.html.

53. Kocin, P. J., and Uccellini, L. W. Last Modified 9 March 2013. The Northeast Snowfall Impact Scale (NESIS). National Oceanic and Atmospheric Administration (NOAA). National Climate Date Center (NCDC). Accessed 2022. http://www.ncdc.noaa.gov/snow-and-ice/rsi/nesis

54. Kyllonen, Simo. 2014. "Civil Disobedience, Climate Protests and a Rawlsian Argument for 'Atmospheric' Fairness." *Environmental Values*, pp. 593-613.

55. Lamont-Doherty. 2014. “Comprehensive Seismographic Network. Columbia University.” Online address: http://www.ldeo.columbia.edu/LCSN/index.php.

56. Meehl, G. and Tebaldi, C. 2004. “More Intense, More Frequent, and Longer Lasting Heat Waves in the 21st Century.” Science. Vol. 305 no. 5686. August 13. On-Line Address: http://www.sciencemag.org/content/305/5686/994

57. Merriam-Webster. 2017. “Hailstorm.” Accessed 2022. https://www.merriam-webster.com/dictionary/hailstorm

58. Midwestern Regional Climate Center (MRCC). 2021. “cli-MATE: MRCC Application Tools Environment.” Online address: https://mrcc.purdue.edu/CLIMATE/restricted.jsp;jsessionid=8D1787078004955F494C10D30757CA9E?accessdenied=%2FCLIMATE%2FCounty%2Fcounty_btd.jsp

59. National Fire Protection Association (NFPA). 2021. “NFPA 901: Standard Classifications for Incident Reporting and Fire Protection Data.” https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=901.

60. National Oceanic and Atmospheric Administration (NOAA). National Centers for Environmental Information (NCEI). 2021. “Climate at a Glance.” Accessed 2021. Online address: https://www.ncdc.noaa.gov/cag/county/time-series/PA-045/pcp/1/4/1991-2021.

61. NOAA National Centers for Environmental Information (NCEI). 2022. Storm Events Database. Accessed 2022. https://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=42%2CPENNSYLVANIA

62. NOAA. N.d. “1981-2010 U.S. Climate Normals.” Accessed 2022. https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data

63. National Weather Service (NWS). 2022. “Lightning Fatalities.” https://www.weather.gov/safety/lightning-fatalities.

64. NWS. 2022. “What is a Nor’easter?” Accessed 2022. https://www.weather.gov/safety/winter-noreasterNWS. 2021. “Weather Fatalities.” Online address: https://www.weather.gov/media/hazstat/80years_2020.pdf

65. NWS. 2020. “Hydrograph Terminology.” https://water.weather.gov/ahps2/pdf/hydrograph_terminology.pdf

66. NWS. 2015. “Flash Flood.” On-line address: http://w1.weather.gov/glossary/index.php?word=flash+flood

67. NWS. 2015. “Frost and Freeze Information.” https://www.weather.gov/iwx/fallfrostinfo.

68. NWS. 2011. "Flood Safety." On-Line Address: http://www.erh.noaa.gov/car/WCM/Awareness_Campaigns_files/flood_part_1.htm

69. NWS. 2009. “Hail Size Chart.” Online address: lnkd.in/ePBMApY

70. NWS. 2009. “National Weather Service Glossary.” Accessed 2022. https://w1.weather.gov/glossary/.

71. NWS. 2005. During a Heat Wave. Accessed 2022. https://www.weather.gov/safety/heat-during

72. NWS. N.d. Wind Chill Chart. Accessed 2022. https://www.weather.gov/safety/cold-wind-chill-chart

73. National Hurricane Center (NHC). 2013. Saffir-Simpson Hurricane Wind Scale. National Hurricane Center (NHC). National Weather Services (NWS). http://www.nhc.noaa.gov/aboutsshws.php.

74. NHC. 2022. "Historical Hurricane Tracks." Online address: https://coast.noaa.gov/hurricanes/#map=4/32/-80

75. NOAA. 2022. Severe Weather 101 - Lightning Basics. https://www.nssl.noaa.gov/education/svrwx101/lightning/#:~:text=In%20the%20early%20stages%20of,that%20we%20know%20as%20lightning.

76. National Climate Assessment (NCA). 2014. "Northeast Climate Change." N.d. Accessed 2022. Online Address: https://nca2014.globalchange.gov/report/regions/northeast

77. National Committee for Levee Safety. 2010. "Overview of Legislation Needed to Implement the National Levee Safety Program. PDF, NA: National Dam Safety Committee. http://www.damsafety.org/media/Documents/Mark's%20Links/NCLS%20Legislative%20Overvie.

78. National Drought Mitigation Center. 2018. "Types of Drought." Online address: https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx

79. National Atmospheric and Space Administration (NASA). 2004. "Retreating Glaciers Spur Alaskan Earthquakes." Online address: http://www.nasa.gov/centers/goddard/news/topstory/2004/0715glacierquakes.html.

80. National Performance of Dams Program (NPDP). 2018. NPDP Dam Incident Database. Accessed 2022. http://npdp.stanford.edu/dam_incidents

81. National Park Service (NPS). 2018. "Landslide Hazard." Accessed 2022. https://www.nps.gov/subjects/geohazards/landslide-hazards.htm#:~:text=Landslides%20include%20a%20wide%20range,factors%20that%20serve%20as%20triggers.

82. NOAA National Severe Storms Laboratory (NSSL). 2013. "Severe Thunderstorm Climatology." http://www.nssl.noaa.gov/projects/hazard/index.html.

83. NSSL. 2015. "Severe Weather 101 – Tornado Basics." Accessed 2022. http://www.nssl.noaa.gov/education/svrwx101/tornadoes/.

84. NSSL. 2022. "NSSL Research: Winter Weather." Accessed 2022. https://www.nssl.noaa.gov/research/winter/.

85. New York State Disaster Preparedness Commission. 2011. New York State Emergency Management Office (NYSEMO). Draft New York State Comprehensive Emergency Management Plan (Volume 1). New York State Standard Multi-Hazard Mitigation Plan. Accessed 2022. Online address: http://www.semo.state.ny.us/programs/planning/hazmitplan.cfm

86. Northeast Regional Climate Center. 2021. "Northeast Drought Update." Online address: http://www.nrcc.cornell.edu/regional/drought/drought.html

87. Northeast States Emergency Consortium. N.d. "Ice Jams." Accessed 2022. https://nesec.org/ice-jams/

88. Pennsylvania Department of Conservation and Natural Resources (DCNR). 2022. "Landslides." Accessed 2022. https://www.dcnr.pa.gov/Geology/GeologicHazards/Landslides/Pages/default.aspx

89. DCNR. 2022. “Mine Subsidence, Loss, & Coverage.” https://www.dep.pa.gov/Citizens/MSI/Pages/Mine-Subsidence-Loss-and-Coverage.aspx

90. DCNR. 2022. “PaGEODE - Pennsylvania GEOlogic Data Exploration.” Accessed 2022. https://www.gis.dcnr.state.pa.us/pageode/.

91. DCNR. 2001. “Landslides in Pennsylvania.” Accessed 2022. https://spcwater.org/wp-content/uploads/2020/01/DCNR_Landslides_2001.pdf

92. Pennsylvania Emergency Management Agency (PEMA). 2020. Commonwealth of Pennsylvania’s All-Hazard Mitigation Planning Standard Operating Guide. October 2020.

93. PEMA. 2020. “PENNSYLVANIA HAZARDOUS MATERIAL EMERGENCY PLANNING AND RESPONSE ACT 1990-165, 2018 ANNUAL REPORT.” Online address: https://www.pema.pa.gov/Preparedness/Hazardous-Material/Documents/Hazardous-Materials-Annual-Report-2018.pdf

94. PEMA. 2019. “2018 State Hazard Mitigation Plan.” Accessed 2022. https://pahmp.com/

95. Pennsylvania Department of Environmental Protection (PA DEP). 2022. Dam Safety. Accessed 2022. https://www.dep.pa.gov/Business/Water/Waterways/DamSafety/Pages/default.aspx

96. PA DEP. PA_Drought_History_Maps_1980_Present. 2022. Accessed 2021. http://files.dep.state.pa.us/Water/BSDW/Drought/DroughtStatusMaps/PA_Drought_History_Maps_1980_Present.pdf

97. PA DEP. 2022. Radon Test Data by ZIP Code. Accessed 2022 https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/Pages/Radon-in-the-home.aspx

98. PA DEP. 2020. “Drought Management in Pennsylvania.” Accessed 2022. http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=4275

99. PADEP. 2009. “Pennsylvania Climate Impact Assessment.” Accessed 2022. Online Address: .http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/7000-BK-DEP4252%5B1%5D.pdf

100. PADEP. 2009. “Pennsylvania State Water Plan. Accessed 2022. https://www.dep.pa.gov/Business/Water/PlanningConservation/StateWaterPlan/Pages/2009-Update.aspx

101. Pennsylvania Invasive Species Council [PISC]. 2010. Accessed 2022. https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/GISC/Documents/PISC%205%20Year%20Plan.pdf.

102. Piggott, R.J. and P. Eynon. "Ground Movements Arising from the Presence of Shallow Abandoned Mineworkings." Large Ground Movements and Structures. 1978. London: Pentech Press, pp. 749-780.

103. Pipeline and Hazardous Materials Safety Administration (PHMSA). 2022. “Data and Statistics Overview”. Accessed 2022. Online Address: https://www.phmsa.dot.gov/data-and-statistics/pipeline/data-and-statistics-overview

104. Radeloff et al. 2018. “Rapid growth of the US wildland-urban interface raises wildfire risk.”

105. Rettew, B. 2021. “Sinkhole forms in Delco along pipeline route.” *Daily Times*, Accessed 2022. https://www.delcotimes.com/2019/04/26/sinkhole-forms-in-delco-along-pipeline-route/.

106. Robinson, P. J. 2001. On the Definition of a Heat Wave, Journal of Applied Meteorology, 40(4), 762-775. Accessed 2022. https://journals.ametsoc.org/view/journals/apme/40/4/1520-0450_2001_040_0762_otdoah_2.0.co_2.xml

107. Schuster, R. and Highland, L. 2001. Socioeconomic and Environmental Impacts of Landslides in the Western Hemisphere. Accessed 2022. https://pubs.usgs.gov/of/2001/0276/report.pdf

108. Shedlock, K. and Pakiser, L. 1997. Earthquakes. United States Geological Survey. http://pubs.usgs.gov/gip/earthq1/.

109. Shetty, M. "Penn and the 1918 Influenza Epidemic." 2018. Accessed 2022. https://archives.upenn.edu/exhibits/penn-history/flu

110. Shortle, J. et al. 2013. Pennsylvania Climate Impact Assessment Update to the Department of Environmental Protection. Environment and Natural Resources Institute, Pennsylvania State University. http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-97037/PA%20DEP%20Climate%20Impact%20Assessment%20Update.pdf

111. Small Business Administration. 2021. Disaster Loan Assistance. https://disasterloanassistance.sba.gov/ela/s/search-declarations.

112. Spiker, E. C., and Gori, P. L. U.S. Geological Survey (USGS). 2000. "National Landslide Hazards Mitigation Strategy – A Framework for Loss Reduction." Accessed 2021. Online Address: http://pubs.usgs.gov/of/2000/ofr-00-0450/ofr-00-0450.pdf

113. Steward, S. 2015. "Mapping the wildland urban interface (WUI): where housing meets wildland vegetation." *U.S. Forest Service*, Accessed 2022. https://www.fs.usda.gov/rmrs/projects/mapping-wildland-urban-interface-wui-where-housing-meets-wildland-vegetation.

114. Tantala, M. et al.. 2003."The New York City Consortium for Earthquake Loss Mitigation (NYCEM) Earthquake Risks and Mitigation in New York, New Jersey, and Connecticut Region." Accessed 2022. http://nycem.org/techdocs/FinalReport/03-SP02p.pdf.

115. Tecle A. and Neary, D. 2015. "Water quality impacts of forest fires."

116. U.S. Army Corps of Engineers (USACE). 2022. "Ice Jam Database." Online address: https://icejam.sec.usace.army.mil/ords/f?p=101:7:::NO:::

117. USACE. 2021. Dam Safety Program. Accessed 2022. https://www.usace.army.mil/Missions/Civil-Works/Dam-Safety-Program/

118. USACE. 2016. National Inventory of Dams. Accessed 2022. https://nid.usace.army.mil/#/

119. U.S. Census Bureau. 2021. "Poverty Thresholds."

120. U.S. Census Bureau. 2020. 2020 Census.

121. U.S. Census Bureau. 2019. https://data.census.gov/cedsci/all?q=Delaware%20County,%20Pennsylvania

122. U.S. Census Bureau. 2010. 2010 Census.

123. U.S. Census Bureau. 2000. 2000 Census.

124. U.S. Department of Agriculture (USDA). 2021. "Disaster Designation Information." Online address: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index

125. USDA. 2021. "Cause of Loss Historical Data Files." Online address: http://www.nrcc.cornell.edu/regional/drought/drought.html

126. USDA. 2017. "2017 Census of Agriculture, Delaware County, Pennsylvania." Online address: https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Pennsylvania/cp42045.pdf

127. USDA. 2017. "2017 Census of Agriculture, Delaware County, Pennsylvania." https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Pennsylvania/cp42045.pdf

128. U.S. Environmental Protection Agency (EPA). 2022. "Climate Change Indicators: Weather and Climate." Accessed 2022. Online Address: https://www.epa.gov/climate-indicators/weather-climate.

129. EPA. 2022. Health Risks of Radon. Accessed 2022. https://www.epa.gov/radon/health-risk-radon

130. EPA. 2020. Hazardous Waste. On-Line Address: https://www.epa.gov/hw/learn-basics-hazardous-waste

131. EPA. 2006. "Climate Change Indicators: Weather and Climate." Accessed 2022. Online Address: https://www.epa.gov/climate-indicators/weather-climate

132. EPA. N.d. "Assessment of Risks from Radon in Homes (EPA 402-R-03-003)." Accessed 2022. https://www.epa.gov/radon/epa-assessment-risks-radon-homes

133. EPA. N.d. Determining the Prevalence of Contaminants in Treated and Untreated Drinking Water. Accessed 2022. https://www.epa.gov/water-research/determining-prevalence-contaminants-treated-and-untreated-drinking-water

134. U.S. Department of Homeland Security. 2019. "2019 National Preparedness Report." Accessed 2021. https://www.fema.gov/media-library-data/1575309879997-d19134cec727cfa75c17f4051c4f88aa/2019_NPR_Final_508c_20191119.pdf

135. U.S. Department of Transportation. 2021. "Bureau of Transportation Statistics." https://www.bts.gov/content/transportation-fatalities-mode.

136. U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration. 2019. "Incident Statistics." Accessed 2022. https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics

137. U.S. Forest Service (USFS). 2022. "Fire Danger Rating." Accessed 2022. http://www.wfas.net/index.php/fire-danger-rating-fire-potential--danger-32.

138. USFS. 2022. "Wildland Fire Assessment System." Accessed 2022. https://www.wfas.net/index.php/news-mainmenu-26/1-wfas.

139. U.S. Geological Survey (USGS). 2022. "What is a sinkhole?" Accessed 2022. https://www.usgs.gov/faqs/what-sinkhole.

140. USGS. 2019. "Land Subsidence." Accessed 2022. https://www.usgs.gov/mission-areas/water-resources/science/land-subsidence.

141. USGS. 2018. "Earthquake Hazard." Online address: https://www.usgs.gov/natural-hazards/earthquake-hazards/earthquakes.

142. USGS. 2016. "Landslide Incidence and Susceptibility of the Southwestern United States." Accessed 2022. https://geochange.er.usgs.gov/sw/impacts/geology/landslides/

143. USGS. 2012. Earthquake Glossary- seiche. USGS. http://earthquake.usgs.gov/learn/glossary/?term=seiche.

144. USGS. 2005. "Landslide Hazards – A National Threat." Accessed 2022. https://pubs.usgs.gov/fs/2005/3156/2005-3156.pdf

145. USGS. "Domestic Water Use." N.d. Accessed 2021. https://www.usgs.gov/mission-areas/water-resources/science/domestic-water-use?qt-science_center_objects=0#qt-science_center_objects

146. USGS. n.d. "How much does sinkhole damage cost each year in the United States?". Accessed 2021. Online Address: https://www.usgs.gov/faqs/how-much-does-sinkhole-damage-cost-each-year-united-states?qt-news_science_products=3#qt-news_science_products

147. USGS. N.d. National Water Information System. Accessed 2022. https://waterdata.usgs.gov/nwis

148. USGS. N.d. Sinkholes. https://www.usgs.gov/special-topic/water-science-school/science/sinkholes

149. Wehner, M.F., J.R. Arnold, T. Knutson, K.E. Kunkel, and A.N. LeGrande, 2017: Droughts, floods, and wildfires. In Climate Science Special Report: Fourth National Climate Assessment, Volume I. D.J. Wuebbles, D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, pp. 231-256, doi:10.7930/J0CJ8BNN

150. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. 2022. Accessed 2022.

151. World Health Organization. 2020. Accessed 2022. Online Address: https://www.who.int/hac/techguidance/ems/flood_cds/en/#:~:text=Floods%20can%20potentially%20increase%20the,fever%2C%20and%20West%20Nile%20Fever

152. World Health Organization (WHO). 2015. "The WHO Pandemic Phases". Online Address: https://www.ncbi.nlm.nih.gov/books/NBK143061/.

LOCAL MITIGATION PLAN REVIEW TOOL 2019

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*.

Jurisdiction: **Delaware County, PA**	**Title of Plan:** **Delaware County HMP**	**Date of Plan:**
Local Point of Contact:	**Address:**	
Title:		
Agency:		
Phone Number:	**E-Mail:**	

State Reviewer: **Ernie Szabo**	**Title:** **State Planner**	**Date:**

FEMA Reviewer: **Matt McCullough**	**Title:** Community Planner	**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 page number)**	**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))	Section 3 Appendices C, D, E	X	
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))	Section 3 & Appendices C, D , E	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3 & Appendices E	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2.5	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 7.2.3	X	
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))	Section 7.2	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met

ELEMENT A: REQUIRED REVISIONS

A1.) Discussion:
Table 3.2- Not all communities contributed to the plan to the level needed to be counted as participants. Based on the plan materials these are the following categories:

Full Participation- (Attended Meeting(s) & Provided Completed Forms)
Bethel Twp, Chester City, Chester Heights Borough, Concord Twp, Marple Twp, Middletown Twp, Newtown Twp, Prospect Park Boro, Radnor Twp, Thornbury Twp

Changeovers to Full Participation:
Aston Township, Brookhaven Borough, Chadds Ford Township, Chester Township, Haverford Township, Marcus Hook, Media Borough, Upland Borough, Upper Chichester Borough, Upper Providence Township, Brandywine Conservancy & Museum Special District.

This changeover occurred because the Plan Developer provided additional participation documentation for those communities who initially had not met the minimum of attending 1 meeting and filling out 1 form. Other communities with an asterisk were previously designated as only partially participating because they had only performed half of the minimum requirement for meetings or form completion. However, some communities had either attended multiple meetings or provided multiple forms. They are now being designated as participating.

Partial Participation- (Either Attended a Meeting(s) or Provided Completed Forms)
Aldan Boro, Aston Boro*,Brookhaven Boro*, Chadds Ford Twp, Chester Twp, Clifton Heights Boro, Darby Boro, Darby Twp, Eddystone Boro, Haverford Twp*, Marcus Hook*, Media Boro*, Ridley Park Boro, Ridley Twp, Rutledge Boro, Springfield Twp, Swarthmore Boro, Tinicum Twp, Upland Boro*, Upper Chichester Boro*, Upper Darby Twp, Upper Providence Twp, Yeadon Boro, Brandywine Conservancy & Museum SD

*- Attended multiple meetings or Provided Multiple Completed Forms

Highlighted green indicate updated participation information from Plan Developer. Those who do not have an asterisk but have the green highlighting will be deemed as participating.

Information has been verified in Appendix C for those communities who have participated beyond just meeting attendance.

No Participation- (Neither Attended a Meeting no Provided Completed Forms)
Collingsdale Boro, Colwyn Boro, East Lansdowne Boro, Edgmont Twp, Folcroft Boro, Glenolden Boro, Lansdowne Boro, Lower Chichester Twp, Millbourne Boro, Morton Boro, Nether Providence Twp, Norwood Boro, Parkside Boro, Rose Valley Boro, Sharon Hill Boro, Trainer Boro

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))	Section 4	X	
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))	Section 4	X	
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))	Section 4	X	
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. 4.3.8-46	X	

ELEMENT B: REQUIRED REVISIONS

B3.) Kudos:
Impacts are addressed by different sectors: Life, Health and Safety/General Building Stock/Critical Facilities/Economy/Environment

B3.) Recommended Revision:
Pg. 4.3.8-42: Table 4.3.8-10 The number of structures at-risk, per jurisdiction, are noted in this table. Is there additional information that can be provided as to the functions or uses of these building types?

Table 4.3.8-14 What types of critical facilities/lifelines are within the 1% annual chance area? What functions or services do they provide for each community? Providing this context is crucial to develop an understanding of needs within the communities.

Table 4.3.8-16 The sharing of this debris data for recovery purposes could aid in the post-disaster recovery needs to debris management. Pairing this information with open space availabilities within the County could be performed prior to an event to quicken recovery operations.

B3.) Recommended Revision:
Appendix C- Pg 63- 96: Additional cascading effects of the hazard events on these facilities/assets/structures could be provided to better explain the impact to the community's ability to function. Providing the "so what" of the asset being affected by that hazard.

B3.) Kudos:
Additional Data & Next Steps- clear distinction of what the County needs and how they would like to improve the plan.

B4.) Required Revision:
The Rep Loss data needs to be provided per jurisdiction. Also, the data pull should be within the timeframe of the plan update. The data is noted as being from 2019.
FEMA will provide instructions for a direct data request to the PIVOT system.

Updated Rep Loss information has been provided.

ELEMENT C. MITIGATION STRATEGY

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))	Section 5	X	
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))	5-10 – 5-11 & Appendix D	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	6-14 to 6-15	X	
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))	Section 6	X	
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))	Table 6.4	X	
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))	Section 5.2.5	X	

ELEMENT C: REQUIRED REVISIONS

C1.) Recommended Revision:
Application of evaluation criteria to improve the understanding of current gaps and opportunities for improvement.

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))	Section 2.2- 2.4	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 6-4 to 6-13	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 6-1 to 6-3	X	

ELEMENT D: REQUIRED REVISIONS

Recommended Revision:
D1.) Please provide mapping future land use; possibly from the County Comprehensive Plan.

Kudos:
D1.) Future Growth & Development write-up: rarely are discussions had within the hazard section as to the effects on development in relation to individual hazard types. Well done!

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))			
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))			
ELEMENT E: REQUIRED REVISIONS			
OPTIONAL: HIGH HAZARD POTENTIAL DAM RISKS			
HHPD1. Did Element A4 (planning process) describe the incorporation of existing plans, studies, reports, and technical information for high hazard potential dams?			X
HHPD2. Did Element B3 (risk assessment) address HHPDs?			X
HHPD3. Did Element C3 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?			X
HHPD4. Did Element C4-C5 (mitigation actions) address HHPDs prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?			X
REQUIRED REVISIONS HHPDs not profiled. N/A.			
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 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.*

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 jurisdiction 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?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Aston Township											
2	Brookhaven Borough											
3	Bethel Twp											
4	Chadds Ford Township											
5	Chester City											
6	Chester Township											
7	Chester Heights Borough											
8	Concord Twp											

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
9	Haverford Township											
10	Marcus Hook Township											
11	Marple Twp											
12	Media Borough											
13	Middletown Twp											
14	Newtown Twp											
15	Prospect Park Boro											
16	Radnor Twp											
17	Thornbury Twp											
18	Upland Borough											
19	Upper Chichester Borough											
20	Upper Providence Township											

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
21	Brandywine Conservancy & Museum Special District											

APPENDIX C. MEETING DOCUMENTATION

Appendix C includes meeting agendas, sign-in sheets, and meeting notes (where applicable and available) for meetings convened during the development of the Delaware County Hazard Mitigation Plan.

MEETING NOTES

Meeting	Delaware County Hazard Mitigation Plan (HMP) Steering Committee Kickoff Meeting		
Date	October 25, 2021	**Time**	2:00 – 3:35 p.m.
Location	Webinar		
Attendees	Howard Lazarus, Executive Director, Delaware County		
	Larry Bak, Deputy Director, Emergency Management, Delaware County Emergency Services		
	Tim Boyce, Director of Emergency Services, Delaware County Emergency Services		
	Sean Devlin, Emergency Management Specialist, Delaware County Emergency Services		
	Sharon Jaye, Interim Director and Sustainability and Resilience Manager, Delaware County Public Works Department		
	Denise Long, Delaware County Public Works Department		
	Ed Magargee, District Manager, Delaware County Conservation District		
	Sara Senkow, Delaware County Emergency Services		
	Tom Shaffer, Interim Director and Manager of Transportation Planning, Delaware County Planning Department		
	Anne Stauffer, Senior Planner, Delaware County Planning Department		
	Tom Morgan, Emergency Management Coordinator (EMC), Aston Township		
	Maryann Furlong, Tax Collector, Borough of Chester Heights		
	Mark Possenti, Manager, Darby Borough		
	Steven Poole, Deputy Emergency Management Coordinator (EMC), Haverford Township		
	Patrick O'Connell, Emergency Management Director, Prospect Park Borough		
	Steve Norcini, Township Engineer, Radnor Township		
	Chris Gluck, EMC and Sergeant, Radnor Township		
	John Pietrafitta, Emergency Management Coordinator (EMC), Springfield Township		
	Tony Subbio, Project Manager, Tetra Tech		

Discussion Points

This section summarizes each discussion point addressed during the Steering Committee Kickoff Meeting.

Introductions

Mr. Bak welcomed the group. Attendees introduced themselves.

Overview of Hazard Mitigation

Mr. Subbio described hazard mitigation and funding that is available for implementing mitigation projects.

Project Scope

Mr. Subbio briefly reviewed the planning process that will be used to update the HMP.

Hazards of Concern

The committee discussed the hazards of concern for the 2022 update of the HMP. The following hazards were examined in the 2017 version of the HMP:

- Civil Disturbance
- Dam Failure
- Drought
- Earthquake
- Environmental Hazards – Hazardous Materials Release
- Extreme Temperatures
- Flood, Flash Flood, and Ice Jam
- Hailstorm
- Hurricane, Tropical Storm, Nor'easter
- Landslide
- Levee Failure
- Lightning
- Pandemic
- Radon Exposure
- Subsidence, Sinkholes
- Terrorism
- Tornado, Windstorm
- Transportation Accidents
- Urban Fire and Explosion
- Utility Interruption
- Wildfire
- Winter Storm

The following comments related to specific hazards were provided during the meeting:

- Earthquake – Mr. Devlin stated that earthquakes were possible, but that the plan might not need to address them. Mr. Bak replied that an earthquake has impacted the county.
- Landslide – Mr. O'Connell reported that landslides have impacted the banks along the county's rail lines.
- Subsidence, Sinkholes – Mr. Norcini reported that subsidence in the county occurs due to buried materials settling, and from water and wastewater pipes leaking and causing voids. He stated that karst topography is not present in the county.
- Utility Interruption – Mr. O'Connell reported that several utility outages have occurred over the last few months. He stated that the hazard is a concern due to the power, water, wastewater, telecommunications, and natural gas infrastructure in the county.
- Wildfire – Ms. Furlong reported that three serious wildfires occurred in the county last year.

Attendees agreed to keep the 2017 hazards of concern for the 2022 HMP update, and to add Environmental Hazards – Gas/Liquid Pipeline.

Planning Team Members

Mr. Subbio reviewed the difference between the Steering Committee and the Planning Team, and presented a list of types of organizations that should be involved in the planning process. Mr. Bak reported that Emergency Services has several lists of stakeholders, including the Local Emergency Planning Committee (LEPC) for industry contacts, the Delaware County Chamber of Commerce, and the Brandywine and Main Line Chambers of Commerce. Mr. Magargee stated that he has lists of contacts for the Delaware River Basin Commission and local watershed groups. The Planning Department has a point of contact at the Delaware Valley Regional Planning Commission. Mr. Bak reported that many local media outlets have closed.

MEETING NOTES

Public and Stakeholder Outreach

Mr. Subbio reviewed a set of tools that will be used for stakeholder outreach. Tetra Tech will maintain a project website. He described a set of surveys that will be developed and distributed to stakeholders. Attendees discussed the Delco Alert system, and decided that it would be appropriate to provide information about the planning process via that system.

Project Schedule

Mr. Subbio reviewed the project schedule. The Planning Team Kickoff Meeting will be conducted from 1:00-3:00 p.m. on November 16, 2021. The group agreed that daytime meetings are best for planning meeting, and that public meetings should be held in the evening. Mr. Bak reported that he shared Tetra Tech's Geographic Information Systems (GIS) Data Wish List with the Planning Department.

Next Steps

- Mr. Bak will compile the list of stakeholders to include in the planning process.
- Tetra Tech will work with Mr. Bak to deploy the surveys.
- Ms. Jaye will provide a list of bridges in the county, indicating which are on the "scour list."
- Tetra Tech will develop the hazard profiles.

The meeting adjourned at 3:35 p.m.

AGENDA

DELAWARE COUNTY 2022 HAZARD MITIGATION PLAN UPDATE
Steering Committee Kickoff Meeting

Monday, October 25, 2021 | 2:00 – 4:00 p.m.

1. **Welcome and Introductions**
2. **Overview of Hazard Mitigation**
3. **Project Scope**
   a. Risk Assessment
   b. Capability Assessment
   c. Mitigation Strategy
   d. Draft Development
4. **Hazards of Concern**
   - Drought
   - Earthquake
   - Extreme Temperatures
   - Flood, Flash Flood, and Ice Jam
   - Hailstorm
   - Hurricane, Tropical Storm, Nor'easter
   - Landslide
   - Lightning
   - Pandemic
   - Radon Exposure
   - Subsidence, Sinkholes
   - Tornado, Windstorm
   - Wildfire
   - Winter Storm
   - Civil Disturbance
   - Dam Failure
   - Environmental Hazards – Hazardous Materials Release
   - Levee Failure
   - Terrorism
   - Transportation Accidents
   - Urban Fire and Explosion
   - Utility Interruption
5. **Planning Team Members**
   - Municipalities
   - County Departments
   - Schools and School Districts
   - Delaware River Basin Commission
   - Watershed Associations
   - DVRPC
   - Higher Ed
   - Prisons
   - Healthcare
   - Major Businesses
   - SEPA RTF
   - Neighboring Counties
   - American Red Cross
   - Media
   - Utilities
   - SEPTA
   - Railroads
   - Federal Agencies
   - Commonwealth Agencies
   - Others

AGENDA

DELAWARE COUNTY 2022 HAZARD MITIGATION PLAN UPDATE
Steering Committee Kickoff Meeting

Monday, October 25, 2021 | 2:00 – 4:00 p.m.

6. **Public and Stakeholder Outreach**
    a. Meetings
    b. Problem Area Survey
    c. Survey Monkey Surveys
    d. Social Media
    e. Other

7. **Project Schedule**

8. **Next Steps**

9. **Questions**

Project Schedule

Subject to Change

Task	Timeframe
Project Management	• Project Kickoff Meeting conducted on October 25, 2021 • Monthly status reports • Quarterly progress reports submitted to PEMA • Project Closeout Meeting upon FEMA approval of the HMP
Task 1: Organize Resources	• Initial Planning Team Meeting conducted on or about November 17, 2021 • Project website maintained throughout the planning process • Outreach to municipalities and other stakeholders throughout the planning process • Plans and other documents reviewed throughout the planning process
Task 2: Conduct Capability Assessment	• Capabilities assessed through completion of the draft HMP
Task 3: Conduct Risk Assessment	• Risk assessment conducted from the Initial Planning Team Meeting through the end of February 2022 • Public Planning Team meeting to review the risk assessment conducted in early March 2022
Task 4: Develop Mitigation Strategy	• Goals and objectives updated in early March 2022 • Mitigation Strategy Workshop conducted on or about March 16, 2022 • Mitigation actions developed by April 15, 2022
Task 5: Define Plan Maintenance	• Plan Maintenance section updated by late February 2022
Task 6: Prepare the Updated HMP Draft	• Draft completed by April 29, 2022
Task 7: Review and Finalize the Updated HMP Draft	• Public comment period in May 2022 • Public Draft Review Meeting conducted on or about June 2, 2022 • Draft finalized by June 6, 2022
Task 8: Submit the Updated HMP Draft for Formal Review	• Draft submitted to PEMA on or about June 7, 2022 • PEMA Review Period from June 8-21, 2022 • Draft HMP updated and submitted to FEMA Region III by June 23, 2022 • FEMA Review Period from June 24 – August 11, 2022 • Steering Committee Meeting (teleconference) with PEMA and FEMA mitigation staff conducted on or about August 17, 2022, to review FEMA comments • HMP updated and resubmitted to FEMA Region III by August 19, 2022 • “Approvable Pending Adoption” (APA) granted on or about August 26, 2022
Task 9: Facilitate Adoption of the Updated HMP	• Final HMP provided to the County for adoption in September 2022

MEETING NOTES

Meeting	Delaware County Hazard Mitigation Plan (HMP) Planning Team Kickoff Meeting		
Date	November 16, 2021	**Time**	1:00 – 2:11 p.m.
Location	Webinar		
Attendees	Larry Bak, Deputy Director, Emergency Management, Delaware County Emergency Services		
	Tim Boyce, Director of Emergency Services, Delaware County Emergency Services		
	Julie DelMuto, GIS Manager, Sustainability Division, Delaware County Planning Department		
	Sharon Jaye, Sustainability and Resilience Manager, Delaware County Public Works Department		
	Ed Magargee, District Manager, Delaware County Conservation District		
	Sara Senkow, Delaware County Emergency Services		
	Anne Stauffer, Senior Planner, Delaware County Planning Department		
	Suzanne Kelley, Emergency Management Coordinator, Aldan Borough		
	Tom Morgan, Emergency Management Coordinator (EMC), Aston Township		
	Maryann Furlong, Township Manager, Chadds Ford Township		
	William Rigby, Fire Commissioner and Office of Emergency Management Director, City of Chester		
	Frederick H. Field, EMC and Fire Marshal, Concord Township		
	Mark Possenti, Manager, Darby Borough		
	Steven Poole, Deputy EMC, Haverford Township		
	Tom Murray, EMC, Marple Township		
	Brittany Forman, Manager, Media Borough		
	Jim Jeffery, Code Enforcement Officer, EMC, Fire Marshal, and Zoning Officer, Media Borough		
	Bob Drennen, EMC, Middletown Township		
	John McMullan, Township Manager, Middletown Township		
	Jean Bail, EMC, Newtown Township		
	Chris Gluck, EMC and Sergeant, Radnor Township		
	Lee Fulton, Township Manager, Springfield Township		
	John Pietrafitta, EMC, Springfield Township		
	Jeff Seagraves, Township Manager, Thornbury Township		
	Michael Ciach, Manager, Upland Borough		
	Bill Robinson, EMC, Upper Chichester Township		
	Miles Owen, Environmental Planner, Delaware Valley Regional Planning Commission (DVRPC)		
	Tony Subbio, Project Manager, Tetra Tech		

Discussion Points

This section summarizes each discussion point addressed during the Planning Team Kickoff Meeting.

Welcome and Introductions

Mr. Bak welcomed the group. Attendees introduced themselves and identified the following areas of focus for the planning effort:

- Mr. Seagraves voiced concern about the energy transfer pipeline and facilitating evacuations if there is an incident.
- Mr. Jeffery stated that surface flooding from urban areas is a problem. There is unmanaged surface water flow in the county. There are a few neighborhoods in the borough that need infrastructure improvements.
- Mr. Field stated that the county needs to address the loss of electrical power.
- Mr. Magargee stated that the district's primary foci are flooding from stormwater runoff, flooding of repetitive loss properties, and water quality from illicit discharges.
- Ms. Furlong reported that stormwater runoff and flooding are concerns for property owners and the public works department.

Overview of Hazard Mitigation

Mr. Subbio provided a brief overview of hazard mitigation for attendees. He defined hazard mitigation and reviewed types of mitigation actions. He described the requirements of the Disaster Mitigation Act of 2000 (DMA 2000) for HMPs as well as Pennsylvania's requirements. He discussed the Federal Emergency Management Agency's (FEMA) mitigation grants. Finally, he reviewed statistics regarding the benefits of mitigation versus their costs.

Planning Process

Mr. Subbio provided an overview of the HMP planning process, then described the steps in detail. This section summarizes the detailed description of each step.

The first step involves identifying the hazards of concern for Delaware County. The hazards of concern that will be analyzed in the HMP are as follows:

- Civil Disturbance
- Dam Failure
- Drought
- Earthquake
- Environmental Hazards
- Extreme Temperatures
- Flood, Flash Flood, and Ice Jam
- Hailstorm
- Hurricane, Tropical Storm, Nor'easter
- Landslide
- Levee Failure
- Lightning
- Pandemic
- Radon Exposure
- Subsidence, Sinkholes
- Terrorism
- Tornado, Windstorm
- Transportation Accidents
- Utility Interruption
- Wildfire
- Winter Storm

Hazards of concern are examined in the risk assessment process. After the risk assessment is complete, Tetra Tech and the county will conduct a Risk Assessment Review Meeting to collect feedback on the results.

Tetra Tech and the county will assess municipalities' and stakeholders' capabilities to implement hazard mitigation. These capabilities include plans, regulations, staff expertise, access to internal and external funding, training of key staff, and education and outreach.

Based on the risk assessment and capabilities assessment, plan participants will update the mitigation strategy. Municipalities and other stakeholders will identify mitigation actions they have taken over the last 5 years. The HMP Steering Committee will develop a set of mitigation goals and objectives for the updated HMP. Tetra Tech's planners will work with the county and other stakeholders to identify specific, implementable mitigation actions for inclusion in the updated plan. To that end, a Mitigation Strategy Workshop will be conducted to help participants identify solutions to the problems posed by hazards in the county. Mr. Gluck stated that there are pumping stations that need improvements to protect them.

Throughout this process, Tetra Tech will be developing the HMP document. The risk assessment, capabilities assessment, and mitigation strategy will each have their own sections of the HMP. Other sections of the HMP include an updated County Profile section, which describes the nature of the county and its population; the Planning Process section, which documents the steps the county took to update the HMP; and the Plan Maintenance section, which documents how the HMP will be reviewed and updated over its 5-year lifespan.

Mr. Subbio then described the plan review and approval process. He noted that the Pennsylvania Emergency Management Agency (PEMA) usually requests only minor changes, but FEMA almost always asks for substantial changes based on best practices from other jurisdictions in FEMA Region III. Tetra Tech will update the HMP as necessary until it is granted Approvable Pending Adoption (APA) status by FEMA. After that, Delaware County and participating municipalities can adopt the HMP, which will be followed by formal approval of the HMP by FEMA. The goal for the plan to achieve APA status is August 2022 so that the plan can be adopted in September 2022, prior to the opening of the application period for the Building Resilient Infrastructure and Communities (BRIC) and Flood Mitigation Assistance (FMA) grants.

Following the approval of the updated plan, the county will continue to conduct regular review meetings with the Planning Team. In addition, members of the Planning Team should discuss the HMP and hazard mitigation at other stakeholder meetings. Most importantly, the county and municipalities should work to implement the plan.

Review Schedule

Mr. Subbio reviewed the project schedule. The draft of the updated HMP will be complete by the end of April 2022 if information is provided to Tetra Tech in a timely manner. That will allow time for the public, PEMA, and FEMA reviews to occur and APA status to be achieved by August 2022.

Introduce Worksheets

Mr. Subbio reviewed the following set of information-gathering worksheets that municipalities are asked to complete:

- Hazard Identification and Risk Evaluation Worksheet
- Capability Assessment Survey
- Local Compliance with the National Flood Insurance Program (NFIP) Checklist
- Mitigation Strategy 5-Year Mitigation Plan Review

Mr. Subbio explained that the worksheets are primarily for municipal officials to complete, but other stakeholders would have ample opportunity to participate in the planning process.

Public and Stakeholder Outreach

Mr. Subbio then described the public and stakeholder outreach methods that are being used to secure as much participation in the planning process as possible. A project website, www.delcopahmp.com, has been created to provide information on the planning process. Tetra Tech has developed a set of information-gathering online surveys for different stakeholder groups (e.g., academia, business and industry, healthcare, public works, transportation, etc.; neighboring counties; and the general public) to provide information on how hazards affect them and their organizations and what needs they may have. Tetra Tech is also developing a simple online mapping tool in which a person can identify a location where hazards can or have affected a community. Stakeholder organizations will be invited to attend Planning Team meetings held throughout the planning process. Finally, there will be two public meetings during the planning process: one to review the risk assessment results and one to review the final draft.

Next Steps

The following next steps were identified at the close of the meeting:

- Municipalities will send any relevant documents, reports, plans, etc., to the county or Mr. Subbio for review and incorporation into the HMP.
- Tetra Tech and the county will distribute the set of standard worksheets to municipal officials.
- Tetra Tech will develop the online problem area mapping tool.
- Tetra Tech and the county will distribute the stakeholder surveys to stakeholder organizations.
- Municipalities will complete the information-gathering worksheets.
- Tetra Tech will continue to update the hazard profiles.

The meeting adjourned at 2:11 p.m.

TETRA TECH

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Delaware County Hazard Mitigation Plan 2022 Update

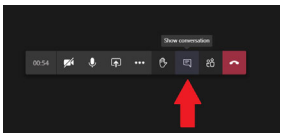
Planning Team Kickoff Meeting

November 16, 2021
1:00 – 3:00 p.m.

1

Welcome

- If you are attending the webinar on your computer, please add your name, title, and organization(s) to the chat window.
  - Bring your mouse to the lower part of the screen until a set of buttons appears.
  - Click Show conversation.



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Agenda

- Welcome and Introductions
- Overview of Hazard Mitigation
- Planning Process
- Review Schedule
- Introduce Worksheets
- Public and Stakeholder Outreach
- Next Steps
- Questions

3

Welcome and Introductions

- Please post your name and organization in the Chat.
- What are your areas of focus for the HMP?

4

What is hazard mitigation?

Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event

"…provides the blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and local ability…" (CFR).

5

5

Mitigation Works!

- The nation saves **$6** for every **$1** spent through mitigation grants, funded through select federal agencies.

National Benefit-Cost Ratio (BCR) Per Peril *BCR numbers in this study have been rounded	Beyond Code Requirements	Federally Funded
Overall Hazard Benefit-Cost Ratio	$4:1	$6:1
Riverine Flood	$5:1	$7:1
Hurricane Surge	$7:1	Too few grants
Wind	$5:1	$5:1
Earthquake	$4:1	$3:1
Wildland-Urban Interface Fire	$4:1	$3:1

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Overview of Hazard Mitigation (Cont.)

Questions?

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Planning Process

- Update the Risk Assessment
- Update the Capabilities Assessment
- Update the Mitigation Strategy
- Update Other Sections of the HMP
- Submit the HMP for Review
- Adopt the HMP
- Implement the HMP

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Planning Process: Step 1
Update the Risk Assessment

- Hazards of Concern

• Drought	• Landslide	• Wildfire	• Terrorism
• Earthquake	• Lightning	• Winter Storm	• Transportation Accidents
• Extreme Temperatures	• Pandemic	• Civil Disturbance	• Utility Interruption
• Flood, Flash Flood, and Ice Jam	• Radon Exposure	• Dam Failure	
• Hailstorm	• Subsidence, Sinkholes	• Environmental Hazards	
• Hurricane, Tropical Storm, Nor'easter	• Tornado, Windstorm	• Levee Failure	

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Planning Process: Step 2
Update the Capabilities Assessment

- Capabilities
  - Planning and Regulatory Capability
  - Administrative and Technical Capability
  - Financial Capability
  - Education and Outreach
  - Self-Assessment of Capability

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Planning Process: Step 3
Update the Mitigation Strategy

- Review Goals and Objectives
- Determine Status of Mitigation Actions
- Identify New Mitigation Actions/Projects
  - ***Focus on specific, implementable actions!***
- Conduct Mitigation Strategy Workshop

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Planning Process: Step 4
Update Other Sections of HMP

- County Profile
  - Updated data
- Planning Process
  - Documentation of the update process
- Plan Maintenance
  - Incorporation into other plans, as well as determining ways to incorporate other plans into the updated HMP

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Planning Process: Step 5
Submit the HMP for Review

- Review Draft with Planning Team
- 30-day Public Comment Period
- Conduct Public Meeting to Review the Draft
- Submit for Pennsylvania Emergency Management Agency (PEMA) Review
  - 14 to 28 days
- Submit for Federal Emergency Management Agency (FEMA) Review
  - 45 days
- "Approvable Pending Adoption" Status

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Planning Process: Step 6
Adopt the HMP

- County and at least one participating municipality
- FEMA Approval
- Adoption Goal – September 2022

14

Planning Process: Step 7
Implement the HMP

- Regular Planning Team Meetings
- Stakeholder Meetings
- Implement Mitigation Actions and Projects
  - Integrate actions where appropriate

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Review Schedule

- Risk Assessment
  - September 2021 – March 2022
- Capabilities Assessment
  - November 2021 – April 2022
- Mitigation Strategy
  - February – April 2022
- Draft Plan by the end of April 2022
- Submit to PEMA by the beginning of June 2022
- Submit to FEMA by the end of June 2022
- "Approvable Pending Adoption" by the end of August 2022

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Introduce Worksheets

- Hazard Identification and Risk Evaluation Worksheet
- Capability Assessment Survey
- Local Compliance with the NFIP Checklist
- Mitigation Strategy 5-Year Mitigation Plan Review

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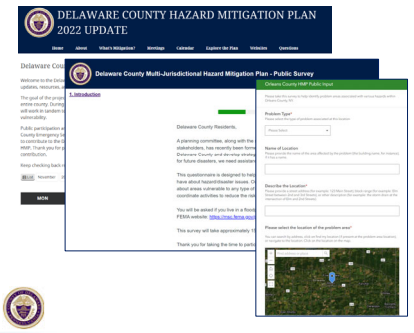
Public and Stakeholder Outreach



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Next Steps

- Document Request
- Complete Municipal Worksheets
- Update the Risk Assessment

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Questions?

Thank you for your time!

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Contacts

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(610) 565-8700

Tony Subbio
tony.subbio@tetratech.com
(717) 839-5654

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AGENDA

DELAWARE COUNTY 2022 HAZARD MITIGATION PLAN UPDATE

Planning Team Kickoff Meeting

Tuesday, November 16, 2021 | 1:00 – 3:00 p.m.

1. **Welcome and Introductions**
2. **Overview of Hazard Mitigation**
3. **Planning Process**
   a. Update the Risk Assessment
   b. Update the Capabilities Assessment
   c. Update the Mitigation Strategy
   d. Update Other Sections of the HMP
   e. Submit the HMP for Review
   f. Adopt the HMP
   g. Implement the HMP
4. **Review Schedule**
5. **Introduce Worksheets**
6. **Public and Stakeholder Outreach**
7. **Next Steps**
8. **Questions**

Project Schedule

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Task	Timeframe
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Hazard Identification and Risk Evaluation Worksheet

Name: _____ **Title:** _____

Jurisdiction: _____ **Email:** _____

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought		
Earthquake		
Extreme Temperatures (heat and cold)		
Flood (riverine, flash, stormwater, and ice jam)		
Hailstorm		
Hurricane, Tropical Storm, Nor'easter		
Landslide		
Lightning Strike		
Pandemic		
Radon Exposure		
Subsidence, Sinkhole		
Tornado/Windstorm		
Wildfire		
Winter Storm		
Human-Caused Hazards		
Civil Disturbance		
Dam Failure		

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases		
Levee Failure		
Terrorism		
Transportation Accidents		
Urban Fire and Explosion		
Utility Interruptions		

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Capability Assessment Survey

Name: _____ **Title:** _____

Jurisdiction: _____ **Email:** _____

Phone Number: _____

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan					
Emergency Operations Plan					
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations					
Floodplain Management Plan					
Zoning Regulations					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations					
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)					
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance					
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code					
Fire Code					
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)				
Planners or engineers (with natural and/or human caused hazards knowledge)				
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)				
Emergency Manager				
Floodplain Manager				
Land Surveyors				
Scientists or staff familiar with the hazards of the community				
Personnel skilled in GIS and/or FEMA's HAZUS program				
Grant writers or fiscal staff to handle large or complex grants				
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
Community Development Block Grants (CDBG)				
Special Purpose Taxes				
Gas / Electric Utility Fees				
Water / Sewer Fees				
Stormwater Utility Fees				
Development Impact Fees				
General Obligation, Revenue, and/or Special Tax Bonds				
Partnering Arrangements or Intergovernmental Agreements				
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification				
StormReady certification				
Natural disaster or safety related school programs				
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)				
Public-private partnership initiatives addressing disaster-related issues				
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.				
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			
Administrative and Technical Capability			
Financial Capability			
Education and Outreach			

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: _____ **Title:** _____

Jurisdiction: _____ **Email:** _____

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.		
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.		
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.		
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.		
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.		

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.		

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.		
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.		

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.		

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.		
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.		

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	
Are there any outstanding compliance issues (i.e., current violations)?		
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____

Jurisdiction: _____ Email: _____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.						
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Delaware County Department of Emergency Services
Emergency Management
Quarterly Inservice for First Quarter 2022

Welcome:

1) Natural Hazard Mitigation Plan Update – Tony Subbio, Tetratech
2) Flood Plain Management – Acquisition & Demolition
3) Shelter Survey Review
    a. Explanation of the County's Mass Care program – Danielle Koerner
    b. Publicly funded schools and organizations
    c. Mutual Aid agreements for sheltering
4) Nominations, Appointments & Certifications
    a. Pat O'Connell – Local Professional
    b. John Pietrafitta – Local Basic
    c. Joseph Pretti – Local Basic
    d. Joseph LaSpina – Nominated by Rutledge
    e. Alfonse Brooks – Nominated by Marcus Hook & Trainer
    f. Ray Stiles – Appointed for Bethel
    g. John Gould Appointed for Clifton Heights
5) Training Classes
    a. Classes are posted in Train.org/PA
    b. We are working to revive the in-person training here on campus.
    c. Please forward class requests to Brigid Payne (payneb@co.delaware.pa.us)
    d. Local checklists available here
    e. Time in Service for certification
6) Statewide Spring Exercise 2022
    a. April 20th tornado event
    b. Designed to accommodate Joint Commission Criteria as well as EM.
    c. Contact Sara Senkow (Senkows@co.delaware.pa.us) for full package,intro package available here.
7) Open Forum
8) Adjournment

DELAWARE COUNTY EMERGENCY SERVICES

Event: 1st QTR County EM

Date: 9 MARCH 2022

Time: 1330 – 1500

	Last Name	First Name	From	Phone Number	Email Address
1	BRENNEN	BOB	MIDDLETOWN TWP	610-565-2700	BBRENNEN@MIDDLETOWNDELCOPA.GOV
2	Alston	Darnell	CFD	267-[illegible]507-4807	dalston@chesterfire.net
3	Postlewait	Kevin	CFD	610-447-7765 x110	
4	SCHROW	SARA	DES	610-892-8117	skrow@co.delaware.pa.us
5	BAIL	Joseph	NEWTOWN TWP	610-724-8148	TCTSGT@AOL.COM
6	STILES	RAY	BETHEL	610 960 8041	RSTILES@BETHELTWP.COM
7	OConnell	Pat	Prospect Park	610 476-4311	POconnell@prospectparkboro.com
8	Gluck	Chris	Radnor PD	610-212-3001	cgluck@radnor.org
9	Smith	DANIEL	UPLAND BORO	484-324-5340	FIREMARSHAL@UPLANDBORO.ORG
10	Petraglia	John	Springfield Twp	610-476-1697	oempetro9174@gmail.com
11	Rigby	WILLIAM	CHESTER	610 213 9588	WRIGBY@CHESTERFIRE.NET
12	HANCOCK	JASON	DES		
13	Koerner	Danielle	DES	215-275-8581	Koerner@co.delaware.pa.us
14	Maciolek	Tammi	DES		maciolek@co.delaware.pa.us
15	ROBINSON	WILLIAM	UPPER CHI. TWP	610-872-8401	EMC@UPPERCHITWP.ORG
16	BAINS	INDER	DES	267 827 9535	BAINSI@co.delaware.pa.us
17	FIELD	FRED	CONCORD TWP	610-459-8911	FFIELD@CONCORDTWP.ORG
18	MORGAN	THOMAS	ASTON	610 656 2651	MORGANT@CODELAWARE.PA.US
19	MURRAY	THOMAS	MARPLE	610 613-2036	TJMURRAY7501@GMAIL.COM
20	PRETTI	JOE	EddysTone P.D	6107244729	JPRETTI@EddysTonePd.com
21	[illegible]	JIM	Media Boro	610-566-5210	jim@mediaborough.com
22	Seagreves	Jeff	Thornbury Twp	610-399-8383	Jeff@thornbury.org
23	Michael	Leonard	Delco DES		
24	FULTON	LEE	SPRINGFIELD	610-653-0221	LFULTON@SPRINGFIELDPA.GOV

DELAWARE COUNTY EMERGENCY SERVICES

Event:

Date:

Time:

	Last Name	First Name	From	Phone Number	Email Address
1	WARD	LARRY	Chester Heights	610 656 2660	larryd@garnetvalley.org
2	Payne	Brigid	DES		
3	McKee	Jen	Rutledge	484-474-0211	rutledgemanager@gmail.com
4	Holcomb	Rufus	Yeadon Borough	484-645-5503	EMCyeadon@gmail.com
5	NARCavage	Robert	DES	484-239-4261	NarcavageR@co.Delaware.PA.US
6	VASEK	Bob	CONCORD Township	484-576-0532	BVasek@ConcordTownship.org
7	KLINE	ED	DELCO DES	610 308 7529	KLINEE@co.delaware.pa.us
8	SAWYER	DERRICK	UDFD	610-613-0603	dsawyer@udfd.org.
9	[redacted]				
10	CARR	STEVEN	DES	610 496-1628	
11					
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Delaware County Hazard Mitigation Plan

2022 Update

Municipal Meeting

March 9, 2022
1:30 p.m.

1

Status

- Geographic Information Systems (GIS) data received March 1, 2022
- Conducting vulnerability assessment
- Next Steps:
  - Complete risk assessment
  - Public meeting to review risk assessment
  - Develop mitigation actions

2

Information Provided

- Worksheets provided by:
  - Concord Township
  - Marcus Hook Borough
  - Marple Township
  - Thornbury Township
- Problem area survey completed by:
  - MIPC (Monroe Energy)

https://arcg.is/1jryu11

3

Problem Areas

Where/How do these hazards affect you?

• Civil Disturbance	• Extreme Temperature	• Lightning Strike	• Transportation Accident
• Dam Failure	• Flood, Flash Flood, and Ice Jam	• Pandemic and Infectious Disease	• Urban Fire and Explosion
• Drought and Water Supply Deficiencies	• Hailstorm	• Radon Exposure	• Utility Interruption
• Earthquake	• Hurricane, Tropical Storm, Nor'easter	• Subsidence, Sinkhole	• Wildfire
• Environmental Hazards - Hazardous Materials Releases	• Landslide	• Terrorism	• Winter Storm
• Environmental Hazards - Gas/Liquid Pipelines	• Levee Failure	• Tornado, Windstorm	

4

Contacts

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bakl@co.delaware.pa.us
(610) 565-8700

Tony Subbio
tony.subbio@tetratech.com
(717) 839-5654

5

MEETING NOTES

Meeting	Delaware County Hazard Mitigation Plan (HMP) Risk Assessment Review Meeting		
Date	June 14, 2022	**Time**	6:00 – 7:55 p.m.
Location	Webinar		
Attendees	Larry Bak, Deputy Director, Emergency Management, Delaware County Emergency Services		
	Tim Boyce, Director of Emergency Services, Delaware County Emergency Services		
	Ed Magargee, District Manager, Delaware County Conservation District		
	Brigid Payne, Delaware County Emergency Services		
	Sara Senkow, Delaware County Emergency Services		
	Thomas P. Shaffer, Interim Director, Delaware County Planning Department		
	Anne Stauffer, Senior Planner, Delaware County Planning Department		
	Ray Stiles, EMC, Bethel Township		
	Karen Wilwol, Delaware County Conservation District		
	Debra Zimmerman, Township Manager, Chester Township		
	Frederick H. Field, EMC and Fire Marshal, Concord Township		
	Bill Robinson, EMC, Upper Chichester Township; President, Ogden Fire Company; Member, Delaware County Local Emergency Planning Committee (LEPC)		
	Don Vymazal, Township Manager, Upper Providence Township		
	Jamie Anderson, Coordinator, Eastern Delaware County Stormwater Collaborative		
	Karen Holm, Eastern Delaware County Stormwater Collaborative		
	Tony Subbio, Project Manager, Tetra Tech		

Discussion Points

This section summarizes each discussion point addressed during the Risk Assessment Review Meeting.

Welcome

Mr. Bak welcomed attendees to the meeting.

Worksheet Completion Status

Mr. Subbio stated that worksheets were still needed from 41 municipalities. All four worksheets have been received from 8 municipalities.

Risk Assessment Results

Hazard Profiles

Mr. Subbio reviewed the results of the risk assessment with attendees. Discussion points associated with each hazard are listed below.

- **Civil Disturbance** – Mr. Bak reported that several communities experienced disturbances surrounding the George Floyd case.

- **Dam Failure**
    - The Earles Lake Dam and Broomall Lake Dam were breached and no longer exist.
    - Several dams on the Darby Creek and Ridley Creek were removed for environmental improvement, not because they posed a risk.
    - The spillway on the PA-252/Providence Road dam was rebuilt.
- **Drought & Water Supply Deficiencies** – nursery stock is the county's highest-value agricultural product.
- **Earthquake** – attendees had no comments on this hazard.
- **Environmental Hazards (Hazardous Materials Releases)** – attendees had no comments on this hazard.
- **Environmental Hazards (Oil and Natural Gas Pipelines)** – attendees had no comments on this hazard.
- **Extreme Temperature** – attendees had no comments on this hazard.
- **Flood, Flash Flood, and Ice Jam**
    - The county has removed structures in flood prone areas in Colwyn Borough, Darby Township, and Springfield Township.
    - Flooding on the Blue Route has caused cars to stall and resulted in accidents.
    - On the Garnet Mine Road border of Bethel Township and Concord Township near Kirk Road, a small stream overwhelms the capacity of a culvert, causing flooding on the roadway.
    - Chester Township has completed eight acquisition/demolition projects and is pursuing another nine.
    - In Haverford Township, the apartment complex along the Darby Creek at West Chester Pike and Lawrence Road floods.
    - Mr. Magargee reported that SEPTA is designing a flood control project in Sharon Hill Borough.
    - In Springfield Township, Darby Creek experiences debris dams near West Rolling Road and Doe Run Lane, causing flooding to nearby homes. The township removed several homes in this area after Hurricane Floyd.
    - In Upper Chichester Township:
        - I-95 at PA-452 (Exit 2) floods frequently.
        - The culvert along Spring Run under Larkin Road is undersized, and the road floods.

        - The culvert along the East Branch of Naaman Creek under Larkin Road is undersized, causing flooding on the roadway.
    - In Upper Darby Township
        - The Idle Hour Tennis Club off of State Road is vulnerable to flooding from the Darby Creek.
        - The Naylors Run culvert is undersized.
    - In Upper Providence Township, Crum Creek Road off of State Road at the US-1 overpass floods frequently.
- **Hailstorm** – attendees had no comments on this hazard.
- **Hurricane/Tropical Storm** – attendees had no comments on this hazard.
- **Landslide** – attendees had no comments on this hazard.
- **Levee Failure** – Mr. Magargee stated that all of the levees in the county have had problems.
- **Lightning** – attendees had no comments on this hazard.
- **Pandemic and Infectious Disease**
    - Mr. Bak reported that the county lacked the logistical infrastructure to support distribution of vaccines, medical supplies, and personal protective equipment (PPE). Logistical infrastructure in the county needs to be improved.
    - Broadband infrastructure to support remote working/learning is needed in the county.
    - Healthcare and EMS facilities may close, which would impact the ability to provide healthcare in the county.
    - Delaware County had to request a federal hospital be set up during the pandemic.
- **Radon Exposure** – attendees had no comments on this hazard.
- **Subsidence and Sinkholes** – attendees had no comments on this hazard.
- **Terrorism** – the for-profit health systems on which the county relies may be targets.
- **Tornado, Windstorm** – attendees had no comments on this hazard.
- **Transportation Accidents –** Flooding on roadways has caused accidents in the past.
- **Urban Fire and Explosion** – attendees had no comments on this hazard.
- **Utility Interruptions**
    - Mr. Bak expressed concern that some water plants are vulnerable to flooding.
    - Trees killed by the Emerald Ash Borer in particular can fall on utility lines.
- **Wildfire** – attendees had no comments on this hazard.

- **Winter Storm** – attendees had no comments on this hazard.

Risk Factor Analysis

Mr. Subbio reviewed the Risk Factor Analysis, which prioritizes the hazards that could affect the county and its municipalities. He also reviewed the Municipal Risk Factor Analysis worksheet. Municipal officials can indicate on the worksheet their risk relative to the county's overall risk from each of the profiled hazards.

Next Steps

- Municipal officials will complete any remaining information gathering worksheets.
- Tetra Tech and the county will finalize the risk assessment.
- Tetra Tech will develop a set of draft mitigation goals and objectives and discuss them with the Steering Committee.
- A Mitigation Strategy Workshop will be conducted on June 29, 2022. Invitations were sent via email.
- Tetra Tech and participating organizations will begin developing mitigation actions for inclusion in the updated HMP.

The meeting adjourned at 7:55 p.m.

TETRA TECH

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Delaware County Hazard Mitigation Plan

2022 Update

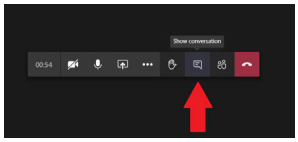
Risk Assessment Review Meeting

June 14, 2022
7:00 – 9:00 p.m.

1

Welcome

- Please add your name, title, and organization(s) to the chat window.
  - Bring your mouse to the lower part of the screen until a set of buttons appears.
  - Click **Show conversation**.



2

Agenda

- Welcome
- Worksheet Completion Status
- Risk Assessment Results
- Next Steps

3

Worksheet Completion Status

- Still need worksheets from 41 municipalities
- Received all worksheets from 8 municipalities
- Providing information is a participation requirement for the HMP
  - Lack of participation in this HMP planning process can prevent funding eligibility

4

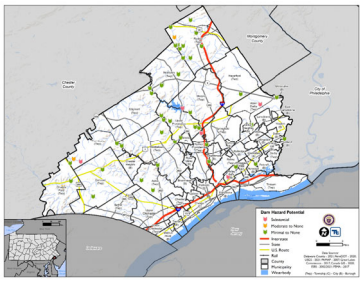
Risk Assessment Results

- Civil Disturbance
  - History
    - No comprehensive list of past occurrences
  - Exposure
    - Government facilities and monuments are most vulnerable
    - Potential economic impacts and other damage

5

Risk Assessment Results

- Dam Failure
  - 53 dams
  - 8 high-hazard
  - Buildings, economy, and population at risk



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Risk Assessment Results

- **Drought & Water Supply Deficiencies**
  - History (since 1980)
    - 17 drought watch declarations
    - 19 drought warning declarations
    - 12 drought emergency declarations
    - $85 in lost crop insurance payments within the county from 2015-2021
  - Exposure
    - 2,385 acres of farmland
    - $9.5 million per year in agricultural products
    - $214,000 in livestock, poultry, and associated products

7

7

Risk Assessment Results

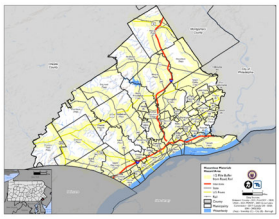
- Earthquake
  - History (since 1724)
    - No earthquake epicenters
    - Numerous earthquakes have occurred throughout the northeast but no major impacts to Delaware County
  - An estimated $71.6 million in damage would occur to buildings in the county during a 500-year earthquake event.

8

8

Risk Assessment Results

- **Environmental Hazards (Hazardous Materials Releases)**
  - Exposure
    - 366,454 people within ½ mile of major roadway
    - 302,055 people within ½ mile of railroad
    - 458,726 people within vulnerability radius of a hazardous Materials SARA site
  - Expected damage depends on the incident



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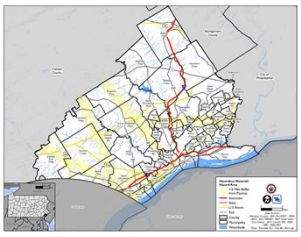
Risk Assessment Results

- **Environmental Hazards (Oil and Natural Gas Pipelines)**
  - Exposure
    - 113, 860 people within ½ mile of pipeline
    - Overall, 293 critical facilities are exposed to a pipeline event, and 194 of those facilities are considered lifelines.
    - Expected damage depends on the incident



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Risk Assessment Results

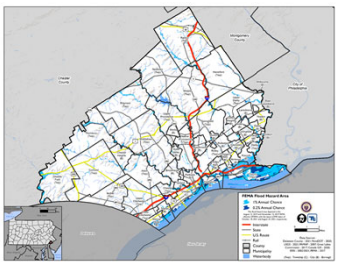
- **Extreme Temperature**
  - History
    - 29 extreme temperature events between 1996 and 2021
      - 3 extreme cold events
      - 26 extreme heat events
  - Exposure
    - Entire population exposed
      - 16 percent of population is 65 years or older

11

11

Risk Assessment Results

- **Flood, Flash Flood, and Ice Jam**
  - History
    - 6 federal disaster declarations since 1950
    - 57 major floods or flash floods since 1950
    - 0 ice jams since 1950
  - Exposure (1% annual chance flood)
    - 14,824 people in the special flood hazard area (SFHA)
    - 110 critical facilities
    - $739.9 million in exposed property value (including residential, commercial, and other occupancy types)
    - 3,230 people seeking shelter



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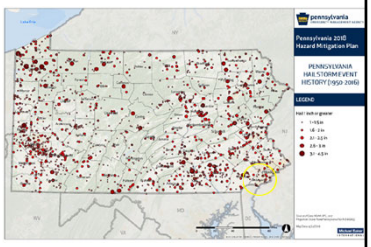
Risk Assessment Results

- Hailstorm
  - History
    - 26 hailstorms since 1980
    - 0 federal disaster declarations
  - If a hailstorm eliminated the entire agricultural yield in Delaware County, total losses on the county's 61 farms could reach $9,494,000



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Risk Assessment Results

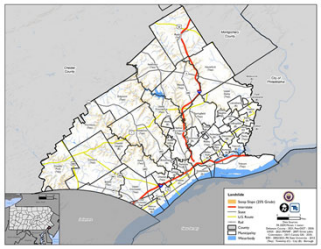
- Hurricane/ Tropical Storm
  - History
    - 30 hurricane, tropical storm, or tropical depression events tracked within 60 nautical miles
    - 8 declared hurricane/tropical storm-related major disaster declaration (DR) or emergency (EM) classified
  - Exposure
    - $247.8 million in damages to buildings for a 500-year MRP hurricane wind event

14

14

Risk Assessment Results

- Landslide
  - 1 geological hazard-related event
  - Slopes over 25 percent
  - Exposure
    - 27,156 people
    - Depends on soil type
    - 8,874 buildings
    - 37 critical facilities
  - Expected losses depend on the nature and extent of the landslide



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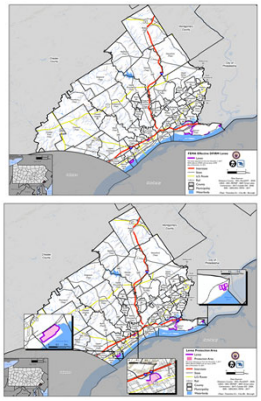
Risk Assessment Results

- Levee Failure
  - 8 levees
  - No levee failure events
  - 4 critical facilitates within hazard area



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Risk Assessment Results

- Lightning
- History- events between 1950 and 2021
  - 39 impactful lightning events
  - 1 fatality
  - 5 injuries
  - Over $800,000 in property damage
  - No FEMA declared major disaster declarations

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17

Risk Assessment Results

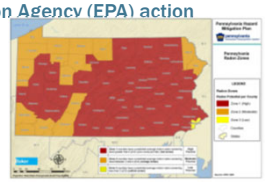
- Pandemic and Infectious Disease
  - Previous Pandemics
    - 1918-1920 – Spanish Flu H1N1
    - 1957-1958 – Asian Flu H2N2
    - 1968-1969 – Hong Kong Flu H3N2
    - 2009-2010 – Swine Flu H1N1
  - COVID-19 – as of 6/13/21
    - 118,665 confirmed cases
    - 1,888 deaths
    - 482,952 full vaccinations administered (72%)
    - 482,952 partially vaccinated (85%)

18

18

Risk Assessment Results

- **Radon Exposure**
  - Health impacts
    - Responsible for more than 20,000 lung cancer deaths every year in the U.S.
  - High exposure potential
  - U.S. Environmental Protection Agency (EPA) action level:
    4 picoCuries per liter (pCi/L)
    - U.S. average: 1.3 pCi/L
    - County average: 4 pCi/L



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Risk Assessment Results

- **Subsidence and Sinkholes**
  - Delaware County does not have the carbonate geology that results in sinkholes
  - Exposure
    - 2,300 located in a subsidence hazard area
    - 844 building in a subsidence hazard area
    - 15 critical facilities in a subsidence hazard area

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Risk Assessment Results

- **Terrorism**
  - History
    - Occasional domestic terrorism incidents such as school bomb threats.
    - Annual probability: Delaware County can expect to experience several terrorist threats or suspicious activities each year; however, few will result in an actual terrorist incident
  - Exposure
    - Entire County is vulnerable

21

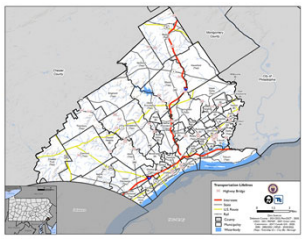
Risk Assessment Results

- **Tornado, Windstorm**
  - History (1950-2021)
    - 5 tornados
    - 101 strong wind events
    - 34 high wind events
    - 165 thunderstorm wind events
    - Annual probability: 100%
  - Exposure
    - Entire County is vulnerable

22

Risk Assessment Results

- **Transportation Accidents**
  - History (2015 – 2020)
    - 29,050 major vehicle accidents, depending on source
    - 428 railroad incidents
    - 13 aviation incidents
  - Potential economic impacts and other damage



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Risk Assessment Results

- **Urban Fire Explosion**
  - 20 urban fire events reported between 2002-2022
  - An estimated 95.2-percent chance of an urban fire or explosion event occurring in any given year

24

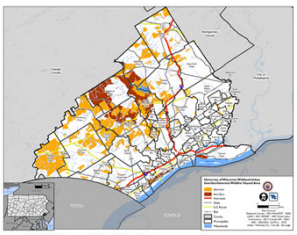
Risk Assessment Results

- **Utility Interruptions**
  - Often a secondary impact of another hazard event
  - History – 1996-2021
    - 104 major incidents
  - Exposure
    - Entire county
    - Regional events are usually the most severe
  - Impacts to vulnerable populations

25

Risk Assessment Results

- **Wildfire**
  - History
    - 16 wildfires, 2001-2022
    - Does not include all events
  - Exposure
    - 18, 781 people in the wild-urban interface
    - 33,786 people in the wild-urban intermix
    - 6,587 structures in the wild-urban interface
    - 11,111 structures in the wild-urban intermix
    - 79 critical facilities in wild-urban interface/intermix



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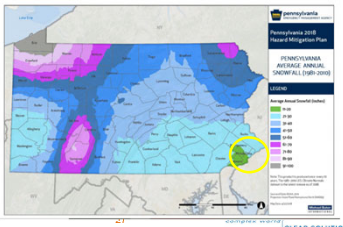
Risk Assessment Results

- **Winter Storm**
  - History
    - 38 major winter storm events since 1950
    - 6 disaster declarations since 1953
  - Exposure
    - Entire County is vulnerable



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Risk Assessment Results

- **Risk Factor Analysis**

HAZARD RISK	HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, and Ice Jam	4	3	4	3	3	3.3
	Winter Storm	4	2	4	3	3	3.1
	Drought and Water Supply Deficiencies	4	2	3	1	4	2.9
	Environmental Hazards - Hazardous Materials	4	2	2	4	2	2.9
	Utility Interruption	3	2	3	4	3	2.9
	Hailstorm	4	2	2	2	1	2.5
MODERATE	Extreme Temperature	2	2	4	1	3	2.4
	Radon Exposure	4	1	2	1	4	2.4
	Tornado, Windstorm	3	2	2	4	1	2.4
	Pandemic and Infectious Disease	2	2	3	1	4	2.3
	Environmental Hazards - Gas/Liquid Pipelines	2	2	2	4	2	2.2
	Lightning Strike	4	1	2	2	1	2.2
	Transportation Accident	4	1	1	4	1	2.2
	Wildfire	3	1	2	2	3	2.1
	Hurricane, Tropical Storm, Nor'easter	2	2	2	1	3	2.0
LOW	Urban Fire and Explosion	3	1	1	4	1	1.9
	Dam Failure	1	2	1	4	2	1.7
	Subsidence, Sinkhole	2	1	1	4	1	1.6
	Terrorism	1	2	2	1	1	1.5
	Landslide	1	1	2	3	1	1.4
	Civil Disturbance	1	2	1	1	2	1.4
	Earthquake	1	1	1	4	1	1.3
	Levee Failure	1	1	1	2	2	1.2

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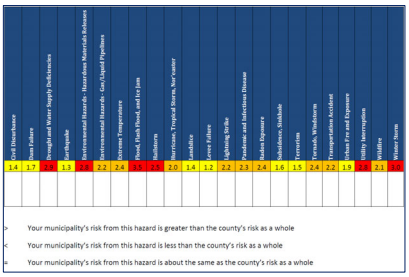
Risk Assessment Results

- **Municipal Risk Factor Analysis**



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Next Steps

- Complete Municipal Worksheets
- Finalize Risk Assessment
- Develop Mitigation Goals and Objectives
- Conduct Mitigation Strategy Workshop
- Identify Mitigation Actions

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Questions?

Thank you for your time!

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Contacts

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Tony Subbio
tony.subbio@tetratech.com
(717) 856-4290

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AGENDA

DELAWARE COUNTY 2022 HAZARD MITIGATION PLAN UPDATE

Risk Assessment Review Meeting

June 14, 2022 | 7:00 – 9:00 p.m.

1. **Welcome**
2. **Worksheet Completion Status**
3. **Risk Assessment Results**
   a. Hazard Profiles
   b. Risk Factor Analysis
4. **Next Steps**
   a. Mitigation Actions Handout
   b. Mitigation Strategy Workshop
5. **Questions**

Worksheet Completion Status

Municipality	Hazard Evaluation Survey	Capability Assessment Survey	NFIP Survey	Mitigation Strategy Survey
Aldan Borough				
Aston Township				
Bethel Township	x	x	x	x
Brookhaven Borough				
Chadds Ford Township				
Chester City				
Chester Heights Borough				
Chester Township				
Clifton Heights Borough				
Collingdale Borough				
Colwyn Borough				
Concord Township	x	x	x	x
Darby Borough				
Darby Township				
East Lansdowne Borough				
Eddystone Borough				
Edgmont Township				
Folcroft Borough				
Glenolden Borough				
Haverford Township				
Lansdowne Borough				
Lower Chichester Township				
Marcus Hook Borough	x	x	x	x
Marple Township	x	x	x	x
Media Borough				
Middletown Township	x	x	x	x
Millbourne Borough				
Morton Borough				
Nether Providence Township				
Newtown Township				

Municipality	Hazard Evaluation Survey	Capability Assessment Survey	NFIP Survey	Mitigation Strategy Survey
Norwood Borough				
Parkside Borough				
Prospect Park Borough	x	x	x	x
Radnor Township	x	x	x	x
Ridley Park Borough				
Ridley Township				
Rose Valley Borough				
Rutledge Borough				
Sharon Hill Borough				
Springfield Township				
Swarthmore Borough				
Thornbury Township	x	x	x	x
Tinicum Township				
Trainer Borough				
Upland Borough				
Upper Chichester Township				
Upper Darby Township				
Upper Providence Township				
Yeadon Borough				

Contents

Delaware County/Countywide/Multiple Municipalities

- Many stakeholder survey respondents indicated that flooding is their biggest concern within the County.
    - Backyards flood
    - Chester Creek floods and causes tree loss when floodwaters inundate the creek banks.
    - Crum Creek Dam floods and causes erosion along pipeline right of way.
- There are many child-care facilities throughout the county vulnerable to hazards.
- The Delaware County Sewage Treatment Plant is located within a 0.2 percent chance flood zone.
- The following critical facilities are within the wildland-urban interface and may be vulnerable to wildfires:
    - District Court 32-2-46
    - US Army Reserve Base Sewer Treatment Plant
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Delaware County Historical Society
    - Delaware County Housing Authority
    - Delaware County Human Services Building - 16007002-1
    - Delaware County Institute of Technology
    - Delaware County Intermediate Unit
    - Delaware County Memorial Hospital
    - Delaware County Prison Sewer Treatment Plant
    - Delaware County Sewage Treatment Plant
    - Delaware County Sheriff's Department
    - Delaware County Technical School: Folcroft Campus
    - Delaware County Technical High School: Marple Campus
    - PENNDOT 0630-01 Delaware County
- The FAA PHL ALSF may be vulnerable to sinkholes.

Aldan (B)

- The following critical facilities are within ½ mile of rail routes and may be vulnerable to a hazardous materials release and are located within a selected buffer of a SARA Site:
    - Aldan Elementary School
    - Aldan Historical Commission

Aston (Twp)

- The Aston Beechwood Fire Company is located within the 0.2 percent annual chance flood zone.
- The following critical facilities may be vulnerable to a hazardous materials release
    - Aston Free Library
    - Aston Historical Society
    - Aston Police Department
    - Aston Twp Community Center
    - Green Ridge Fire Company

- Holy Family Regional Catholic School
- Iceworks
- Kindercare Learning Center
- Media Children's House
- Nalco Water Pretreatment Solutions – Aston
- Nuco 2 Supply Llc Aston Depot
- Pennell Elementary School
- Pyramid Materials

Bethel (Twp)

- The following critical facilities may be vulnerable to a hazardous materials release
  - Belmont Senior Center
  - Bethel Fire Co
  - Bethel Police Department
  - Bethel Springs Elementary School
  - Bethel Township Building
  - Bethel Township Hose Company
  - Bethel Township Preservation Society
  - Booths Corner Market
  - Laurel Pipeline Company, L.P
  - Naamans Creek Country Manor
  - PECO - Foulk Substation

Brookhaven (B)

- The Brookhaven Treatment Plant is located within the 0.2 percent annual chance flood zone and a subsidence hazard area.
- The Dutton Mill Rd Water Storage Facility is located within the steep slope landslide hazard area.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Brookhaven Fire Company
  - Brookhaven Municipal Center
  - Brookhaven Police Department
  - Brookhaven Treatment Plant
  - Christian Academy
  - Coebourn Elementary School
  - Dutton Mill Rd Water Storage Facility
  - Kindercare Learning Center
  - Lowe's Of Brookhaven (#3277)
  - Our Lady of Charity Church
  - PECO Dutton Mill Rd Sub Station
  - Real Church - 05000003-1

- Thomas Coeburn Elementary School

Chadds Ford (Twp)

- The following critical facilities are located within a flood zone:
  - Brandywine Conservancy & Environmental Management Center
  - Christian C. Sanderson Museum
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Brandywine Battlefield Park Association
  - Brandywine Conservancy & Environmental Management Center
  - Brinton 1704 House
  - Calvary Chapel of Delaware County
  - Chadds Ford HARB
  - Chadds Ford Historical Society
  - Christian C. Sanderson Museum
  - Goddard School
  - Knights Bridge Sewage Treatment Plant
  - Nestle Health Science Philadelphia
  - PECO 202 Sub Station
  - Ridings Sewage Treatment Plant
  - Saint Cornelius School
  - Springhill Farms Sewage Treatment Plant
- The following critical facilities may be vulnerable to wildfires:
  - Calvary Chapel of Delaware County
  - Christian C. Sanderson Museum
  - Ridings Sewage Treatment Plant
  - Saint Cornelius School

Chester City (C)

- The following critical facilities are located within a 0.1 percent chance flood zone:
  - Anthem Propane
  - Apple Pie Christian Academy
  - Evonik Corporation
  - Exelon Chester Generating Station
  - Kimberly Clark Pa LLLC
  - PECO Front St Sub Station
  - PQ Corporation Chester
- The following critical facilities are located within a 0.2 percent chance flood zone:
  - Anthem Propane
  - Apple Pie Christian Academy
  - Delaware Valley Resource Recovery Facility
  - Evonik Corporation

  - Exelon Chester Generating Station
  - Haven Kindergarten Academy
  - Kimberly Clark Pa LLC
  - PECO Front St Sub Station
  - PQ Corporation Chester
  - Sun Ship Historic Marker
  - Sun Village Maintenance Garage
- The following critical facilities may be vulnerable to a hazardous materials release:
  - 1724 Chester Courthouse
  - Amtrak/Lamokin Substation
  - Anthem Propane
  - Apple Pie Christian Academy
  - Belvedere Center Genesis Healthcare
  - Center for Self-Development
  - Chatham Estates
  - Chester Apartments
  - Chester City Fire Company
  - Chester City Municipal Building
  - Chester City Police Department
  - Chester Community Charter School East Campus
  - Chester Fire Station 82
  - Chester High School
  - Chester Historical Preservation Society
  - Chester Park Barn
  - Chester Senior Center
  - Chester Voter Services Center - Vc-2
  - Del Co Voting Machine Storage Building
  - Delaware Valley Resource Recovery Facility
  - Drexel Neumann Academy
  - Edgemont Senior Apartments
  - Evonik Corporation
  - Excelon Front St Sub Station
  - Exelon Chester Generating Station
  - Exelon Lamokin Electric Substation
  - Faith Temple Christian School
  - Felton Fire Company
  - Frederick Douglass Christian School
  - Haven Kindergarten Academy
  - Institute Of Islamic Studies
  - J. Lewis Crozer Library
  - Kimberly Clark Pa LLC
  - Murphy Ame Church
  - Norquay, LLC
  - PECO - Paper Tap Substation

  - PECO - Tilghman Street Gas Plant
  - PECO Booth St Sub Station
  - PECO Engle St Sub Station
  - PECO Flower St Sub Station
  - PECO Front St Sub Station
  - PECO Macdade Blvd Sub Station
  - PQ Corporation Chester
  - Ruth L Bennett Community Center
  - Saint Daniels U.M. Church
  - Shiloh Baptist Church
  - Shiloh Development Academy
  - Stem Academy at Showalter
  - Stetser Elementary School
  - Sun Ship Historic Marker
  - Sun Village Maintenance Garage
  - The Chester Upland School of The Arts
  - True Vine Missionary Full Gospel
  - Verizon Chester A Central Office
  - Verizon Chester B Central Office
  - Victory O/T World Baptist Church
  - WDNR Radio Tower
  - Wellington Ridge
  - West Phila Bronze Co Inc
  - Widener Child Development Center
  - Widener University - Kirkbride Hall
  - Widener University - Maintenance Yard
  - Widener University- Schwartz Center
  - William Penn Landing Site

- The following critical facilities are located within the steep slope land landslide hazard area:
  - Exelon Lamokin Electric Substation
  - Widener University- Schwartz Center
- Chester High School is a levee protected area.
- The following critical facilities are within a subsidence hazard area
  - Evonik Corporation
  - PECO Flower St Sub Station
- The following critical may be vulnerable to wildfires:
  - Center for Self-Development
  - Felton Fire Company
  - NORQUAY, LLC
  - PECO - Tilghman Street Gas Plant
  - Saint Daniels U.M. Church
  - William Penn Landing Site

Chester (Twp)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Alloy Surfaces Company Incorporated
  - Aston Facility
  - Chester Community Charter School
  - Chester Community Charter School Aston Campus
  - Chester Community Charter School West Campus
  - Chester Township Police Department
  - Chester Twp Administration Building
  - Cintas Corporation 100
  - Comcast Cable-Wallingford Headend
  - Feltonville Fire Company
  - Hachik Distributors Inc
  - PECO Bethel Rd Sub Station
  - Pyromet
  - Sunoco Partners Marketing & Terminals L.P. - Marcus Hook Tank Farm
  - Toby Farms Elementary School
  - Toby Farms Intermediate School
  - Toby Farms Nursery School
  - Westrock Cp, LLC

Chester Heights (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Chester Heights Camp Meeting
  - Chester Heights Fire Company
  - Old St Thomas at Ivy Mills Historic District
  - Saint Thomas the Apostle School

Clifton Heights (B)

- LifeWorks School is in a flood zone and may be vulnerable to floods. It is also located within a steep slope area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Clifton Heights Borough Hall
  - Clifton Heights Fire Company
  - Clifton Heights Police Department
  - Lifeworks School
  - McFadden Park
  - Nicholas School
  - PECO Maddison Ave Sub Station
  - Saint Mark's Christian School
  - Today's Child Community Center

- Today's Child Learning Center

Collingdale (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Airgas - Collingdale
  - BR20 Collingdale
  - Christ Memorial Classical Academy
  - Collingdale Community Center
  - Collingdale Fire Company # 1
  - Collingdale Fire Company # 2
  - Collingdale Nazarene Church
  - Collingdale Police Department
  - Collingdale Public Library
  - Harris Elementary
  - Harris School
  - Multi-Flex Plating Company
  - Southeast Academy
  - Ted Direnzo Montessori School
  - The Children's Garden

Colwyn (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Colwyn Borough Hall
  - Colwyn Elementary School
  - Colwyn Fire Company # 1
  - Colwyn Police Department
  - Today's Child Learning Center

Concord (Twp)

- The following critical facilities may be vulnerable to flooding due to them being located within a flood zone:
  - Concord Twp Sewage Treatment Plant 1
  - Fox Valley Sewage Treatment Plant
- Refresco Beverages US INC is located within a steep slope landslide hazard area.
- The following critical facilities may be vulnerable to wildfires
  - Aardvark Child Care and Learning Center
  - Brandywine Youth Club
  - Concord Elementary School
  - Concord Township Historical Commission

  - Concord Township Municipal Building
  - Concord Twp Sewage Treatment Plant 1
  - Fox Valley Sewage Treatment Plant
  - Garnet Valley Elementary School
  - Garnet Valley Middle School
  - KinderCare Learning Center
  - Refresco Beverages Us Inc
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Aardvark Child Care and Learning Center
  - AT&T-Concordville
  - Brandywine Specialty Care
  - Brandywine Youth Club
  - Brinton Manor
  - CarSense Glen Mills
  - Concord Beverage Water Tower
  - Concord Elementary School
  - Concord Township Historical Commission
  - Concord Township Municipal Building
  - Concord Twp Sewage Treatment Plant 1
  - Concord Twp Sewage Treatment Plant 2
  - Concordville Fire Association
  - Continuing Care at Maris Grove
  - Costco Wholesale #1114
  - Fox Hill Farms
  - Fox Valley Sewage Treatment Plant
  - Garnet Valley High School
  - Garnet Valley Middle School
  - Garnett Valley Sewage Treatment Plant
  - KinderCare Learning Center
  - Maris Grove
  - Nicholas Newlin Foundation
  - PECO Spring Valley Rd Sub Station
  - Pennington Center
  - Refresco Beverages Us Inc
  - Southco Sewage Treatment Plant
  - St Johns Episcopal Church
  - Target Store T-2172
- The following critical facilities may be vulnerable to wildfires:
  - Aardvark Child Care and Learning Center
  - Brandywine Youth Club
  - Concord Elementary School
  - Concord Township Historical Commission
  - Concord Township Municipal Building
  - Concord Twp Sewage Treatment Plant 1

- Fox Valley Sewage Treatment Plant
- Garnet Valley Elementary School
- Garnet Valley Middle School
- Kindercare Learning Center
- Refresco Beverages US INC

Darby (B)

- The AT&T is located within a flood zone and may be vulnerable to flooding.
- The following critical facilities are located within a steep slope area and may be vulnerable to landslides:
  - AT&T
  - Darby Borough Recreation Center
  - Park Lane Elementary School
- The following critical facilities may be vulnerable to a hazardous materials release:
  - AT&T
  - Blessed Virgin Mary School
  - Creative Minds Christian Academy
  - Darby Borough Historical Commission
  - Darby Borough Historical Preservation Society
  - Darby Borough Police Department
  - Darby Borough Recreation Center
  - Darby Fire Company # 1
  - Darby Fire Company # 2
  - Darby Free Library
  - Little Flower Manor
  - Marvil Funeral Home
  - Park Lane Elementary School
  - PECO Wycombe Ave Sub Station
  - Penn Wood Middle School
  - Penn Wood West Junior High School
  - St Francis Country House
  - Tender Years Preschool
  - The Children's Garden
  - Walnut Street Elementary School

Darby (Twp)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - Darby Twp Sewage Treatment Plant
  - Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Ashland Middle School

- Briarcliffe Fire Company
- Bumble Bee Preschool and Kindergarten
- Darby Township Community Center
- Darby Township Elementary School
- Darby Township Fire Company
- Darby Township Historical Commission
- Darby Township Old Municipal Building
- Darby Township Police Department
- Darby Township School
- Darby Twp Sewage Treatment Plant
- Evangel Assembly of God Church
- Goodwill Fire Company
- Kindergarten Center
- Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm

East Lansdowne (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - East Lansdowne Basic School
  - East Lansdowne Borough Hall
  - East Lansdowne Elementary School
  - East Lansdowne Fire Company # 1
  - East Lansdowne Police Department
  - Vision Academy Charter School

Eddystone (B)

- PECO 7TH ST SUB STATION is located within the 0.1 percent chance flood zone and may be vulnerable to flooding.
- The following critical facilities are located within the 0.2 percent flood zone and may be vulnerable to flooding:
  - Boeing Sub Station
  - Exelon Power Plant
  - PECO 7TH St Sub Station
  - Penn Terminals, LLC
- The PECO - Baldwin Service Building is located within a steep slope hazard area and may be vulnerable to landslides
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Baker Petrolite
  - Boeing Sub Station
  - Del Monte Fresh Produce Company
  - Eddystone Elementary School
  - Eddystone Fire Company

- Eddystone Police Department
- Exelon Fire and Rescue
- Exelon Power Plant
- Liberty Electrical Company Electrical Plant
- Liberty Electric Power LLC
- Light House Hall
- PECO 7TH St Sub Station
- PECO - Baldwin Service Building
- Penn Terminals, LLC

Edgmont (Twp)

- The following critical facilities may be vulnerable to wildfires:
  - Edgemont Fire Company
  - Edgmont Township Municipal Building
  - Edgemont USARC
  - El Buen Samaritano Church
  - Health Care Ctr at White Horse Village
  - Neumann University
  - PECO Graddyville Rd Sub Station
  - Runnymeade Farms Sewage Treatment Plant 1
  - Runnymeade Farms Sewage Treatment Plant 2
  - Runnymeade Farms Sewage Treatment Plant 4
  - US Army Reserve Base Sewer Treatment Plant
  - Whitehorse Village Sewage Treatment Plant
- The Colonial Pennsylvania Plantation is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Edgemont Fire Company
  - Edgemont USARC
  - Edgmont Township Municipal Building
  - El Buen Samaritano Church
  - Health Care Ctr At White Horse Village
  - Neumann University
  - PECO Graddyville Rd Sub Station
  - Runnymeade Farms Sewage Treatment Plant 2
  - Runnymeade Farms Sewage Treatment Plant 4
  - US Army Reserve Base Sewer Treatment Plant
  - Whitehorse Village Sewage Treatment Plant

Folcroft (B)

- The following critical facilities are within the selected buffer of SARA sites and may be vulnerable to a hazardous materials release:
    - Bullen Companies
    - Cork Industries, INC
    - Delcroft Elementary School
    - East Penn Manufacturing Co.
    - Folcroft Fire Company # 1
    - Folcroft Police Department
    - Folcroft Public Library
    - Folcroft Union Church
    - KinderCare Learning Center
    - White Cap, Ltd. (WC186)

Glenolden (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
    - Amtrak/Glenolden Substation
    - Glenolden Elementary School
    - Glenolden Fire Company # 1
    - Glenolden Historical Commission
    - Glenolden Library
    - Glenolden Police Department
    - PECO Knowles Ave Sub Station
    - PECO - Macdade Substation
    - Verizon Glenolden Co
    - Walter M. Senkow Elementary

Haverford (Twp)

- The Haverford Township Administration Build is located within a steep slope hazard area and may be vulnerable to landslides.
- The Haverford Twp Community Center is located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - American Legion Nunan-Slook 338
    - Annunciation Church
    - Armenian Martyrs Cong Church
    - Bon Air Fire Co
    - Bon Aire Fire Company
    - Brookline Fire Company
    - Bryn Mawr Extended Care Center
    - Bryn Mawr Terrace

- Campbell Ave Water Storage Facility
- Cardinal Foley School
- Chatham Park Elementary School
- Chestnutwold Elementary School
- Child Guidance Elementary Ed. Program
- Crestwood
- Friendly Faces Day Care
- Haverford College
- Haverford Friends School
- Haverford High School
- Haverford Monthly Meeting Of Friends
- Haverford Police Department
- Haverford Township Administration Build
- Haverford Township Historical Society
- Haverford Township Middle School
- Haverford Twp Community Center
- Haverford Twp. Library
- Havertown PCP Site
- Keep Kindergarten
- Kindred Hospital Philadelphia-Havertown
- Little Eagle Daycare
- Llanerch Fire Company
- Lowe's Of Havertown (#3169)
- Lynnewood Elementary School
- Manoa Community Church
- Manoa Elementary School
- Manoa Fire Company
- Normandy Park Building
- Oakmont Fire Company # 1
- Old Haverford Friends Meeting
- Old Sacred Heart School
- PECO Eagle Rd Sub Station
- PECO Landover Rd Sub Station
- PECO West Chester Pike Sub Station
- Play And Learn
- Sacred Heart School
- Saint Faith Preschool and Kindergarten
- St James United Church of Christ
- The Grange
- Trinity Christian Church
- Westgate Hills Rehab & Nursing Center
- WHHS

Lansdowne (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - 20th Century Club
  - Ardmore Avenue Elementary School
  - Historic Lansdowne Theater Corporation
  - Lansdowne Borough HARB
  - Lansdowne Fire Company
  - Lansdowne Friends School
  - Lansdowne Montessori School
  - Lansdonwe Police Department
  - Lansdowne Public Library
  - PECO Union Ave Sub Station
  - Penn Wood High School
  - Peppers Pharmacy
  - SS. Cyril & Philomena School
  - Today's Child Learning Center
  - Verizon Lansdowne Co (Pa24650)

Lower Chichester (Twp)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Delaware Bay & River Cooperative Inc
  - Esschem INC
  - Honeywell International Inc
  - Linwood Elementary School
  - Linwood Fire Company
  - Linwood Youth Center
  - Lower Chichester Police Department
  - Nalco Water Pretreatment Solutions
  - PECO Laughead Ave Sub Station
  - PECO - Linwood Substation
  - PECO Ormond St Sub Station
  - Sonrise Christian Day School
  - Sun Oil Refinery Sub Station

Marcus Hook (B)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - Marcus Hook Community Center
  - Marcus Hook Energy Center
  - Sun Oil Fire Brigade
  - Sunoco LLC - Race Fuels
  - Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex

- The following critical facilities may be vulnerable to hazardous materials release:
    - Braskem / Marcus Hook
    - Marcus Hook Community Center
    - Marcus Hook Elementary
    - Marcus Hook Energy Center
    - Marcus Hook Fire Company
    - Marcus Hook Historical Commission
    - Marcus Hook Municipal Building
    - Marcus Hook Police Station
    - Marcus Hook Recreation Center
    - MARY M. CAMPBELL LIBRARY
    - PECO - Blueball Substation
    - PECO - Marcus Hook Substation
    - PECO - Post Substation
    - Plank House
    - Sun Oil Fire Brigade
    - Sunoco LLC - Race Fuels
    - Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex
    - Viscose Fire Company

Marple (Twp)

- The Broomall Rehabilitation & Nursing Center is located within a steep slope hazard area and may be vulnerable to landslides.
- The Broomall Presbyterian Village is located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - 1696 Thomas Massey House
    - AT&T
    - Broomall Fire Company
    - Broomall Manor
    - Broomall Presbyterian Village
    - Broomall Rehabilitation & Nursing Center
    - Cardinal O'Hara High School
    - Charles H. Russell Elementary School
    - Chesterbrook Academy
    - CHI Institute
    - Children In The Son Learning Center
    - Etta Natalie Rosenblatt Preschool
    - Grayson School
    - Hillview Nursery School
    - Jay W. Worrall Elementary School
    - Marple Historical Society
    - Marple Municipal Building

- Marple Police Department
- Marple Public Library
- Marple Twp Water Storage Facility
- Meadows At Martins Run
- Miss Annette's Creative Nursery
- Paxon Hollow Middle School
- PECO Chester Pike Sub Station
- PECO New Ardmore Ave Sub Station
- PECO Reed Rd Sub Station
- Saint Pius X School
- Sproul Rd Water Storage Facility
- St Luke Greek Orthodox Church
- The Home Depot Store #4181
- Wesley Enhanced Living Main Line Rehab and Skilled Nursing

Media (B)

- The Blue Route Vineyard Community Church is located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - AT&T
  - Blue Route Vineyard Community Church
  - Christ Episcopal Church Child Care Program
  - Crew Kids Choice Day Care & Learning Center
  - Ethel Mason Child Development Center
  - Heritage Commission of Delaware County
  - Media Borough HARB
  - Media Community Center
  - Media Elementary School
  - Media Fire Company
  - Media Historic Archives Commission
  - Media Police Department
  - Media Providence Friends School
  - Media Voter Services Center
  - Media-Upper Providence Library
  - Nativity BVM Church
  - PA Veterans Museum Media Amory
  - Sterling Health Care & Rehab Center
  - Today's Child Learning Center
  - Verizon MEDIA CO
  - Youth Way Water Storage Facility

Middletown (Twp)

- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
    - Children's Academy
    - Easter Seals of Southeastern Pa
    - Fair Acres Geriatric Center
    - Glenwood Elementary School
    - Hanson Aggregates Pa LLC
    - Hunter Street Water Storage Facility
    - Lima Fire Company
    - Middletown Free Library
    - Middletown Montessori School
    - Middletown Municipal Building
    - Middletown Township Historical Society
    - Middletown Water Storage Facility
    - Monticello House
    - Oakbridge Terrace at Lima Estates
    - PECO Middletown Rd Sub Station 1
    - Riddle Hospital
    - Riddle Memorial Hospital
    - Riddle Memorial Hospital-Based SNF
    - Simon Youth Academy
    - The Pennsylvania State University-Brandywine Campus
    - Willowbrooke Court at Lima Estates
- The following critical facilities may be vulnerable to hazardous release materials:
    - Aqua Pa - Ridley Creek Water Treatment Plant
    - Children's Academy
    - Easterseals Southeastern Pennsylvania
    - Elwyn Davidson School
    - Fair Acres Geriatric Center
    - Glenwood Elementary School
    - Hanson Aggregates Pa LLC
    - Hunter Street Water Storage Facility
    - Indian Lane Elementary School
    - Lanchford Hall at Tyler Arboretum
    - Lenni Fire Company # 1
    - Lima Fire Company
    - Middletown Fire Company
    - Middletown Free Library
    - Middletown Montessori School
    - Middletown Municipal Building
    - Middletown Township Historical Society
    - Middletown Water Storage Facility
    - Monticello House

- Oakbridge Terrace at Granite Farms Estates
- Oakbridge Terrace at Lima Estates
- PA State Police
- Painter Library at Tyler Arboretum
- PECO Baltimore Pike Sub Station
- PECO Middletown Rd Sub Station 1
- Penncrest High School
- Riddle Memorial Hospital
- Roosevelt Community Center
- Simon Youth Academy
- The Development Center at Elwyn
- The Pennsylvania State University-Brandywine Campus
- Wawa Beverage Company
- Willowbrooke Court at Granite Farms Estates
- Willowbrooke Court at Lima Estates

Millbourne (B)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Millbourne Borough Hall
  - Milbourne Fire Company
  - Millbourne Police Department

Morton (B)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Morton Borough Hall
  - Morton Fire Company
  - Morton Police Department
  - Morton Train Station
  - Step by Step Learning Center and Child Care

Nether Providence (Twp)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Garden City Fire Co 1
  - Garden City Fire Company
  - Helen Kate Furness Library
  - Media Shopping Center
  - Mother of Providence Regional Catholic School
  - Nether Providence Elementary School
  - Nether Providence Historical Commission

- Nether Providence Historical Society
- Nether Providence Middle School
- Nether Providence Police Department
- PECO Harvey Rd Sub Station
- South Media Fire Company
- Strath Haven High School
- Strath Haven Middle School
- Thomas Leiper House
- Wallingford Elementary School
- Wallingford Nursing & Rehabilitation Ctr
- Wilson Of Wallingford Inc

Newtown (Twp)

- The Melmark School is located within a steep slope hazard area and may be vulnerable to landslides
- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
  - Garretts Way Day Care and Learning Center
  - Malvern School of Newtown Square
  - Newtown Square Penn Railroad Museum
  - Newtown Twp. Water Storage Facility
  - SAP AMERICA INC
  - Square Tavern
  - WRNB Radio Tower
- The following critical facilities may be vulnerable to a hazardous materials release:
  - BPG Real Estate Investors Straw Party 1, L.P.
  - Chesterbrook Academy
  - Culbertson Elementary School
  - Delaware County Christian School
  - Garretts Way Day Care and Learning Center
  - Gauntlett Center
  - Lyondel Chemical Fire Brigade
  - Malvern School of Newtown Square
  - Marple-Newtown Senior High School
  - Netwon Township Police Department
  - Newtown Public Library
  - Newtown Square Fire Company # 1
  - Newtown Square Penn Railroad Museum
  - Newtown Square Presbyterian Nursery School
  - Newtown Twp. Water Storage Facility
  - Octagonal School at Dunwoody Village
  - Saint Anastasia School
  - Sap America Inc

- Springton Lake Montessori School
- Square Tavern
- Stratford Friends School
- The Episcopal Academy
- Verizon Larchmont Co
- William Hood Dunwoody Care Center
- William S. Culbertson Elementary School
- WRNB

Norwood (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - ABC & Me Learning Center
  - Equipment Trade Service Co Inc
  - Norwood Borough Hall
  - Norwood Elementary School
  - Norwood Fire Company
  - Norwood Historical Society Inc
  - Norwood Police Department
  - Norwood Public Library
  - VFW Post 7213

Parkside (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Parkside Elementary School
  - Parkside Fire Company # 1
  - Parkside Police Department
  - PECO Houston Rd Sub Station

Prospect Park (B)

- The Concord Township Sewer Department is located within a flood zone and may be vulnerable to flooding.
- The Morton Homestead is located within a subsidence hazard area and may be vulnerable to sinkholes.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Concord Township Sewer Department
  - Interboro Athletic Field House
  - Interboro Kindergarten Academy
  - Interboro High School
  - Morton Homestead
  - Prospect Park Health & Rehab Residence

- Prospect Park Police Department
- Prospect Park Fire Company
- Propect Park Elementary School
- Prospect Park Historical Society
- Prospect Park Library

Radnor (Twp)

- The Main Line Montessori is located within a flood zone and may be vulnerable to flooding
- The Radnor Police Department is located within a steep slope hazard area and may be vulnerable to landslides.
- The WYBF Radio Tower and the Saint David's Episcopal Day School are both located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Academy Of Notre Dame De Namur
  - Agnes Irwin School
  - Archbishop Carroll High School
  - AT&T Corp
  - Cabrini University
  - Central Nursery School
  - Cheder Chabad
  - Hilltop Preparatory School
  - Ithan Elementary School
  - Jack M. Barrack Hebrew Academy
  - JUDITH CREED HORIZONS FOR ACHIEVING IND
  - Lane Montessori School
  - Main Line Classical Academy
  - Main Line Montessori
  - PECO Aldwyn Ln Sub Station
  - Radnor Elementary School
  - Radnor Fire Company
  - Radnor High Scholl
  - Radnor Historical Society
  - Radnor Middle School
  - Radnor Police Department
  - RADNOR TOWNSHIP BUILDING
  - Radnor Township HARB
  - RADNOR TWP. LIBRARY
  - RADNOR UNITED METHODIST CHURCH
  - Saint David's Episcopal Day School
  - Saint Katharine Of Siena
  - ST MARY'S EPISCOPAL CHURCH
  - SULPIZIO GYMNASIUM
  - THE ROSEMONT PLAZA APTS

- Valley Forge Military Academy
- Verizon WAYNE CO (PA21170)
- Villanova University
- W235AP Radio Tower
- WAYNE CENTER
- Wayne Elementary School
- WAYNE PRESBYTERIAN CHURCH - 36001001-1
- Wayne Presbyterian Nursery School
- WXVU Radio Tower
- WYBF Radio Tower

Ridley (Twp)

- The following critical facilities are located within a flood hazard area and may be vulnerable to flooding:
  - Boeing Fire Brigade
  - Boeing - Philadelphia
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
  - Sellers Ave Sewage Treatment Plant
  - Sure Power Philadelphia
  - Water's Edge (Old Rookies River Rm)
- The following critical facilities are located within a subsidence hazard area and may be vulnerable to sinkholes:
  - Boeing - Philadelphia
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
  - Sure Power Philadelphia
- The following critical facilities are susceptible to sea level rise:
  - Boeing - Philadelphia
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Amosland Elementary School
  - Art of Growing Nursery School
  - Boeing - Philadelphia
  - Boeing Fire Brigade
  - Buxmont Academy/Woodlyn Center
  - Church of Atonement Day School
  - Church of Christ
  - Concordville Operations Center
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
  - Fizzano Brothers Concrete Products, Inc.

- Folsom Fire Company
- Grace Park Elementary
- Grace Park School - 38002003-1
- Holmes Fire Company
- Holy Spirit Lutheran Church
- Knights Of Columbus
- Leedom Elementary School
- Leedom Fire Company
- Marine Corps Reserve Center Folsom
- Maxim Crane Works L. P.
- Milmont Fire Company
- Notre Dame De Lourdes
- Our Lady of Angels Regional School
- Our Lady of Fatima Church
- PECO - Woodlyn Substation
- PECO Chester City Sub Station
- PECO Fairview Rd Sub Station
- PECO Springfield Ave Sub Station
- Ridley Community Center
- Ridley High School
- Ridley Township Police Department
- Ridley Twp. Public Library
- S.M. Vauclain Fire Company
- Sellers Ave Sewage Treatment Plant
- Sure Power Philadelphia
- The Discovery Tree
- The Home Depot Store #4142
- Water's Edge (Old Rookies River Rm)
- Woodlyn Elementary School
- Woodlyn Fire Company
- WRSD Radio Tower
- YMCA Ridley Area Children's Corner Kindergarten

Ridley Park (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Christ Episcopal Church
  - Conner-Williams Nursing Home
  - Lakeview Elementary Scholl
  - Ridley Middle School
  - Ridley Park Borough
  - Ridley Park Fire Company
  - Ridley Park HARB
  - Ridley Park Historical Commission

- Ridley Park Historical Society
- Ridley Park Library
- Ridley Park Police Department
- Saint James Regional Catholic School
- Southco, Inc. - Concordville
- Taylor Hospital
- Verizon RIDLEY PARK CO (PA24320)

Rose Valley (B)

- The Old Mill Polling Site is located within a flood zone and may be vulnerable to flooding.
- The School in Rose Valley and the Rose Valley Treatment Plant are both located within a wildfire hazard area and may be vulnerable to wildfires
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Rose Valley Museum & Historical Society
  - Rose Valley Treatment Plant
  - The School in Rose Valley

Rutledge (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Rutledge Community Center
  - Rutledge Fire Company

Sharon Hill (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Academy Park High School
  - ES OPCO USA LLC – PH
  - PECO Chester Pike Sub Station
  - PECO - Sharon-Hill Substation
  - Sharon Hill Elementary School
  - Sharon Hill Fire Company
  - Sharon Hill Historical Commission
  - Sharon Hill Historical Society
  - Sharon Hill Police Department
  - Sharon Hill Public Library
  - Today's Child Learning Center

Springfield (Twp)

- The Littler Friends Child Care is located within a flood zone and may be vulnerable to flooding.
- The Aqua Pa - Crum Creek Water Treatment Plant is located within a steep slope hazard area and may be vulnerable to landslides.

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Aqua Pa - Crum Creek Water Treatment Plant
  - AQUA PA - Springfield Transportation Garage
  - Baltimore Pike Water Storage Facility
  - Bj's Wholesale Club #056
  - Church Of The Redeemer
  - E.T. Richardson Middle School
  - Friends Meetinghouse
  - Harlee Manor Nursing & Rehab Center
  - Harvey Sabold Elementary School
  - Holy Cross School
  - Life Discovery School Kindergarten
  - Littler Friends Child Care
  - New Destiny Christian Center
  - Office Suites At Stoney Creek
  - Old Central School
  - PECO - Morton Substation
  - PECO Baltimore Pike Sub Station
  - PECO Church Rd Sub Station
  - PECO Springfield Rd Substation
  - PECO Sproul Rd Sub Station
  - PECO Thomson Ave Sub Station
  - Public Works Building
  - Saint Francis Of Assisi School
  - Scenic Hills Elementary School
  - Scott Kia Of Springfield
  - Springfield Baptist Church
  - Springfield Country Club
  - Springfield Fire Company
  - Springfield Hanby Masonic Lodge 767
  - Springfield High School
  - Springfield Historical Society
  - Springfield Hospital
  - Springfield Hospital At The Healthplex
  - Springfield Library
  - Springfield Municipal Building
  - Springfield Police Department
  - Springfield Township Fire Co
  - Springfield Twp. Library
  - Target Store T-1136
  - Target Store T-2312
  - The Home Depot Store #4114
  - Tree Of Life Church
  - Verizon Springfield Co (Pa24690)

- West Ave Water Storage Facility

Swarthmore (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Cades
  - Friends Historical Library
  - George Crothers Memorial School at Cades
  - Swarthmore Borough Hall
  - Swarthmore Fire Company
  - Swarthmore Historical Society
  - Swarthmore Library
  - Swarthmore Police Department
  - Swarthmore-Rutledge School
  - The Kids Place
  - Trinity Cooperative Day Nursery
  - WSRN-FM

Thornbury (Twp)

- The Home Depot Store #4121 is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
  - Bethlehem United Methodist Church
  - Stonybank Community Church
  - The Home Depot Store #4121
  - Thornbury Historical Society
  - Thornbury Twp Sewage Treatment Plant
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Bethlehem United Methodist Church
  - Cheyney College Sewage Treatment Plant
  - Glen Mills School
  - Glen Mills School Sewage Treatment Plant
  - Malvern School of Glen Mills
  - Stonybank Community Church
  - The Home Depot Store #4121
  - Thornbury Historical Commission
  - Thornbury Historical Society
  - Thornbury Township Municipal Bldg
  - Thornbury Twp Sewage Treatment Plant
  - Wzze

Tinicum (Twp)

- The following critical facilities are located within a flood hazard area and may be vulnerable to flooding:
    - FAA PHL ALSF
    - FAA PHL ATCT
    - Lester Fire Company
    - Messina Electric - 45002000-1
    - Philadelphia Fuel Facility Inc
    - Philadelphia International Airport
    - PHL-CDF
    - SKC Hangar (Tenants Assoc.)
    - Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
    - Tinicum Police Department
    - Tinicum Public Library
    - Tinicum Twp Sewage Treatment Plant
    - Tinicum Twp Water Storage Facility
    - UNITED AIRLINES-PHL
    - Western Fumigation (B-2)
- The Sunoco Partners M & T, L.P. - Fort Mifflin Terminal is located within a levee protection area.
- The following critical facilitates are located within a subsidence hazard area and may be vulnerable to sinkholes:
    - FAA PHL ALSF
    - Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
    - UNITED AIRLINES-PHL
- The Essington Fire Company and the Tinicum Township Fire Co. #48 are both located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Essington Fire Company
    - Esstech, Inc.
    - FAA PHL ALSF
    - FAA PHL ATCT
    - Lester Fire Company
    - LOCAL 1776 I A M A W UNION HALL - 45004000-1
    - MESSINA ELECTRIC - 45002000-1
    - PECO ROUTE 291 SUB STATION
    - Philadelphia Air Hub
    - Philadelphia Fuel Facility Inc
    - Philadelphia International Airport
    - PHL-CDF
    - SKC Hangar (Tenants Assoc.)
    - Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
    - TINICUM MUNICIPAL BLDG - 45003000-1
    - Tinicum Police Department

- TINICUM PUBLIC LIBRARY
- Tinicum School
- TINICUM TOWNSHIP FIRE CO. #48 - 45001000-1
- Tinicum Township Historical Society
- TINICUM TWP SEWAGE TREATMENT PLANT
- TINICUM TWP WATER STORAGE FACILITY
- UNITED AIRLINES-PHL
- Western Fumigation (B-2)

Trainer (B)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - Monroe Energy, LLC
  - PECO - Trainer Substation
  - Trainer Police Department
  - Trainer Oil Refinery Sub Station
- Both the Trainer Oil Refinery Sub Station and the PECO - Trainer Substation are located within the levee protection area.
- Both the Trainer Fire Company and the Conoco Phillips Fire and Rescue are located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Congoleum Acquisitions, LLC
  - Congoleum Fire Brigade
  - Conoco Phillips Fire and Rescue
  - DELCORA - Western Regional Treatment Plant
  - Lennox Park Fire Company # 1
  - Monroe Energy, LLC
  - PECO - Trainer Substation
  - Trainer Community Center
  - Trainer Fire Company
  - Trainer Oil Refinery Sub Station
  - Trainer Police Department

Upland (B)

- The Caleb Pusey House & Landingford Plantation is located within a flood zone and may be vulnerable to flooding.
- The Upland Fire Company is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Caleb Pusey House & Landingford Plantation
  - Cheshire House
  - Chester Community Charter School Upland
  - Crozer-Chester Medical Center

- Main Street Elementary School
- Upland Fire Company
- Upland Baptist Church
- Upland Borough Hall
- Upland Police Department

Upper Chichester (Twp)

- Gehr Plastics Inc. is located within a flood zone and may be vulnerable to flooding
- The Verizon CHESTER HEIGHTS CO (PA24013) is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Boothwyn Fire Co 1
  - Boothwyn Fire Company # 1
  - Chichester Historical Society
  - Chichester Kinderschool
  - Kiddie Kampus Learning Center
  - Kindercare Learning Center
  - Little Lambs Christian Kindergarten
  - Mt. Pleasant Nursery School
  - Ogden Fire Co
  - Ogden Fire Company
  - Reliance Hook & Ladder Company
  - Upper Chichester Community Service
  - Upper Chichester Municipal Bldg
  - Upper Chichester Police Department
  - W278AK

Upper Darby (Twp)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - PECO Marshall Rd Sub Station
  - PECO - Upper Darby Substation
  - Speedway 6806
  - Swedish Cabin
- The following critical facilities are located within the steep slope hazard area and may be vulnerable to landslides:
  - Charles Kelly Elementary School
  - PECO MARSHALL RD SUB STATION
  - SEPTA VICTORY SHOP
- The Upper Darby Historical Society and the Speedway 6806 are both located within the wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - 69th St Alliance Church - 16006004-1

- Aardvark Child Care And Learning Center
- Alverston Rd Water Storage Facility
- Ancona Montessori School
- Apple Pie Christian Academy
- Aronomink Elementary School
- Beverly Hills Middle School
- Bywood Elementary School
- Cardington Stonehurst Fire Company
- Careview Community Church - 16007001-1
- Charles Kelly Elementary School
- Christ Lutheran Church - 16007003-1
- Christ's Community Church - 16005008-1
- COMCAST CABLE-Upper Darby OTN
- Delaware Valley Steel
- District Court 32-2-52 - 16002007-1
- Drexel Hill Fire Company
- Drexel Hill Middle School
- Drexel Hill United Methodist Church - 16001005-1
- DREXELBROOK BUILDING 10 - 16001006-1
- DREXELBROOK COMMUNITY CENTER - 16001008-1
- Face The Music Studio - 16003006-1
- Fairy Tale Academy
- Friends Of Sellers Hall
- Garrettford Drexel Hill Fire Co - 16005006-1
- Garrettford Elementary School
- Highland Ave Water Storage Facility
- Highland Park Elementary School
- Highland Park Fire Company
- Hillcrest Elementary School
- Holy Child Academy
- Isaac Garrett House
- Little Friends Child Care And Kindergarten
- Little Friends II Daycare & Learning Center
- Llanerch Hills Chapel - 16003007-1
- Masjid Al-Madinah Islamic Center - 16006002-1
- Meenan Oil Co.
- Monsignor Bonner And Archbishop Prendergast High School
- Mourning House At Arlington Cemetery
- PECO - Llanerch Substation
- PECO - Upper Darby Substation
- PECO Garret Rd Sub Station
- PECO Marshall Rd Sub Station
- Pennock/Sellers Home At Sellers Memorial Library
- Preschool Academy

- Primos Elementary School
- Primos/Secane Fire Company
- Providence Rd Water Storage Facility
- Saint Andrews School
- Saint Bernadette School
- Saint Dorothy School
- Saint Eugene School
- Saint Laurence
- Sellers Library - Main Branch
- Sellers Library Muni. Bldg.
- Sellers Library Primos Branch
- Sellers Memorial Free Library - 16004002-1
- SEPTA VICTORY SHOP
- Sonshine Christian Academy
- Speedway 6806
- Stonehurst Elementary School
- Swedish Cabin
- The Discovery Tree
- Tiny Miracles Learning Center
- Treasure Island Academy - The Journey
- Upper Darby Fire Company # 3
- Upper Darby High School
- Upper Darby Historical Commission
- Upper Darby Historical Society
- Upper Darby Kindergarten Center
- Upper Darby Municipal Library - 16005003-1
- Upper Darby Police Station
- Upper Darby Township Welcome Center - 16007004-1
- Upper Darby Twp Bldg Police Annex - 16006011-1
- Upper Darby Twp Municipal Building - 16005010-1
- Upper Darby Voter Services Center - Vc-3
- Verizon KIRKLYN CO (PA24760)
- Verizon UPPER DARBY ACCTG BLDG (PA24150)
- Verizon Wireless - UPPER DARBY (ID:70010)
- Waste Management Delaware Vallley South
- Watkins Senior Center Gym - 16006006-1
- Westbrook Park Elementary School

Upper Providence (Twp)

- Aqua Pa - Media WWTP is located within a 0.2 percent chance flood zone and may be vulnerable to flooding.
- The Rose Tree Early Learning Center is located within the subsidence hazard area and may be vulnerable to sinkholes.

- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
    - Benchmark School
    - District Court 32-2-46
    - Reformation Lutheran Church
    - Reformation Lutheran Church- Stay & Play Program
    - RMH-HB/SNF nursing home
    - Rose Tree Early Learning Center
    - Rose Tree Elementary School
    - Rose Tree Fire Company
    - Upper Providence Police Department
    - Walden School
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Aqua PA - Media WWTP
    - Benchmark School
    - District Court 32-2-46
    - Media Sewage Treatment Plant
    - PA Institute of Technology
    - PECO Middletown Rd Sub Station 2
    - Reformation Lutheran Church
    - Reformation Lutheran Church- Stay & Play Program
    - RMH-HB/SNF nursing home
    - Rose Tree Early Learning Center
    - Rose Tree Elementary School
    - Rose Tree Fire Company
    - Springton Lake Middle School
    - Upper Providence Police Department
    - Walden School

Yeadon (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
    - Bell Avenue Elementary School
    - Hydrol Chemical Company, Inc.
    - Manorcare Health Services Mercy Fitzgerald
    - Penn Wood East Junior High School
    - Penn Wood High School Cypress Street Campus
    - William B. Evans Computer Magnet School
    - William B. Evans Elementary School
    - Yeadon Fire Company
    - Yeadon Police Department
    - Yeadon Public Library

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	**Degree of Risk**			**Weight Value**
	Level	**Criteria**	**Index**	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	3	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

Risk Factor Methodology Equation

RF Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)]

HAZARD RISK	HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, and Ice Jam	4	3	4	3	3	3.5
	Winter Storm	4	2	4	1	3	3.0
	Drought and Water Supply Deficiencies	4	2	3	1	4	2.9
	Environmental Hazards - Hazardous Materials	4	2	2	4	2	2.8
	Utility Interruption	3	2	3	4	3	2.8
	Hailstorm	4	2	2	2	1	2.5
MODERATE	Extreme Temperature	2	2	4	1	3	2.4
	Radon Exposure	4	1	2	1	4	2.4
	Tornado, Windstorm	3	2	2	4	1	2.4
	Pandemic and Infectious Disease	2	2	3	1	4	2.3
	Environmental Hazards - Gas/Liquid Pipelines	2	2	2	4	2	2.2
	Lightning Strike	4	1	2	2	1	2.2
	Transportation Accident	4	1	1	4	1	2.2
	Wildfire	3	1	2	2	3	2.1
	Hurricane, Tropical Storm, Nor'easter	2	2	2	1	3	2.0
LOW	Urban Fire and Explosion	3	1	1	4	1	1.9
	Dam Failure	1	2	1	4	2	1.7
	Subsidence, Sinkhole	2	1	1	4	1	1.6
	Terrorism	1	2	2	1	1	1.5
	Landslide	1	1	2	3	1	1.4
	Civil Disturbance	1	2	1	1	2	1.4
	Earthquake	1	1	1	4	1	1.3
	Levee Failure	1	1	1	2	2	1.2

Jurisdiction Risk - _____ (Municipality)

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Delaware County Emergency Management

2022 County Quarterly EMC Meeting

Second Quarter

Welcome: Director

Attendance: Please sign in legibly so that we can spell your name correctly

New Certifications

Advanced County Staff

- Sara Senkow

Advanced Local EMC

- Chris Gluck, Radnor Township
- Tom Murray, Marple Township
- Bill Rigby, Chester City

Basic Local EMC

- Larry Ward, Chester Heights Borough
- Bill Robinson, Upper Chichester Township

Advanced Local Staff

- Darnell Alston, Chester City
- Kevin Postelwait, Chester City
- John Paul Shirley, Chester City

Certification Tracker under development so please forward your course certificates to Jason Heacock, Email: Heacockj@co.delaware.pa.us

Also please forward a list of needed courses to Jason after looking on Train.org/PA. If you need a copy of a checklist they are available from: https://www.pema.pa.gov/Directives/Documents/2018-Earlier/D2017-02-EM-Certification-Training-Directive.pdf

American Red Cross

- "Deferred maintenance"
- Isolated housing – "Non-conjugate"
- Staffing Issues
-

Acceptance of Emergency Plans

- Dams, Childcare, Long Term Care, Lifecare
- Signoff form for Municipality, EMA, Police, Fire, EMS and Public Works

Review of Disaster Declaration Process

- Dough for Snow – Historic Snowfall the biggest one-day snowfall was 27.6 inches on Jan. 7, 1996, multi-day event 31"+ January 9, 1996
- Public Assistance Damage Thresholds (population X Per Capita $)
- Delaware County Population 576,830
- County per Capita $4.10
- Delaware County dollar amount $2,365,003.00
- Commonwealth Population 13,002,709
- Commonwealth per Capita $1.63
- Commonwealth dollar amount $21,194,416

Why declare?

- Activates Local Emergency Operations Plan
- Allows emergency purchasing
- Enables County to declare
- Starts the re-imbursement process

Windshield Survey

- Affected
- Minor
- Major
- Destroyed
- Unaccessible

Damage Reporting

Detailed assessments – Uninsured Loss (40%)

Individual and Family Assistance Grants – T.S. Ida

SBA Disaster Assistance Loans – Multiple Opportunities

Public Assistance – Municipal expense categories

Natural Hazard Mitigation Plan Renewal March 2022.

https://www.delcopahmp.com/

Risk Profiles:

Section 4.3.1 – Civil Disturbance_dfp

Section 4.3.2 – Dam Failure_dfp

Section 4.3.3 – Drought and Water Supply Deficiencies_dfp

Section 4.3.4 – Earthquake_dfp

Section 4.3.5 – Env Hazard Hazardous Materials Releases_dfp

Section 4.3.6 – Env Hazards-Gas and Liquid Pipelines_dfp

Section 4.3.7 – Extreme Temp_dfp

Section 4.3.8 – Flood, Flash Flood, Ice Jam_dfp

Section 4.3.9 – Hailstorm_dfp

Section 4.3.10 – Hurr Trop Storm_dfp

Section 4.3.11 – Landslide_dfp

Section 4.3.12 – Levee Failure_dfp

Section 4.3.13 – Lightning_dfp

Section 4.3.14 – Pandemic and Infectious Disease_dfp

Section 4.3.15 – Radon Exposure_dfp

Section 4.3.16 – Subs Sink_dfp

Section 4.3.17 – Terrorism_dfp

Section 4.3.18 – Tornado Windstorm_dfp

Section 4.3.19 – Transportation Accident_dfp

Please take the time to complete the Risk Mapping and Strategies paperwork that we will be sending out again. This data will allow us to provide projects that will assist you in receiving grants for mitigation against future events. Look for the forms to arrive in the next few weeks.

Hazard Mapping

Risks

Inservice Training

DELAWARE COUNTY EMERGENCY MANAGEMENT

1

Agenda

1. EMC Nomination & Appointment
2. Local Critical Infrastructure lists
3. County Natural Hazard Mitigation Plan

2

EMC Nomination and Appointment

- Municipality nominates a candidate by completing the nomination form and sending it to the County with a PSP Volunteer Background Check. (Do not send a NCIC form)
- County signs off and submits the form to PEMA.
- PEMA appoints the Acting Local EMC pending certification at the Basic Level.

3

Appointments

- Alfonse Brooks, Trainer & Marcus Hook Boroughs

4

Certifications

- Sara Senkow, County Advanced Staff
- Chris Gluck, Local Advanced Coordinator
- Tom Murray, Local Advanced Coordinator
- Bill Rigby, Local Advanced Coordinator
- Bill Robinson, Local Basic Coordiantor
- Larry Ward, Local Basic Coordinator
- Darnell Alston, Local Advanced Staff
- Kevin Postlewait, Local Advanced Staff
- JP Shirley, Local Advanced Staff

5

Natural Hazard Mitigation Plan

- County document adopted by municipalities
- Primarily focuses on Natural hazards but can include Technological and Terroristic/Criminal Hazards
- Mitigation strategies and plans can be financed with Post Disaster Grant monies as they become available.
- This cycle there is an emphasis on Critical Infrastructure and strategies to make CI more resilient
- An example of a mitigation strategy would be to install a generator at a critical location that is always losing power.

6


Why should we do this?
Knowing our critical infrastructure and Hazard Mitigation Strategies go a long way towards building a stronger community that is better prepared to withstand events that will likely occur.
We use a Threats, Hazard Identification and Risk Analysis (THIRA) to look at the sum total of conditions and preparedness activities to gauge our capabilities to respond and return to normal from a catastrophic event.
Opportunities to mitigate!!!

7

DELAWARE COUNTY EMERGENCY SERVICES

Event: Q2 2022 County EM

Date: June 21, 2022

Time: 1400

	Last Name	First Name	From	Phone Number	Email Address
1	VASEK	Robert	Concord Twp	484 576 0532	BVasek@ ConcordTownship.org
2	Bail	Joseph	New Town Tw.	610 724 8148	TCTSGT@AOL.COM
3	Bail	Jean	Newtown Twp	6102990683	jean.bail@jefferson.edu
4	FIELD	FRED	CONCORD TWP	610-459-8911	FFIELD@CONCORDTOWNSHIP.ORG
5	Pietrafitta	John	Springfield Twp	610-476-1697	oempetro9174@aol.com
6	Byrne	Thomas	Ridley Park	610-842-3107	tbyrne@ridleyparkpolice.org
7	Byrne	John	Ridley Twp.	4843251977	John Byrne @ Ridleytwp.org
8	Moleski	Tom	Swarthmore	610 636 4457	TMoleski@SwarthmoreFd.org
9	WARD	LARRY	Chester Heights	610 656 8660	Larry@garnetvalley.org
10	STILES	RAY	BETHEL TWP	610 910 8041	RAY.STILES@BETHELTWP.COM
11	GIARRATANO	STEVE	TINICUM/RADNOR	267-455-4567	STEVEJIAN@gmail.com
12	ROBINSON	WILLIAM	UPPER CHICHESTER	610-872-8401	EM@UPPERCHITWP.ORG
13	Jeffs	Jim	Media Bor	610-636-4203	JIM@mediaboro.com
14	PRETTI	JOE	Eddystone P.D.	610-724-4729	JPRETTI@EddystonePd.com
15	SENKOW	Sara	DES	610-892-8117	Senkow@Co.Delaware.pa.us
16	HEACOCK	Jason	DES	6106373588	Heacock@co.delaware.pa.us
17	Mickle	Jim	Rutledge	610 714-5167	rutledgemanager@rutledgepa.org
18	MURRAY	THOMAS	MARPLE TWP	610-613-2036	TJMURRAY7501@GMAIL.COM
19	OConnell	Pat	Prospect Park	610 476 4311	POconnell@ProspectParkBorough.org
20	SAWYER	DERRICK	UPPER DARBY TWP	610-613-0603	dsawyer@udfd.org
21	Rigby	WILLIAM	CHESTER	610 213 9588	WRIGBY@CHESTERFIRE.NET
22	Postlewait	Kevin	Chester	610 447 7765	kpostlewait@chesterfire.Net
23	Booth	Conlen	Crozer Health	610 368 9291	Conlen.Booth@crozer.org
24	ALSTON	DARNELL	CHESTER	6104477765	DALSTON@CHESTERFIRE.NET

DELAWARE COUNTY EMERGENCY SERVICES

Event:

Date:

Time:

	Last Name	First Name	From	Phone Number	Email Address
1	Solt Viola	John	Haverford		
2	POOLE	STEVEN	HAVERFORD		SPOOLE@HAVTWP.ORG
3	Brigid	Payne	DES		PayneB@codele-pa.us
4	Alston	Darnell	CFD		dalston@chesterfire.net
5					
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Delaware County Local Emergency Planning Committee

Second Quarter 2022 Meeting Minutes

The goal of the Delaware County Local Emergency Planning Committee is to promote the safety and preparedness of the Chemical, Manufacturing and Transportation industries and the health and welfare of the residents and businesses of the County.

Welcome: Director Boyce or designee

Attendance: Documented by sign-ins

Today's lunch Provided by Adelphia Gateway, Scott Aharonian. They will be making a presentation on what their recent renovation project included.

If your organization would like to provide lunch for a future meeting please let Larry Bak know.

Tier II Reporting

- SARA Tier II Reporting and Invoicing - The voluntary reporting of all chemicals is greatly appreciated and should not generate excess charges. Please bear with us as we correct some recordkeeping issues that have come to our attention. If you receive a rebill for an invoice that you previously paid please contact Sara Senkow, 610-565-8700 or senkows@co.delaware.pa.us
- Tier II reporting – We bill by email so it is critically important that email addresses for the billing contact be included. We are working on the capability to accept credit cards.

Contact Lists

- Please send us any contacts who we should be using for your facilities and what their role is. Please include Office, mobile and fax numbers as well as email numbers. Please specify if they are a 24 hour contact or daytime only. Please make sure that corrections are being made in the PATTS system as we are finding a number of bad contacts listed in the system. Please send contact lists to Sara Senkow, senkows@co.delaware.pa.us

Reports from facilities

Reports from partner agencies

General Discussion

If anyone needs a copy of the attendance sheet or other handouts please contact us and we will send a copy of it out to you.

Delaware County Local Emergency Planning Committee

Adelphia Gateway / NJ Resources provided a good history of the repurposing of their pipeline to move Natural Gas Products into Delaware County to support operations at key sites. The discussion of the safety practices provided an excellent review for all attendees. It was noted that Adelphia Gateway has always been an active supporter of the training of emergency management and first responders through their sponsorship of tabletop and full scale exercises at their facilities in the County.

The Natural Hazard Mitigation plan was discussed as to the Risk Identification and Mitigation Strategies work going on right now and the need for the input of business and industry on their perceptions on issues that surround their facilities. We will distribute the the forms to any facility wishing to complete them.

There were no further comments and the meeting was adjourned.

Delaware County Local Emergency Planning Committee

Second Quarter 2022 Meeting Agenda

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DELAWARE COUNTY EMERGENCY SERVICES

Event: 2nd Quarter LEPC

Date: June 22 2022

Time: NOON

	Last Name	First Name	From	Phone Number	Email Address
1	Bak	Larry			
2	Aharonian	Scott	Adelphia	570 687 8835	saharonian@njresources.com
3	Lamb	Jeff	Adelphia	732 489 5484	jrlamb@njresources.com
4	Michael	Leonard	Delco	610 852 8123	
5	DRENNEN	BOB	MIDDLETOWN	610-565-2700	BDRENNEN@MIDDLETOWNDELCO.PA.GOV
6	BAIRD	NATE	BOEING	215-684-9244	nathanael.w.baird@boeing.com
7	Sinkus	Steve	des	610 892 8117	swinkus@co.delaware.pa.us
8	clark	Tim	dus		clarkt@co.delaware.pa.us
9	HENDRICK	JASON	DES		
10	Brennan	Joseph	Delco	6108928125	brennanj@co.delaware.pa.us
11	FIELD	FRED	CONCORD TWP	610-459-8911	FFIELD@CONCORDTOWNSHIP.ORG
12	Hoag	LARRY	SKC Hangar	610-969-6273	larryhoag@gmail.com
13	Derwood	DAVE	Energy Transfer	267-224-7871	david.Derwood@energytransfer.com
14	Moat	Byron	Aqua	6108042806	bdmoat@aquaamerica.com
15	Harlan	John	Aqua	C:O 613-9384	jaharlan@aquaamerica
16	Rosen	Kevin	Aqua	215-313-9879	kjrosen@aquaamerica.com
17	KAVANAGH	THADDEUS	MAIN LINE HEALTH	484-580-4490	KAVANAGHT@MLHS.ORG
18	Clark	Scott	Hepaco	267-575-8853	Sclark@hepaco.com
19	Pelna	Stephen	Lewis	610-633-5999	spelna@discoverlewis.com
20	DUFF	DANIEL	LIBERTY Electric	610-872-7585	DANIEL.DUFF@VISTRAENERGY.COM
21	KEENAN	MIKE	ICEWORKS	610-506-2427	ekimhockey@HOTMAIL.COM
22	MILLER	JOSHUA	COAST GUARD	215-271-4860	joshua.K.Miller@uscg.mil
23	Kanapathy	Anand	Adelphia	7327401756	akanapathy@NJresources.com
24	KUKLINSKI	Joe	constellation Energy	610-662-8514	josephokuklinski@constellation.com

DELAWARE COUNTY EMERGENCY SERVICES

Event:

Date:

Time:

	Last Name	First Name	From	Phone Number	Email Address
1	McKenna	Jim	Braskem	610-731-7215	James.mckenna@braskem.com
2	Gaynor	George	Menzies	215-519-3935	george.gaynor@menziesaviation.com
3	Samson	Reuben	Menzies		
4	Payne	Brigid	DES		PayneB@co.del.pa.us
5	Carr	Steven	DES	610 496-1628	carr839@comcast.net
6	Narcavage	Robert	DES	484-239-4261	NarcavageR@co.Padelaw-us
7	Postlewait	Kevin	Chester	484 431 7766	kpostlewait@chesterfire.net
8	Bowen	John	Monroe/MJPC	484-816-3303	john.bowen@monroe-energy.com
9	Pierce	Ron	Monroe Energy	484-844-5773	Ron.Pierce@monroe-energy.com
10	Bamgbose	Abdul	Monroe/MJPC	484 8329848	abdul.bamgbose@monroe-energy.com
11					
12					
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MEETING NOTES

Meeting	Delaware County Hazard Mitigation Plan (HMP) Mitigation Strategy Workshop		
Date	June 29, 2022	**Time**	10:00 – 11:40 a.m.
Location	Webinar		
Attendees	Larry Bak, Deputy Director, Emergency Management, Delaware County Emergency Services		
	Tim Boyce, Director of Emergency Services, Delaware County Emergency Services		
	Thomas J. Clark, Emergency Planner, Delaware County Emergency Services		
	Jason Heacock, Delaware County Emergency Services		
	Howard Lazarus, Delaware County Executive Director		
	Denise Long, Delaware County Public Works Department		
	Ed Magargee, District Manager, Delaware County Conservation District		
	Adrienne Marofsky, Director, Delaware County Office of Public Relations		
	Sara Senkow, Delaware County Emergency Services		
	Thomas P. Shaffer, Interim Director, Delaware County Planning Department		
	Karen Wilwol, Delaware County Conservation District		
	Thomas Morgan, Emergency Management Coordinator (EMC), Aston Township		
	Kevin Postlewait, Chester City Bureau of Fire		
	John Paul Shirley, Battalion Chief, Chester City Bureau of Fire		
	Bob Vasek, EMC, Concord Township		
	David Burman, Township Manager, Haverford Township		
	Bob Drennen, EMC, Middletown Township		
	Jean Bail, EMC, Newtown Township		
	Patrick O'Connell, EMC, Prospect Park Borough		
	Chris Gluck, EMC and Sergeant, Radnor Township		
	Jeff Seagraves, Township Manager, Thornbury Township		
	Michael Ciach, Manager, Upland Borough		
	Daniel Smith, Fire Marshal, Upland Borough		
	Tony Subbio, Project Manager, Tetra Tech		

Discussion Points

This section summarizes each discussion point addressed during the Mitigation Strategy Workshop.

Welcome

Mr. Bak and Mr. Subbio welcomed attendees to the meeting. Attendees introduced themselves.

Municipal Participation

Mr. Subbio stated that worksheets were still needed from 42 jurisdictions. All four key worksheets have been received from 8 municipalities.

Municipal Risk Factor Analysis

Mr. Subbio explained the risk factor analysis worksheet that was reviewed at the Risk Assessment Review Meeting. Municipal officials are to complete the worksheet, which is designed to assess the level of risk from each hazard associated with their respective municipalities as compared to the risk from each hazard to the county as a whole.

Develop the Updated Mitigation Strategy

Mr. Subbio reviewed the document listing the problem statements and problem areas that were identified in each municipality during the planning process so far. The document listed problems that applied to the county as an entity, across the county, and to individual municipalities.

Mr. Subbio then explained that the purpose of the mitigation strategy was to reduce the likelihood of hazard impacts as well as lessen any impacts. He reviewed the set of goals and objectives that were suggested to the Steering Committee for the 2022 HMP. He then described the types of mitigation actions that can be chosen to address each of the problems and problem areas.

Mr. Subbio described examples of actions that could be chosen by stakeholders to address the problems that are caused by each of the hazards that were analyzed in the risk assessment. Attendees discussed problems that hazards pose throughout the county, and each municipality's needs for mitigation. Key areas identified during the discussion are listed below:

- Mr. Bak stated that the COVID-19 pandemic showed the need for increased preparedness efforts. The County had issues regarding logistics and distribution, supply shortages, and continuity.
- Mr. Bak reported that there are issues with bridges. Mr. Bak will meet with Public Works Department personnel to identify which bridges need to be addressed.
- Mr. Bak stated that there are many parks in the floodplain throughout the County, and that trails and other features are severely impacted by flooding.
- Mr. Bak reported that County facilities have backup power generators.
- Mr. Magargee reported that logs and wood chips being piled up in the floodway is an issue in the County. He also stated that debris dams are not a big issue for the County; the Conservation District works with PennDOT and SEPTA to clear debris from their bridges.
- Mr. O'Connell reported that there are bridges with shared ownership/accountability. The PA-420 bridge clogs with debris. The bridge is owned by Amtrak, and the road on the bridge is owned by PennDOT.
- Mr. O'Connell reported that the Ward Street bridge in Ridley Park has weight restrictions that cause traffic accidents.
- Mr. Shirley reported that the fire department has helped demolish unsound structures in Chester City.

- Mr. Bak stated that there should be a study of Chester's levee system, from 13th Street to 9th Street, along 14th Street parallel with Parker Street, and at the high school at 10th Street, just east of Parker Street.
- Ms. Marofsky stated that any preventive activities would be helpful, to demonstrate to the public how they can be involved in reducing risk. Mr. Bak stated that information about what people with waterways on their property should do should be included.
- Mr. Postlewait reported that the Delaware County Regional Water Quality Control Authority (DELCORA) is completing a wastewater management tunnel project from Chester to Ridley in 2024-2028. The tunnel will be 14 feet in diameter and will be able to hold approximately 300 million gallons of waste. It will start at DELCORA at a depth of 120 feet and end at the treatment plant at a depth of 80 feet, with a 1 percent grade in between. There will be no way for stormwater to infiltrate the tunnel.
- Mr. Postlewait stated that homes in Parker Manor should be elevated or had their basements filled, but the homes that suffer damage are row homes, which makes elevation difficult.
- Mr. Bak reported that the Kerlin Street bridge could be upgraded to allow more water to flow under it. Mr. Smith reported that Upland Borough requested ARPA funding for a hydraulic and hydrologic (H&H) study for the area upstream of the bridge. Mr. Ciach stated in the Chat that Upland Borough has initiated an evaluation and potential repair or replacement of the Kerlin Street Bridge and the repair of the undermining of Upland Avenue.
- Mr. Bak reported that the Lower Chester Creek watershed will be studied, in Chester, upland, Chester Township, Brookhaven, and Aston.
- Mr. Morgan reported that removal of dams has improved flooding issues.
- Studies are required for the following areas:
    - Along Darby Creek in Darby Borough
    - Along Cobbs Creek in Darby Borough
    - At the confluence of Darby Creek and Cobbs Creek in Colwyn Borough
    - Along Cobbs Creek in Yeadon
    - Along Nailors Run in Upper Darby

Mr. Subbio explained the Mitigation Action Worksheet for municipalities to fill out.

Next Steps

Mr. Subbio reviewed the following next steps in the HMP update process with attendees:

- Municipalities and other stakeholders will submit their mitigation actions to Mr. Bak and/or Mr. Subbio by July 15, 2022.

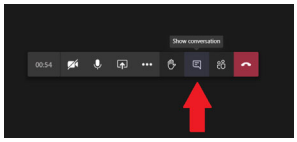
- The County and Tetra Tech will solicit additional participation by the municipalities.
- The HMP draft will be completed middle of August 2022.
- The plan will be available for public review for 30 days following completion.
- A public meeting to review the complete draft will be held after the public comment period.
- After the public meeting, the plan will be finalized and submitted to PEMA for formal review.
- The plan will then be updated, based on PEMA's comments, and submitted to Federal Emergency Management Agency (FEMA) Region III for review.

With no further questions, Mr. Bak and Mr. Subbio thanked attendees for their time and participation.

The meeting adjourned at 11:40 a.m.

Welcome

- Please add your name, title, and organization(s) to the chat window.
  - Bring your mouse to the lower part of the screen until a set of buttons appears.
  - Click **Show conversation**.



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TETRA TECH

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Delaware County Hazard Mitigation Plan

2022 Update

Mitigation Strategy Workshop

June 29, 2022
10:00 a.m. – 12:00 p.m.

2

Agenda

- Welcome
- Municipal Participation
- Municipal Risk Factor Analysis
- Develop the Updated Mitigation Strategy
- Next Steps
- Questions

3

Worksheet Completion Status

- Still need worksheets from 42 jurisdictions
- Received all key worksheets from 8 municipalities
- Providing information is a participation requirement for the HMP
  - Lack of participation in this HMP planning process can prevent funding eligibility

4

Risk Assessment Results

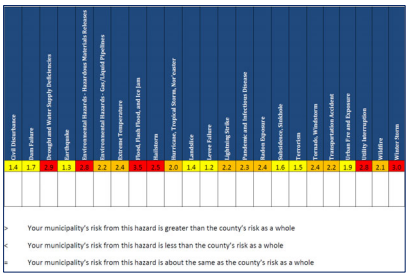
- Risk Factor Analysis

HAZARD RISK	HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, and Ice Jam	4	3	4	3	3	3.5
	Winter Storm	4	2	4	1	3	3.0
	Drought and Water Supply Deficiencies	4	2	3	1	4	2.9
	Environmental Hazards - Hazardous Materials	4	2	2	4	2	2.8
	Utility Interruption	3	2	3	4	3	2.8
	Hailstorm	4	2	2	2	1	2.5
MODERATE	Extreme Temperature	2	2	4	1	3	2.4
	Radon Exposure	4	1	2	1	4	2.4
	Tornado, Windstorm	3	2	2	4	1	2.4
	Pandemic and Infectious Disease	2	2	3	1	4	2.3
	Environmental Hazards – Gas/Liquid Pipelines	2	2	2	4	2	2.2
	Lightning Strike	4	1	2	2	1	2.2
	Transportation Accident	4	1	1	4	1	2.2
	Wildfire	3	1	2	2	3	2.1
	Hurricane, Tropical Storm, Nor'easter	2	2	2	1	3	2.0
LOW	Urban Fire and Explosion	3	1	1	4	1	1.9
	Dam Failure	1	2	1	4	2	1.7
	Subsidence, Sinkhole	2	1	1	4	1	1.6
	Terrorism	1	2	2	1	1	1.5
	Landslide	1	1	2	3	1	1.4
	Civil Disturbance	1	2	1	1	2	1.4
	Earthquake	1	1	1	4	1	1.3
	Levee Failure	1	1	1	2	2	1.2

5

Risk Assessment Results

- Municipal Risk Factor Analysis



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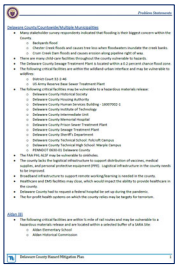
Questions So Far?

7

Develop the Updated Mitigation Strategy

- Problems and Problem Areas
  - Delaware County/Countywide/Multiple Municipalities
  - Each Municipality



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Develop the Updated Mitigation Strategy

- Purpose of the Mitigation Strategy
  - Reduce likelihood of hazard impacts
  - Lessen impacts of hazards
- Goals and Objectives
- Categories of Mitigation Actions
  - Local Plans and Regulations (LPR)
  - Structure and Infrastructure Projects (SIP)
  - Natural Systems Protection (NSP)
  - Education and Awareness Programs (EAP)

9

Develop the Updated Mitigation Strategy

- Identify Mitigation Actions (pretending you have all the time and money in the world!)
  - What plans or regulations does your municipality need?
  - What information must you provide to your residents and visitors?
  - What property and products can be insured?
  - What additional staff do you need?
  - Where are your problem areas? What can be done about them?
  - What critical facilities need backup power generators? What about traffic lights?

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Develop the Updated Mitigation Strategy

- Mitigation Action Examples
  - All
    - Public outreach to increase awareness of hazards and actions people can take
  - Special Flood Hazard Area (SFHA)
    - Acquisition
    - Relocation
    - Elevation
    - Fill basements
    - Floodproofing
    - Flood insurance
    - Clear debris from waterways
    - Protect/restore wetlands
    - Enhanced regulations

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Develop the Updated Mitigation Strategy

- Mitigation Action Examples
  - Stormwater management issues
    - Upgrade culverts, bridges, road drainage
    - Enhanced regulations
  - Dam failure inundation
    - Assess risk at specific property
    - Flood protection measures
  - Critical facilities vulnerable to hazardous materials releases
    - Outreach to make owners/operators aware
    - HVAC system retrofits
  - Steep slopes
    - Assess property as a whole
    - Retrofit

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Develop the Updated Mitigation Strategy

- Mitigation Action Examples
  - Wildland-Urban Interface
    - Assess property
    - Clear brush from near structure(s)
  - Carbonate bedrock/karst topography
    - Assess risk at specific property
    - Acquisition/relocation
  - Problem intersections/road corridors
    - Redesign
    - Enhanced signaling/signage
    - Backup power for traffic signals
    - Roadway improvements
  - Lack of backup power
    - Generator

13

Develop the Updated Mitigation Strategy

- Mitigation Action Examples
  - Poor water/sewer infrastructure
    - System upgrades
  - Wind damage
    - Retrofit structure
  - Pandemic
    - Increase capabilities to distribute prophylaxis
    - Enhance telecommunications infrastructure
    - Continuity planning

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Develop the Updated Mitigation Strategy

- Mitigation Action Worksheet

Municipality(ies):	Action
Action Number:	
Location (address, lat/long)	
Mitigation Technique Category	
Hazard(s) Addressed	
Priority (High, Medium, Low)	
Estimated Cost	
Potential Funding Streams	
Timeline	
Lead Agency/Department	
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

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Next Steps

- Identify and Submit Mitigation Actions by July 15, 2022
- Solicit Additional Participation
- Finalize the Draft HMP
- Provide Public Comment Period
- Conduct Draft Review Meeting
- Submit Plan Update to Pennsylvania Emergency Management Agency (PEMA)
- Submit Plan Update to Federal Emergency Management Agency (FEMA)

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Questions?

Thank you for your time!

17

Contacts

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(610) 565-8700

Tony Subbio
tony.subbio@tetratech.com
(717) 839-5654

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AGENDA

DELAWARE COUNTY 2022 HAZARD MITIGATION PLAN UPDATE

Mitigation Strategy Workshop

June 29, 2022 | 10:00 a.m. – 12:00 p.m.

1. **Welcome**
2. **Municipal Participation**
3. **Municipal Risk Factor Analysis**
4. **Develop the Updated Mitigation Strategy**
5. **Next Steps**
6. **Questions**

Worksheet Status

Municipality	Hazard Evaluation Survey	Capability Assessment Survey	NFIP Survey	Mitigation Strategy Survey	Municipal Risk Factor Analysis
Delaware County					
Aldan Borough					
Aston Township					
Bethel Township	x	x	x	x	
Brookhaven Borough					
Chadds Ford Township					
Chester City					
Chester Heights Borough					
Chester Township					
Clifton Heights Borough					
Collingdale Borough					
Colwyn Borough					
Concord Township	x	x	x	x	
Darby Borough					
Darby Township					
East Lansdowne Borough					
Eddystone Borough					
Edgmont Township					
Folcroft Borough					
Glenolden Borough					
Haverford Township					
Lansdowne Borough					
Lower Chichester Township					
Marcus Hook Borough	x	x	x	x	
Marple Township	x	x	x	x	
Media Borough					
Middletown Township	x	x	x	x	
Millbourne Borough					
Morton Borough					
Nether Providence Township					
Newtown Township					
Norwood Borough					
Parkside Borough					
Prospect Park Borough	x	x	x	x	
Radnor Township	x	x	x	x	
Ridley Park Borough					
Ridley Township					
Rose Valley Borough					
Rutledge Borough					
Sharon Hill Borough					

Municipality	Hazard Evaluation Survey	Capability Assessment Survey	NFIP Survey	Mitigation Strategy Survey	Municipal Risk Factor Analysis
Springfield Township					
Swarthmore Borough					
Thornbury Township	x	x	x	x	
Tinicum Township					
Trainer Borough					
Upland Borough					
Upper Chichester Township					
Upper Darby Township					
Upper Providence Township					
Yeadon Borough					

HAZARD RISK	HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, and Ice Jam	4	3	4	3	3	3.5
	Winter Storm	4	2	4	1	3	3.0
	Drought and Water Supply Deficiencies	4	2	3	1	4	2.9
	Environmental Hazards - Hazardous Materials	4	2	2	4	2	2.8
	Utility Interruption	3	2	3	4	3	2.8
	Hailstorm	4	2	2	2	1	2.5
MODERATE	Extreme Temperature	2	2	4	1	3	2.4
	Radon Exposure	4	1	2	1	4	2.4
	Tornado, Windstorm	3	2	2	4	1	2.4
	Pandemic and Infectious Disease	2	2	3	1	4	2.3
	Environmental Hazards - Gas/Liquid Pipelines	2	2	2	4	2	2.2
	Lightning Strike	4	1	2	2	1	2.2
	Transportation Accident	4	1	1	4	1	2.2
	Wildfire	3	1	2	2	3	2.1
	Hurricane, Tropical Storm, Nor'easter	2	2	2	1	3	2.0
LOW	Urban Fire and Explosion	3	1	1	4	1	1.9
	Dam Failure	1	2	1	4	2	1.7
	Subsidence, Sinkhole	2	1	1	4	1	1.6
	Terrorism	1	2	2	1	1	1.5
	Landslide	1	1	2	3	1	1.4
	Civil Disturbance	1	2	1	1	2	1.4
	Earthquake	1	1	1	4	1	1.3
	Levee Failure	1	1	1	2	2	1.2

Jurisdiction Risk - _____ (Municipality)

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Goals and Objectives from the 2017 HMP – For Reference

Goal 1: Reduce the possible injury/death and damage to existing community assets due to flooding.

Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.

Goal 2: Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.

Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.
Objective 2.4	Provide public outreach/education for manufactured home owners on proper anchoring.
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.

Goal 3: Increase disaster resistance of facilities and infrastructure in the County.

Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).

Goal 4: Promote disaster resistant future development.

Objective 4.1	Direct new development away from high hazard areas.
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.

Goal 5: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

Objective 5.1 Provide public education to increase awareness of hazards and opportunities for mitigation.

Objective 5.2 Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.

Objective 5.3 Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.

Goal 6: Improve response and recovery capabilities.

Objective 6.1 Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.

Objective 6.2 Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.

Goal 7: Improve long-term response to extreme weather events and other hazards.

Objective 7.1 Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.

Objective 7.2 Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.

Suggested Goals and Objectives for the 2022 HMP

Goal 1: Prevent injury/death, damage, and other impacts from natural and man-made hazards in Delaware County.

- Objective 1A: Develop and enhance regulations limiting development in hazard-prone areas.
- Objective 1B: Lessen impacts on natural resources and open space from natural and human-caused hazards.
- Objective 1C: Direct new growth away from hazard-prone areas.
- Objective 1D: Integrate hazard mitigation into other community plans and programs.

Goal 2: Protect the citizens of Delaware County as well as public and private property from the impacts of natural and human-caused hazards.

- Objective 2A: Protect existing structures, including critical facilities, historic and cultural resources, and infrastructure, from damage that can be caused by hazards.
- Objective 2B: Improve and maintain stormwater management systems to reduce backup and flooding.
- Objective 2C: Acquire, relocate, elevate, and/or retrofit existing structures and infrastructure, including repetitive loss properties, located in hazard areas.

Goal 3: Increase public education and awareness of existing and potential hazards in Delaware County and what people can do to reduce their vulnerability.

- Objective 3A: Develop public education and outreach programs on hazards and hazard mitigation.
- Objective 3B: Educate property owners in hazard risk areas regarding their risks and the precautions they can take.
- Objective 3C: Encourage residents to implement hazard mitigation and preparedness measures on their properties.
- Objective 3D: Encourage local participation in the Community Rating System (CRS) Program.
- Objective 3E Educate local officials regarding their municipalities' risk and the precautions they can take.
- Objective 3F: Encourage homeowners, renters, and businesses to insure their properties against all hazards, including flood insurance coverage under the National Flood Insurance Program (NFIP).
- Objective 3G: Educate the public on developing individual and family emergency plans and actions they may take during an emergency.

Goal 4: Improve response and recovery capabilities in Delaware County to protect citizens from natural and human-caused hazards.

- Objective 4A: Develop and improve emergency plans and ensure stakeholders are trained/educated.
- Objective 4B: Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation.
- Objective 4C: Ensure adequacy of equipment and technology.

Goal 5: Protect and restore existing natural resources.

- Objective 5A: Restore degraded natural resources and open space to reduce vulnerability to hazards.
- Objective 5B: Provide appropriate safeguards for the preservation of the quality of water resources, stream corridors, watershed areas, and floodplains.
- Objective 5C: Preserve areas where natural hazard potential is high.

Contents

Delaware County/Countywide/Multiple Municipalities

- Many stakeholder survey respondents indicated that flooding is their biggest concern within the County.
    - Backyards flood
    - Chester Creek floods and causes tree loss when floodwaters inundate the creek banks.
    - Crum Creek Dam floods and causes erosion along pipeline right of way.
- There are many child-care facilities throughout the county vulnerable to hazards.
- The Delaware County Sewage Treatment Plant is located within a 0.2 percent chance flood zone.
- The following critical facilities are within the wildland-urban interface and may be vulnerable to wildfires:
    - District Court 32-2-46
    - US Army Reserve Base Sewer Treatment Plant
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Delaware County Historical Society
    - Delaware County Housing Authority
    - Delaware County Human Services Building - 16007002-1
    - Delaware County Institute of Technology
    - Delaware County Intermediate Unit
    - Delaware County Memorial Hospital
    - Delaware County Prison Sewer Treatment Plant
    - Delaware County Sewage Treatment Plant
    - Delaware County Sheriff's Department
    - Delaware County Technical School: Folcroft Campus
    - Delaware County Technical High School: Marple Campus
    - PENNDOT 0630-01 Delaware County
- The FAA PHL ALSF may be vulnerable to sinkholes.
- The county lacks the logistical infrastructure to support distribution of vaccines, medical supplies, and personal protective equipment (PPE). Logistical infrastructure in the county needs to be improved.
- Broadband infrastructure to support remote working/learning is needed in the county.
- Healthcare and EMS facilities may close, which would impact the ability to provide healthcare in the county.
- Delaware County had to request a federal hospital be set up during the pandemic.
- The for-profit health systems on which the county relies may be targets for terrorism.

Aldan (B)

- The following critical facilities are within ½ mile of rail routes and may be vulnerable to a hazardous materials release and are located within a selected buffer of a SARA Site:
    - Aldan Elementary School
    - Aldan Historical Commission

Aston (Twp)

- The Aston Beechwood Fire Company is located within the 0.2 percent annual chance flood zone.
- The following critical facilities may be vulnerable to a hazardous materials release
    - Aston Free Library
    - Aston Historical Society
    - Aston Police Department
    - Aston Twp Community Center
    - Green Ridge Fire Company
    - Holy Family Regional Catholic School
    - Iceworks
    - Kindercare Learning Center
    - Media Children's House
    - Nalco Water Pretreatment Solutions – Aston
    - Nuco 2 Supply Llc Aston Depot
    - Pennell Elementary School
    - Pyramid Materials

Bethel (Twp)

- The following critical facilities may be vulnerable to a hazardous materials release
    - Belmont Senior Center
    - Bethel Fire Co
    - Bethel Police Department
    - Bethel Springs Elementary School
    - Bethel Township Building
    - Bethel Township Hose Company
    - Bethel Township Preservation Society
    - Booths Corner Market
    - Laurel Pipeline Company, L.P
    - Naamans Creek Country Manor
    - PECO - Foulk Substation

Brookhaven (B)

- The Brookhaven Treatment Plant is located within the 0.2 percent annual chance flood zone and a subsidence hazard area.
- The Dutton Mill Rd Water Storage Facility is located within the steep slope landslide hazard area.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Brookhaven Fire Company
    - Brookhaven Municipal Center
    - Brookhaven Police Department
    - Brookhaven Treatment Plant

- Christian Academy
- Coebourn Elementary School
- Dutton Mill Rd Water Storage Facility
- Kindercare Learning Center
- Lowe's Of Brookhaven (#3277)
- Our Lady of Charity Church
- PECO Dutton Mill Rd Sub Station
- Real Church - 05000003-1
- Thomas Coeburn Elementary School

Chadds Ford (Twp)

- The following critical facilities are located within a flood zone:
  - Brandywine Conservancy & Environmental Management Center
  - Christian C. Sanderson Museum
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Brandywine Battlefield Park Association
  - Brandywine Conservancy & Environmental Management Center
  - Brinton 1704 House
  - Calvary Chapel of Delaware County
  - Chadds Ford HARB
  - Chadds Ford Historical Society
  - Christian C. Sanderson Museum
  - Goddard School
  - Knights Bridge Sewage Treatment Plant
  - Nestle Health Science Philadelphia
  - PECO 202 Sub Station
  - Ridings Sewage Treatment Plant
  - Saint Cornelius School
  - Springhill Farms Sewage Treatment Plant
- The following critical facilities may be vulnerable to wildfires:
  - Calvary Chapel of Delaware County
  - Christian C. Sanderson Museum
  - Ridings Sewage Treatment Plant
  - Saint Cornelius School

Chester City (C)

- The following critical facilities are located within a 0.1 percent chance flood zone:
  - Anthem Propane
  - Apple Pie Christian Academy
  - Evonik Corporation
  - Exelon Chester Generating Station

  - Kimberly Clark Pa LLLC
  - PECO Front St Sub Station
  - PQ Corporation Chester
- The following critical facilities are located within a 0.2 percent chance flood zone:
  - Anthem Propane
  - Apple Pie Christian Academy
  - Delaware Valley Resource Recovery Facility
  - Evonik Corporation
  - Exelon Chester Generating Station
  - Haven Kindergarten Academy
  - Kimberly Clark Pa LLC
  - PECO Front St Sub Station
  - PQ Corporation Chester
  - Sun Ship Historic Marker
  - Sun Village Maintenance Garage
- The following critical facilities may be vulnerable to a hazardous materials release:
  - 1724 Chester Courthouse
  - Amtrak/Lamokin Substation
  - Anthem Propane
  - Apple Pie Christian Academy
  - Belvedere Center Genesis Healthcare
  - Center for Self-Development
  - Chatham Estates
  - Chester Apartments
  - Chester City Fire Company
  - Chester City Municipal Building
  - Chester City Police Department
  - Chester Community Charter School East Campus
  - Chester Fire Station 82
  - Chester High School
  - Chester Historical Preservation Society
  - Chester Park Barn
  - Chester Senior Center
  - Chester Voter Services Center - Vc-2
  - Del Co Voting Machine Storage Building
  - Delaware Valley Resource Recovery Facility
  - Drexel Neumann Academy
  - Edgemont Senior Apartments
  - Evonik Corporation
  - Excelon Front St Sub Station
  - Exelon Chester Generating Station
  - Exelon Lamokin Electric Substation
  - Faith Temple Christian School
  - Felton Fire Company

  - Frederick Douglass Christian School
  - Haven Kindergarten Academy
  - Institute Of Islamic Studies
  - J. Lewis Crozer Library
  - Kimberly Clark Pa LLC
  - Murphy Ame Church
  - Norquay, LLC
  - PECO - Paper Tap Substation
  - PECO - Tilghman Street Gas Plant
  - PECO Booth St Sub Station
  - PECO Engle St Sub Station
  - PECO Flower St Sub Station
  - PECO Front St Sub Station
  - PECO Macdade Blvd Sub Station
  - PQ Corporation Chester
  - Ruth L Bennett Community Center
  - Saint Daniels U.M. Church
  - Shiloh Baptist Church
  - Shiloh Development Academy
  - Stem Academy at Showalter
  - Stetser Elementary School
  - Sun Ship Historic Marker
  - Sun Village Maintenance Garage
  - The Chester Upland School of The Arts
  - True Vine Missionary Full Gospel
  - Verizon Chester A Central Office
  - Verizon Chester B Central Office
  - Victory O/T World Baptist Church
  - WDNR Radio Tower
  - Wellington Ridge
  - West Phila Bronze Co Inc
  - Widener Child Development Center
  - Widener University - Kirkbride Hall
  - Widener University - Maintenance Yard
  - Widener University- Schwartz Center
  - William Penn Landing Site

- The following critical facilities are located within the steep slope land landslide hazard area:
  - Exelon Lamokin Electric Substation
  - Widener University- Schwartz Center
- Chester High School is a levee protected area.
- The following critical facilities are within a subsidence hazard area
  - Evonik Corporation
  - PECO Flower St Sub Station
- The following critical may be vulnerable to wildfires:

  - Center for Self-Development
  - Felton Fire Company
  - NORQUAY, LLC
  - PECO - Tilghman Street Gas Plant
  - Saint Daniels U.M. Church
  - William Penn Landing Site
- The following problem areas were identified in the City's Climate Adaptation Plan
  - Roadways near Ridley Creek: The area east of Route 13/Morton Ave and north of 4th Street is particularly susceptible to flooding.
  - 14th St. & Kerlin St: Although this intersection is not located entirely in the floodplain, it is an area that experiences frequent flooding during storms and rain events. This area is a mandatory evacuation site for residents during major storms, and power often will be shut off for this area during major storms as a safety precaution. Residents are evacuated to the Showalter Middle School. Efforts have been made in the past to mitigate flooding at this site, unsuccessfully. Attempts have been made to buy-out residents, but the residents either sold their houses to new owners or they did not want to move.
  - Neighborhood of Parker Manor: Flooding near 6th & Parker and 13th & Parker has resulted in mandatory evacuations and preemptive power shutdowns by PECO.
  - The 300-block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291: These locations were also identified as areas that flood frequently. Further investigation should be conducted to understand the characteristics and cause of flooding at these locations
  - The Chester Hazards and Climate Adaptation Project Taskforce expressed concern that the freight rail line serving the waterfront industries is in the floodplain. Since the line transports and holds chemicals and other hazardous materials, flood damage could cause widespread water contamination and serious public health concerns. Taskforce members would like to investigate what is being transported and stored in those freight cars.
  - Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant serves eastern Delaware County, including the City of Chester. It is a 44 million gallons per day (MGD) active sludge facility. The stormwater collection system includes a combined sewer outfall – during high flow storm events when the volume of stormwater runoff exceeds the system capacity, the combined stormwater and untreated sewage are discharged directly into Chester Creek and the Delaware River.
  - The DELCORA wastewater treatment plant is situated in the 500 year floodplain and is located in the area of inundation modeled for a Category 2 hurricane. Increased frequency and intensity of extreme precipitation and severe storms, as projected by climate will likely increase the number of combined sewer overflows (CSO)
  - With future sea level rise and intense droughts, the saltwater line may extend upstream from the Delaware Bay beyond Chester. Further investigation is needed to determine the future threat to Chester City industries with Delaware River water intakes.
  - Chester City's Department of Streets and Public Improvement operates its fleet of 18 vehicles responsible for snow removal, sewer cleaning, street sweeping, regular upkeep

of street signs, and other aesthetic and safety needs out of a garage located at W. 2nd and Dock Streets. This facility is located in the 100-year floodplain.
  - The elevation of the prison is between 9 and 12 feet above sea level. Portions of the facility are in the 100-year floodplain.

Chester (Twp)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Alloy Surfaces Company Incorporated
  - Aston Facility
  - Chester Community Charter School
  - Chester Community Charter School Aston Campus
  - Chester Community Charter School West Campus
  - Chester Township Police Department
  - Chester Twp Administration Building
  - Cintas Corporation 100
  - Comcast Cable-Wallingford Headend
  - Feltonville Fire Company
  - Hachik Distributors Inc
  - PECO Bethel Rd Sub Station
  - Pyromet
  - Sunoco Partners Marketing & Terminals L.P. - Marcus Hook Tank Farm
  - Toby Farms Elementary School
  - Toby Farms Intermediate School
  - Toby Farms Nursery School
  - Westrock Cp, LLC

Chester Heights (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Chester Heights Camp Meeting
  - Chester Heights Fire Company
  - Old St Thomas at Ivy Mills Historic District
  - Saint Thomas the Apostle School

Clifton Heights (B)

- LifeWorks School is in a flood zone and may be vulnerable to floods. It is also located within a steep slope area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Clifton Heights Borough Hall
  - Clifton Heights Fire Company
  - Clifton Heights Police Department

- Lifeworks School
- McFadden Park
- Nicholas School
- PECO Maddison Ave Sub Station
- Saint Mark's Christian School
- Today's Child Community Center
- Today's Child Learning Center

Collingdale (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Airgas - Collingdale
  - BR20 Collingdale
  - Christ Memorial Classical Academy
  - Collingdale Community Center
  - Collingdale Fire Company # 1
  - Collingdale Fire Company # 2
  - Collingdale Nazarene Church
  - Collingdale Police Department
  - Collingdale Public Library
  - Harris Elementary
  - Harris School
  - Multi-Flex Plating Company
  - Southeast Academy
  - Ted Direnzo Montessori School
  - The Children's Garden

Colwyn (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Colwyn Borough Hall
  - Colwyn Elementary School
  - Colwyn Fire Company # 1
  - Colwyn Police Department
  - Today's Child Learning Center

Concord (Twp)

- The following critical facilities may be vulnerable to flooding due to them being located within a flood zone:
  - Concord Twp Sewage Treatment Plant 1
  - Fox Valley Sewage Treatment Plant

- Refresco Beverages US INC is located within a steep slope landslide hazard area.
- The following critical facilities may be vulnerable to wildfires
    - Aardvark Child Care and Learning Center
    - Brandywine Youth Club
    - Concord Elementary School
    - Concord Township Historical Commission
    - Concord Township Municipal Building
    - Concord Twp Sewage Treatment Plant 1
    - Fox Valley Sewage Treatment Plant
    - Garnet Valley Elementary School
    - Garnet Valley Middle School
    - KinderCare Learning Center
    - Refresco Beverages Us Inc
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Aardvark Child Care and Learning Center
    - AT&T-Concordville
    - Brandywine Specialty Care
    - Brandywine Youth Club
    - Brinton Manor
    - CarSense Glen Mills
    - Concord Beverage Water Tower
    - Concord Elementary School
    - Concord Township Historical Commission
    - Concord Township Municipal Building
    - Concord Twp Sewage Treatment Plant 1
    - Concord Twp Sewage Treatment Plant 2
    - Concordville Fire Association
    - Continuing Care at Maris Grove
    - Costco Wholesale #1114
    - Fox Hill Farms
    - Fox Valley Sewage Treatment Plant
    - Garnet Valley High School
    - Garnet Valley Middle School
    - Garnett Valley Sewage Treatment Plant
    - KinderCare Learning Center
    - Maris Grove
    - Nicholas Newlin Foundation
    - PECO Spring Valley Rd Sub Station
    - Pennington Center
    - Refresco Beverages Us Inc
    - Southco Sewage Treatment Plant
    - St Johns Episcopal Church
    - Target Store T-2172
- The following critical facilities may be vulnerable to wildfires:

- Aardvark Child Care and Learning Center
- Brandywine Youth Club
- Concord Elementary School
- Concord Township Historical Commission
- Concord Township Municipal Building
- Concord Twp Sewage Treatment Plant 1
- Fox Valley Sewage Treatment Plant
- Garnet Valley Elementary School
- Garnet Valley Middle School
- Kindercare Learning Center
- Refresco Beverages US INC

Darby (B)

- The AT&T is located within a flood zone and may be vulnerable to flooding.
- The following critical facilities are located within a steep slope area and may be vulnerable to landslides:
  - AT&T
  - Darby Borough Recreation Center
  - Park Lane Elementary School
- The following critical facilities may be vulnerable to a hazardous materials release:
  - AT&T
  - Blessed Virgin Mary School
  - Creative Minds Christian Academy
  - Darby Borough Historical Commission
  - Darby Borough Historical Preservation Society
  - Darby Borough Police Department
  - Darby Borough Recreation Center
  - Darby Fire Company # 1
  - Darby Fire Company # 2
  - Darby Free Library
  - Little Flower Manor
  - Marvil Funeral Home
  - Park Lane Elementary School
  - PECO Wycombe Ave Sub Station
  - Penn Wood Middle School
  - Penn Wood West Junior High School
  - St Francis Country House
  - Tender Years Preschool
  - The Children's Garden
  - Walnut Street Elementary School

Darby (Twp)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - Darby Twp Sewage Treatment Plant
  - Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Ashland Middle School
  - Briarcliffe Fire Company
  - Bumble Bee Preschool and Kindergarten
  - Darby Township Community Center
  - Darby Township Elementary School
  - Darby Township Fire Company
  - Darby Township Historical Commission
  - Darby Township Old Municipal Building
  - Darby Township Police Department
  - Darby Township School
  - Darby Twp Sewage Treatment Plant
  - Evangel Assembly of God Church
  - Goodwill Fire Company
  - Kindergarten Center
  - Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm

East Lansdowne (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - East Lansdowne Basic School
  - East Lansdowne Borough Hall
  - East Lansdowne Elementary School
  - East Lansdowne Fire Company # 1
  - East Lansdowne Police Department
  - Vision Academy Charter School

Eddystone (B)

- PECO 7TH ST SUB STATION is located within the 0.1 percent chance flood zone and may be vulnerable to flooding.
- The following critical facilities are located within the 0.2 percent flood zone and may be vulnerable to flooding:
  - Boeing Sub Station
  - Exelon Power Plant
  - PECO 7TH St Sub Station
  - Penn Terminals, LLC
- The PECO - Baldwin Service Building is located within a steep slope hazard area and may be vulnerable to landslides

- The following critical facilities may be vulnerable to a hazardous materials release:
    - Baker Petrolite
    - Boeing Sub Station
    - Del Monte Fresh Produce Company
    - Eddystone Elementary School
    - Eddystone Fire Company
    - Eddystone Police Department
    - Exelon Fire and Rescue
    - Exelon Power Plant
    - Liberty Electrical Company Electrical Plant
    - Liberty Electric Power LLC
    - Light House Hall
    - PECO 7TH St Sub Station
    - PECO - Baldwin Service Building
    - Penn Terminals, LLC

Edgmont (Twp)

- The following critical facilities may be vulnerable to wildfires:
    - Edgemont Fire Company
    - Edgmont Township Municipal Building
    - Edgemont USARC
    - El Buen Samaritano Church
    - Health Care Ctr at White Horse Village
    - Neumann University
    - PECO Graddyville Rd Sub Station
    - Runnymeade Farms Sewage Treatment Plant 1
    - Runnymeade Farms Sewage Treatment Plant 2
    - Runnymeade Farms Sewage Treatment Plant 4
    - US Army Reserve Base Sewer Treatment Plant
    - Whitehorse Village Sewage Treatment Plant
- The Colonial Pennsylvania Plantation is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Edgemont Fire Company
    - Edgemont USARC
    - Edgmont Township Municipal Building
    - El Buen Samaritano Church
    - Health Care Ctr At White Horse Village
    - Neumann University
    - PECO Graddyville Rd Sub Station
    - Runnymeade Farms Sewage Treatment Plant 2
    - Runnymeade Farms Sewage Treatment Plant 4
    - US Army Reserve Base Sewer Treatment Plant

- Whitehorse Village Sewage Treatment Plant

Folcroft (B)

- The following critical facilities are within the selected buffer of SARA sites and may be vulnerable to a hazardous materials release:
  - Bullen Companies
  - Cork Industries, INC
  - Delcroft Elementary School
  - East Penn Manufacturing Co.
  - Folcroft Fire Company # 1
  - Folcroft Police Department
  - Folcroft Public Library
  - Folcroft Union Church
  - KinderCare Learning Center
  - White Cap, Ltd. (WC186)

Glenolden (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Amtrak/Glenolden Substation
  - Glenolden Elementary School
  - Glenolden Fire Company # 1
  - Glenolden Historical Commission
  - Glenolden Library
  - Glenolden Police Department
  - PECO Knowles Ave Sub Station
  - PECO - Macdade Substation
  - Verizon Glenolden Co
  - Walter M. Senkow Elementary

Haverford (Twp)

- The apartment complex along the Darby Creek at West Chester Pike and Lawrence Road floods.
- The Haverford Township Administration Build is located within a steep slope hazard area and may be vulnerable to landslides.
- The Haverford Twp Community Center is located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - American Legion Nunan-Slook 338
  - Annunciation Church
  - Armenian Martyrs Cong Church

- Bon Air Fire Co
- Bon Aire Fire Company
- Brookline Fire Company
- Bryn Mawr Extended Care Center
- Bryn Mawr Terrace
- Campbell Ave Water Storage Facility
- Cardinal Foley School
- Chatham Park Elementary School
- Chestnutwold Elementary School
- Child Guidance Elementary Ed. Program
- Crestwood
- Friendly Faces Day Care
- Haverford College
- Haverford Friends School
- Haverford High School
- Haverford Monthly Meeting Of Friends
- Haverford Police Department
- Haverford Township Administration Build
- Haverford Township Historical Society
- Haverford Township Middle School
- Haverford Twp Community Center
- Haverford Twp. Library
- Havertown PCP Site
- Keep Kindergarten
- Kindred Hospital Philadelphia-Havertown
- Little Eagle Daycare
- Llanerch Fire Company
- Lowe's Of Havertown (#3169)
- Lynnewood Elementary School
- Manoa Community Church
- Manoa Elementary School
- Manoa Fire Company
- Normandy Park Building
- Oakmont Fire Company # 1
- Old Haverford Friends Meeting
- Old Sacred Heart School
- PECO Eagle Rd Sub Station
- PECO Landover Rd Sub Station
- PECO West Chester Pike Sub Station
- Play And Learn
- Sacred Heart School
- Saint Faith Preschool and Kindergarten
- St James United Church of Christ
- The Grange

- Trinity Christian Church
- Westgate Hills Rehab & Nursing Center
- WHHS

Lansdowne (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - 20th Century Club
  - Ardmore Avenue Elementary School
  - Historic Lansdowne Theater Corporation
  - Lansdowne Borough HARB
  - Lansdowne Fire Company
  - Lansdowne Friends School
  - Lansdowne Montessori School
  - Lansdonwe Police Department
  - Lansdowne Public Library
  - PECO Union Ave Sub Station
  - Penn Wood High School
  - Peppers Pharmacy
  - SS. Cyril & Philomena School
  - Today's Child Learning Center
  - Verizon Lansdowne Co (Pa24650)

Lower Chichester (Twp)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Delaware Bay & River Cooperative Inc
  - Esschem INC
  - Honeywell International Inc
  - Linwood Elementary School
  - Linwood Fire Company
  - Linwood Youth Center
  - Lower Chichester Police Department
  - Nalco Water Pretreatment Solutions
  - PECO Laughead Ave Sub Station
  - PECO - Linwood Substation
  - PECO Ormond St Sub Station
  - Sonrise Christian Day School
  - Sun Oil Refinery Sub Station

Marcus Hook (B)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - Marcus Hook Community Center
  - Marcus Hook Energy Center
  - Sun Oil Fire Brigade
  - Sunoco LLC - Race Fuels
  - Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex
- The following critical facilities may be vulnerable to hazardous materials release:
  - Braskem / Marcus Hook
  - Marcus Hook Community Center
  - Marcus Hook Elementary
  - Marcus Hook Energy Center
  - Marcus Hook Fire Company
  - Marcus Hook Historical Commission
  - Marcus Hook Municipal Building
  - Marcus Hook Police Station
  - Marcus Hook Recreation Center
  - MARY M. CAMPBELL LIBRARY
  - PECO - Blueball Substation
  - PECO - Marcus Hook Substation
  - PECO - Post Substation
  - Plank House
  - Sun Oil Fire Brigade
  - Sunoco LLC - Race Fuels
  - Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex
  - Viscose Fire Company

Marple (Twp)

- The Broomall Rehabilitation & Nursing Center is located within a steep slope hazard area and may be vulnerable to landslides.
- The Broomall Presbyterian Village is located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - 1696 Thomas Massey House
  - AT&T
  - Broomall Fire Company
  - Broomall Manor
  - Broomall Presbyterian Village
  - Broomall Rehabilitation & Nursing Center
  - Cardinal O'Hara High School
  - Charles H. Russell Elementary School
  - Chesterbrook Academy

- CHI Institute
- Children In The Son Learning Center
- Etta Natalie Rosenblatt Preschool
- Grayson School
- Hillview Nursery School
- Jay W. Worrall Elementary School
- Marple Historical Society
- Marple Municipal Building
- Marple Police Department
- Marple Public Library
- Marple Twp Water Storage Facility
- Meadows At Martins Run
- Miss Annette's Creative Nursery
- Paxon Hollow Middle School
- PECO Chester Pike Sub Station
- PECO New Ardmore Ave Sub Station
- PECO Reed Rd Sub Station
- Saint Pius X School
- Sproul Rd Water Storage Facility
- St Luke Greek Orthodox Church
- The Home Depot Store #4181
- Wesley Enhanced Living Main Line Rehab and Skilled Nursing

Media (B)

- The Blue Route Vineyard Community Church is located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - AT&T
  - Blue Route Vineyard Community Church
  - Christ Episcopal Church Child Care Program
  - Crew Kids Choice Day Care & Learning Center
  - Ethel Mason Child Development Center
  - Heritage Commission of Delaware County
  - Media Borough HARB
  - Media Community Center
  - Media Elementary School
  - Media Fire Company
  - Media Historic Archives Commission
  - Media Police Department
  - Media Providence Friends School
  - Media Voter Services Center
  - Media-Upper Providence Library
  - Nativity BVM Church

- PA Veterans Museum Media Amory
- Sterling Health Care & Rehab Center
- Today's Child Learning Center
- Verizon MEDIA CO
- Youth Way Water Storage Facility

Middletown (Twp)

- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
  - Children's Academy
  - Easter Seals of Southeastern Pa
  - Fair Acres Geriatric Center
  - Glenwood Elementary School
  - Hanson Aggregates Pa LLC
  - Hunter Street Water Storage Facility
  - Lima Fire Company
  - Middletown Free Library
  - Middletown Montessori School
  - Middletown Municipal Building
  - Middletown Township Historical Society
  - Middletown Water Storage Facility
  - Monticello House
  - Oakbridge Terrace at Lima Estates
  - PECO Middletown Rd Sub Station 1
  - Riddle Hospital
  - Riddle Memorial Hospital
  - Riddle Memorial Hospital-Based SNF
  - Simon Youth Academy
  - The Pennsylvania State University-Brandywine Campus
  - Willowbrooke Court at Lima Estates
- The following critical facilities may be vulnerable to hazardous release materials:
  - Aqua Pa - Ridley Creek Water Treatment Plant
  - Children's Academy
  - Easterseals Southeastern Pennsylvania
  - Elwyn Davidson School
  - Fair Acres Geriatric Center
  - Glenwood Elementary School
  - Hanson Aggregates Pa LLC
  - Hunter Street Water Storage Facility
  - Indian Lane Elementary School
  - Lanchford Hall at Tyler Arboretum
  - Lenni Fire Company # 1
  - Lima Fire Company

- Middletown Fire Company
- Middletown Free Library
- Middletown Montessori School
- Middletown Municipal Building
- Middletown Township Historical Society
- Middletown Water Storage Facility
- Monticello House
- Oakbridge Terrace at Granite Farms Estates
- Oakbridge Terrace at Lima Estates
- PA State Police
- Painter Library at Tyler Arboretum
- PECO Baltimore Pike Sub Station
- PECO Middletown Rd Sub Station 1
- Penncrest High School
- Riddle Memorial Hospital
- Roosevelt Community Center
- Simon Youth Academy
- The Development Center at Elwyn
- The Pennsylvania State University-Brandywine Campus
- Wawa Beverage Company
- Willowbrooke Court at Granite Farms Estates
- Willowbrooke Court at Lima Estates

Millbourne (B)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Millbourne Borough Hall
  - Milbourne Fire Company
  - Millbourne Police Department

Morton (B)

- The following critical facilities may be vulnerable to hazardous materials release:
  - Morton Borough Hall
  - Morton Fire Company
  - Morton Police Department
  - Morton Train Station
  - Step by Step Learning Center and Child Care

Nether Providence (Twp)

- The following critical facilities may be vulnerable to hazardous materials release:

- Garden City Fire Co 1
- Garden City Fire Company
- Helen Kate Furness Library
- Media Shopping Center
- Mother of Providence Regional Catholic School
- Nether Providence Elementary School
- Nether Providence Historical Commission
- Nether Providence Historical Society
- Nether Providence Middle School
- Nether Providence Police Department
- PECO Harvey Rd Sub Station
- South Media Fire Company
- Strath Haven High School
- Strath Haven Middle School
- Thomas Leiper House
- Wallingford Elementary School
- Wallingford Nursing & Rehabilitation Ctr
- Wilson Of Wallingford Inc

Newtown (Twp)

- The Melmark School is located within a steep slope hazard area and may be vulnerable to landslides
- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
  - Garretts Way Day Care and Learning Center
  - Malvern School of Newtown Square
  - Newtown Square Penn Railroad Museum
  - Newtown Twp. Water Storage Facility
  - SAP AMERICA INC
  - Square Tavern
  - WRNB Radio Tower
- The following critical facilities may be vulnerable to a hazardous materials release:
  - BPG Real Estate Investors Straw Party 1, L.P.
  - Chesterbrook Academy
  - Culbertson Elementary School
  - Delaware County Christian School
  - Garretts Way Day Care and Learning Center
  - Gauntlett Center
  - Lyondel Chemical Fire Brigade
  - Malvern School of Newtown Square
  - Marple-Newtown Senior High School
  - Netwon Township Police Department
  - Newtown Public Library

- Newtown Square Fire Company # 1
- Newtown Square Penn Railroad Museum
- Newtown Square Presbyterian Nursery School
- Newtown Twp. Water Storage Facility
- Octagonal School at Dunwoody Village
- Saint Anastasia School
- Sap America Inc
- Springton Lake Montessori School
- Square Tavern
- Stratford Friends School
- The Episcopal Academy
- Verizon Larchmont Co
- William Hood Dunwoody Care Center
- William S. Culbertson Elementary School
- WRNB

Norwood (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - ABC & Me Learning Center
  - Equipment Trade Service Co Inc
  - Norwood Borough Hall
  - Norwood Elementary School
  - Norwood Fire Company
  - Norwood Historical Society Inc
  - Norwood Police Department
  - Norwood Public Library
  - VFW Post 7213

Parkside (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Parkside Elementary School
  - Parkside Fire Company # 1
  - Parkside Police Department
  - PECO Houston Rd Sub Station

Prospect Park (B)

- The Concord Township Sewer Department is located within a flood zone and may be vulnerable to flooding.
- The Morton Homestead is located within a subsidence hazard area and may be vulnerable to sinkholes.

- The following critical facilities may be vulnerable to a hazardous materials release:
    - Concord Township Sewer Department
    - Interboro Athletic Field House
    - Interboro Kindergarten Academy
    - Interboro High School
    - Morton Homestead
    - Prospect Park Health & Rehab Residence
    - Prospect Park Police Department
    - Prospect Park Fire Company
    - Propect Park Elementary School
    - Prospect Park Historical Society
    - Prospect Park Library

Radnor (Twp)

- The Main Line Montessori is located within a flood zone and may be vulnerable to flooding
- The Radnor Police Department is located within a steep slope hazard area and may be vulnerable to landslides.
- The WYBF Radio Tower and the Saint David's Episcopal Day School are both located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Academy Of Notre Dame De Namur
    - Agnes Irwin School
    - Archbishop Carroll High School
    - AT&T Corp
    - Cabrini University
    - Central Nursery School
    - Cheder Chabad
    - Hilltop Preparatory School
    - Ithan Elementary School
    - Jack M. Barrack Hebrew Academy
    - JUDITH CREED HORIZONS FOR ACHIEVING IND
    - Lane Montessori School
    - Main Line Classical Academy
    - Main Line Montessori
    - PECO Aldwyn Ln Sub Station
    - Radnor Elementary School
    - Radnor Fire Company
    - Radnor High Scholl
    - Radnor Historical Society
    - Radnor Middle School
    - Radnor Police Department
    - RADNOR TOWNSHIP BUILDING
    - Radnor Township HARB

- RADNOR TWP. LIBRARY
- RADNOR UNITED METHODIST CHURCH
- Saint David's Episcopal Day School
- Saint Katharine Of Siena
- ST MARY'S EPISCOPAL CHURCH
- SULPIZIO GYMNASIUM
- THE ROSEMONT PLAZA APTS
- Valley Forge Military Academy
- Verizon WAYNE CO (PA21170)
- Villanova University
- W235AP Radio Tower
- WAYNE CENTER
- Wayne Elementary School
- WAYNE PRESBYTERIAN CHURCH - 36001001-1
- Wayne Presbyterian Nursery School
- WXVU Radio Tower
- WYBF Radio Tower

Ridley (Twp)

- The following critical facilities are located within a flood hazard area and may be vulnerable to flooding:
  - Boeing Fire Brigade
  - Boeing - Philadelphia
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
  - Sellers Ave Sewage Treatment Plant
  - Sure Power Philadelphia
  - Water's Edge (Old Rookies River Rm)
- The following critical facilities are located within a subsidence hazard area and may be vulnerable to sinkholes:
  - Boeing - Philadelphia
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
  - Sure Power Philadelphia
- The following critical facilities are susceptible to sea level rise:
  - Boeing - Philadelphia
  - Eddystone Generating Station
  - Eddystone Marine and Rail Terminal Company L.L.C
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Amosland Elementary School
  - Art of Growing Nursery School
  - Boeing - Philadelphia
  - Boeing Fire Brigade

- Buxmont Academy/Woodlyn Center
- Church of Atonement Day School
- Church of Christ
- Concordville Operations Center
- Eddystone Generating Station
- Eddystone Marine and Rail Terminal Company L.L.C
- Fizzano Brothers Concrete Products, Inc.
- Folsom Fire Company
- Grace Park Elementary
- Grace Park School - 38002003-1
- Holmes Fire Company
- Holy Spirit Lutheran Church
- Knights Of Columbus
- Leedom Elementary School
- Leedom Fire Company
- Marine Corps Reserve Center Folsom
- Maxim Crane Works L. P.
- Milmont Fire Company
- Notre Dame De Lourdes
- Our Lady of Angels Regional School
- Our Lady of Fatima Church
- PECO - Woodlyn Substation
- PECO Chester City Sub Station
- PECO Fairview Rd Sub Station
- PECO Springfield Ave Sub Station
- Ridley Community Center
- Ridley High School
- Ridley Township Police Department
- Ridley Twp. Public Library
- S.M. Vauclain Fire Company
- Sellers Ave Sewage Treatment Plant
- Sure Power Philadelphia
- The Discovery Tree
- The Home Depot Store #4142
- Water's Edge (Old Rookies River Rm)
- Woodlyn Elementary School
- Woodlyn Fire Company
- WRSD Radio Tower
- YMCA Ridley Area Children's Corner Kindergarten

Ridley Park (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Christ Episcopal Church

- Conner-Williams Nursing Home
- Lakeview Elementary Scholl
- Ridley Middle School
- Ridley Park Borough
- Ridley Park Fire Company
- Ridley Park HARB
- Ridley Park Historical Commission
- Ridley Park Historical Society
- Ridley Park Library
- Ridley Park Police Department
- Saint James Regional Catholic School
- Southco, Inc. - Concordville
- Taylor Hospital
- Verizon RIDLEY PARK CO (PA24320)

Rose Valley (B)

- The Old Mill Polling Site is located within a flood zone and may be vulnerable to flooding.
- The School in Rose Valley and the Rose Valley Treatment Plant are both located within a wildfire hazard area and may be vulnerable to wildfires
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Rose Valley Museum & Historical Society
  - Rose Valley Treatment Plant
  - The School in Rose Valley

Rutledge (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Rutledge Community Center
  - Rutledge Fire Company

Sharon Hill (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Academy Park High School
  - ES OPCO USA LLC – PH
  - PECO Chester Pike Sub Station
  - PECO - Sharon-Hill Substation
  - Sharon Hill Elementary School
  - Sharon Hill Fire Company
  - Sharon Hill Historical Commission
  - Sharon Hill Historical Society
  - Sharon Hill Police Department
  - Sharon Hill Public Library

- Today's Child Learning Center

Springfield (Twp)

- Darby Creek experiences debris dams near West Rolling Road and Doe Run Lane, causing flooding to nearby homes.
- The Littler Friends Child Care is located within a flood zone and may be vulnerable to flooding.
- The Aqua Pa - Crum Creek Water Treatment Plant is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Aqua Pa - Crum Creek Water Treatment Plant
  - AQUA PA - Springfield Transportation Garage
  - Baltimore Pike Water Storage Facility
  - Bj's Wholesale Club #056
  - Church Of The Redeemer
  - E.T. Richardson Middle School
  - Friends Meetinghouse
  - Harlee Manor Nursing & Rehab Center
  - Harvey Sabold Elementary School
  - Holy Cross School
  - Life Discovery School Kindergarten
  - Littler Friends Child Care
  - New Destiny Christian Center
  - Office Suites At Stoney Creek
  - Old Central School
  - PECO - Morton Substation
  - PECO Baltimore Pike Sub Station
  - PECO Church Rd Sub Station
  - PECO Springfield Rd Substation
  - PECO Sproul Rd Sub Station
  - PECO Thomson Ave Sub Station
  - Public Works Building
  - Saint Francis Of Assisi School
  - Scenic Hills Elementary School
  - Scott Kia Of Springfield
  - Springfield Baptist Church
  - Springfield Country Club
  - Springfield Fire Company
  - Springfield Hanby Masonic Lodge 767
  - Springfield High School
  - Springfield Historical Society
  - Springfield Hospital
  - Springfield Hospital At The Healthplex
  - Springfield Library

- Springfield Municipal Building
- Springfield Police Department
- Springfield Township Fire Co
- Springfield Twp. Library
- Target Store T-1136
- Target Store T-2312
- The Home Depot Store #4114
- Tree Of Life Church
- Verizon Springfield Co (Pa24690)
- West Ave Water Storage Facility

Swarthmore (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Cades
  - Friends Historical Library
  - George Crothers Memorial School at Cades
  - Swarthmore Borough Hall
  - Swarthmore Fire Company
  - Swarthmore Historical Society
  - Swarthmore Library
  - Swarthmore Police Department
  - Swarthmore-Rutledge School
  - The Kids Place
  - Trinity Cooperative Day Nursery
  - WSRN-FM

Thornbury (Twp)

- The Home Depot Store #4121 is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
  - Bethlehem United Methodist Church
  - Stonybank Community Church
  - The Home Depot Store #4121
  - Thornbury Historical Society
  - Thornbury Twp Sewage Treatment Plant
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Bethlehem United Methodist Church
  - Cheyney College Sewage Treatment Plant
  - Glen Mills School
  - Glen Mills School Sewage Treatment Plant
  - Malvern School of Glen Mills

- Stonybank Community Church
- The Home Depot Store #4121
- Thornbury Historical Commission
- Thornbury Historical Society
- Thornbury Township Municipal Bldg
- Thornbury Twp Sewage Treatment Plant
- Wzze

Tinicum (Twp)

- The following critical facilities are located within a flood hazard area and may be vulnerable to flooding:
  - FAA PHL ALSF
  - FAA PHL ATCT
  - Lester Fire Company
  - Messina Electric - 45002000-1
  - Philadelphia Fuel Facility Inc
  - Philadelphia International Airport
  - PHL-CDF
  - SKC Hangar (Tenants Assoc.)
  - Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
  - Tinicum Police Department
  - Tinicum Public Library
  - Tinicum Twp Sewage Treatment Plant
  - Tinicum Twp Water Storage Facility
  - UNITED AIRLINES-PHL
  - Western Fumigation (B-2)
- The Sunoco Partners M & T, L.P. - Fort Mifflin Terminal is located within a levee protection area.
- The following critical facilitates are located within a subsidence hazard area and may be vulnerable to sinkholes:
  - FAA PHL ALSF
  - Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
  - UNITED AIRLINES-PHL
- The Essington Fire Company and the Tinicum Township Fire Co. #48 are both located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Essington Fire Company
  - Esstech, Inc.
  - FAA PHL ALSF
  - FAA PHL ATCT
  - Lester Fire Company
  - LOCAL 1776 I A M A W UNION HALL - 45004000-1
  - MESSINA ELECTRIC - 45002000-1

- PECO ROUTE 291 SUB STATION
- Philadelphia Air Hub
- Philadelphia Fuel Facility Inc
- Philadelphia International Airport
- PHL-CDF
- SKC Hangar (Tenants Assoc.)
- Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
- TINICUM MUNICIPAL BLDG - 45003000-1
- Tinicum Police Department
- TINICUM PUBLIC LIBRARY
- Tinicum School
- TINICUM TOWNSHIP FIRE CO. #48 - 45001000-1
- Tinicum Township Historical Society
- TINICUM TWP SEWAGE TREATMENT PLANT
- TINICUM TWP WATER STORAGE FACILITY
- UNITED AIRLINES-PHL
- Western Fumigation (B-2)

Trainer (B)

- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
  - Monroe Energy, LLC
  - PECO - Trainer Substation
  - Trainer Police Department
  - Trainer Oil Refinery Sub Station
- Both the Trainer Oil Refinery Sub Station and the PECO - Trainer Substation are located within the levee protection area.
- Both the Trainer Fire Company and the Conoco Phillips Fire and Rescue are located within a wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Congoleum Acquisitions, LLC
  - Congoleum Fire Brigade
  - Conoco Phillips Fire and Rescue
  - DELCORA - Western Regional Treatment Plant
  - Lennox Park Fire Company # 1
  - Monroe Energy, LLC
  - PECO - Trainer Substation
  - Trainer Community Center
  - Trainer Fire Company
  - Trainer Oil Refinery Sub Station
  - Trainer Police Department

Upland (B)

- The Caleb Pusey House & Landingford Plantation is located within a flood zone and may be vulnerable to flooding.
- The Upland Fire Company is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Caleb Pusey House & Landingford Plantation
    - Cheshire House
    - Chester Community Charter School Upland
    - Crozer-Chester Medical Center
    - Main Street Elementary School
    - Upland Fire Company
    - Upland Baptist Church
    - Upland Borough Hall
    - Upland Police Department

Upper Chichester (Twp)

- I-95 at PA-452 (Exit 2) floods frequently.
- The culvert along Spring Run under Larkin Road is undersized, and the road floods.
- The culvert along the East Branch of Naaman Creek under Larkin Road is undersized, causing flooding on the roadway.
- Gehr Plastics Inc. is located within a flood zone and may be vulnerable to flooding
- The Verizon CHESTER HEIGHTS CO (PA24013) is located within a steep slope hazard area and may be vulnerable to landslides.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - Boothwyn Fire Co 1
    - Boothwyn Fire Company # 1
    - Chichester Historical Society
    - Chichester Kinderschool
    - Kiddie Kampus Learning Center
    - Kindercare Learning Center
    - Little Lambs Christian Kindergarten
    - Mt. Pleasant Nursery School
    - Ogden Fire Co
    - Ogden Fire Company
    - Reliance Hook & Ladder Company
    - Upper Chichester Community Service
    - Upper Chichester Municipal Bldg
    - Upper Chichester Police Department
    - W278AK

Upper Darby (Twp)

- The Idle Hour Tennis Club off of State Road is vulnerable to flooding from the Darby Creek.
- The Naylors Run culvert is undersized.
- The following critical facilities are located within a flood zone and may be vulnerable to flooding:
    - PECO Marshall Rd Sub Station
    - PECO - Upper Darby Substation
    - Speedway 6806
    - Swedish Cabin
- The following critical facilities are located within the steep slope hazard area and may be vulnerable to landslides:
    - Charles Kelly Elementary School
    - PECO MARSHALL RD SUB STATION
    - SEPTA VICTORY SHOP
- The Upper Darby Historical Society and the Speedway 6806 are both located within the wildfire hazard area and may be vulnerable to wildfires.
- The following critical facilities may be vulnerable to a hazardous materials release:
    - 69th St Alliance Church - 16006004-1
    - Aardvark Child Care And Learning Center
    - Alverston Rd Water Storage Facility
    - Ancona Montessori School
    - Apple Pie Christian Academy
    - Aronomink Elementary School
    - Beverly Hills Middle School
    - Bywood Elementary School
    - Cardington Stonehurst Fire Company
    - Careview Community Church - 16007001-1
    - Charles Kelly Elementary School
    - Christ Lutheran Church - 16007003-1
    - Christ's Community Church - 16005008-1
    - COMCAST CABLE-Upper Darby OTN
    - Delaware Valley Steel
    - District Court 32-2-52 - 16002007-1
    - Drexel Hill Fire Company
    - Drexel Hill Middle School
    - Drexel Hill United Methodist Church - 16001005-1
    - DREXELBROOK BUILDING 10 - 16001006-1
    - DREXELBROOK COMMUNITY CENTER - 16001008-1
    - Face The Music Studio - 16003006-1
    - Fairy Tale Academy
    - Friends Of Sellers Hall
    - Garrettford Drexel Hill Fire Co - 16005006-1
    - Garrettford Elementary School
    - Highland Ave Water Storage Facility
    - Highland Park Elementary School

- Highland Park Fire Company
- Hillcrest Elementary School
- Holy Child Academy
- Isaac Garrett House
- Little Friends Child Care And Kindergarten
- Little Friends II Daycare & Learning Center
- Llanerch Hills Chapel - 16003007-1
- Masjid Al-Madinah Islamic Center - 16006002-1
- Meenan Oil Co.
- Monsignor Bonner And Archbishop Prendergast High School
- Mourning House At Arlington Cemetery
- PECO - Llanerch Substation
- PECO - Upper Darby Substation
- PECO Garret Rd Sub Station
- PECO Marshall Rd Sub Station
- Pennock/Sellers Home At Sellers Memorial Library
- Preschool Academy
- Primos Elementary School
- Primos/Secane Fire Company
- Providence Rd Water Storage Facility
- Saint Andrews School
- Saint Bernadette School
- Saint Dorothy School
- Saint Eugene School
- Saint Laurence
- Sellers Library - Main Branch
- Sellers Library Muni. Bldg.
- Sellers Library Primos Branch
- Sellers Memorial Free Library - 16004002-1
- SEPTA VICTORY SHOP
- Sonshine Christian Academy
- Speedway 6806
- Stonehurst Elementary School
- Swedish Cabin
- The Discovery Tree
- Tiny Miracles Learning Center
- Treasure Island Academy - The Journey
- Upper Darby Fire Company # 3
- Upper Darby High School
- Upper Darby Historical Commission
- Upper Darby Historical Society
- Upper Darby Kindergarten Center
- Upper Darby Municipal Library - 16005003-1
- Upper Darby Police Station

- Upper Darby Township Welcome Center - 16007004-1
- Upper Darby Twp Bldg Police Annex - 16006011-1
- Upper Darby Twp Municipal Building - 16005010-1
- Upper Darby Voter Services Center - Vc-3
- Verizon KIRKLYN CO (PA24760)
- Verizon UPPER DARBY ACCTG BLDG (PA24150)
- Verizon Wireless - UPPER DARBY (ID:70010)
- Waste Management Delaware Vallley South
- Watkins Senior Center Gym - 16006006-1
- Westbrook Park Elementary School

Upper Providence (Twp)

- Crum Creek Road off of State Road at the US-1 overpass floods frequently.
- Aqua Pa - Media WWTP is located within a 0.2 percent chance flood zone and may be vulnerable to flooding.
- The Rose Tree Early Learning Center is located within the subsidence hazard area and may be vulnerable to sinkholes.
- The following critical facilities are located within a wildfire hazard area and may be vulnerable to wildfires:
  - Benchmark School
  - District Court 32-2-46
  - Reformation Lutheran Church
  - Reformation Lutheran Church- Stay & Play Program
  - RMH-HB/SNF nursing home
  - Rose Tree Early Learning Center
  - Rose Tree Elementary School
  - Rose Tree Fire Company
  - Upper Providence Police Department
  - Walden School
- The following critical facilities may be vulnerable to a hazardous materials release:
  - Aqua PA - Media WWTP
  - Benchmark School
  - District Court 32-2-46
  - Media Sewage Treatment Plant
  - PA Institute of Technology
  - PECO Middletown Rd Sub Station 2
  - Reformation Lutheran Church
  - Reformation Lutheran Church- Stay & Play Program
  - RMH-HB/SNF nursing home
  - Rose Tree Early Learning Center
  - Rose Tree Elementary School
  - Rose Tree Fire Company
  - Springton Lake Middle School

- Upper Providence Police Department
- Walden School

Yeadon (B)

- The following critical facilities may be vulnerable to a hazardous materials release:
  - Bell Avenue Elementary School
  - Hydrol Chemical Company, Inc.
  - Manorcare Health Services Mercy Fitzgerald
  - Penn Wood East Junior High School
  - Penn Wood High School Cypress Street Campus
  - William B. Evans Computer Magnet School
  - William B. Evans Elementary School
  - Yeadon Fire Company
  - Yeadon Police Department
  - Yeadon Public Library

Mitigation Action Worksheet

Municipality(ies):	**Action**
Action Number:	
Location (address, lat/long)	
Mitigation Technique Category	
Hazard(s) Addressed	
Priority (High, Medium, Low)	
Estimated Cost	
Potential Funding Streams	
Timeline	
Lead Agency/Department	
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Mitigation Technique Category

- Local Plans and Regulations (LPR) – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
- Structure and Infrastructure Project (SIP) – These actions involve (1) modifying existing structures and infrastructure to protect them from a hazard, or (2) removing 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 includes projects to construct manmade structures to reduce the impact of hazards.
- Natural Systems Protection (NSP) – These are actions that minimize damage and losses, and preserve or restore the functions of natural systems.
- Education and Awareness Programs (EAP) – 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, such as StormReady and Firewise Communities.

Costs:

If an estimated cost is known, please provide or use the following ranges:

Low = < $10,000 *Medium* = $10,000 to $100,000 *High* = > $100,000

If costs have not been estimated, please use the following categories:

Low	Possible to fund under existing budget. Project is part of, or can be part of, an existing on-going program.
Medium	Could budget for under existing work plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High	Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Timeline: Short = 1 to 5 years Long-Term = 5 years or greater

OG = On-going program DOF = Depending on funding

MEETING NOTES

Meeting	Delaware County Hazard Mitigation Plan (HMP) Plan Draft Review Meeting		
Date	October 18, 2022	**Time**	6:30 – 7:15 p.m.
Location	Webinar		
Attendees	Larry Bak, Deputy Director, Emergency Management, Delaware County Emergency Services		
	Tim Boyce, Director of Emergency Services, Delaware County Emergency Services		
	Thomas Morgan, Emergency Management Coordinator (EMC), Aston Township		
	Fred Field, EMC, Concord Township		
	Steven Poole, Haverford Township		
	Stephen Neace, Township Manager, Newtown Township		
	Tony Subbio, Project Manager, Tetra Tech		

Discussion Points

This section summarizes each discussion point addressed during the meeting.

Welcome

Mr. Bak welcomed attendees. Mr. Boyce thanked attendees for participating in the planning project. Mr. Subbio described the purpose of the meeting.

Review the Planning Process

Mr. Subbio reviewed the project timeline. He described the meetings that were conducted and the organizations that participated in the planning process.

Review the Document

Mr. Subbio gave a brief summary of each section of the updated HMP, as described below:

- Section 1: Introduction provides the background, purpose, and scope of the HMP.
- Section 2: County Profile discusses the nature of Delaware County, its communities, and its environment. It also discusses the limitations of data used in developing the HMP.
- Section 3: Planning Process summarizes the process by which the HMP was updated. It identifies the municipalities, special district, and stakeholders that participated in the planning process.
- Section 4: Risk Assessment includes the hazard profiles and vulnerability summary.
- Section 5: Capability Assessment describes the plans, regulations, staff, and resources available to implement hazard mitigation throughout the County. Mr. Subbio described the capabilities that were analyzed.
- Section 6: Mitigation Strategy includes the goals, objectives, and mitigation actions identified in the planning process. Mr. Subbio described the process used to develop mitigation actions,

including using information gathered from worksheets, surveys, planning meetings, and contact with municipal officials. The following discussions were held regarding Section 6:

  - There are approximately 340 specific, implementable mitigation actions included in the HMP.
  - Mr. Boyce stated that the County EOC is aging and vulnerable to hazards, and that there needs to be an action to address that vulnerability. Mr. Subbio stated that Tetra Tech will add the action.

- Section 7: Plan Maintenance describes how the HMP will be maintained over 5 years after adoption, including the annual review process.
- Section 8: Plan Adoption includes template resolutions for each participating jurisdiction to adopt the HMP.
  - Mr. Bak pointed out that there are five members of County Council, not three County Commissioners.
  - Mr. Boyce asked if the County had to adopt the plan before any participating municipalities. Mr. Subbio stated that there is not a requirement one way or the other, but he advises that the County adopt the plan first.
  - Mr. Bak asked if the HMP needs to be re-adopted after each annual amendment. Mr. Subbio replied that re-adoption is not necessary.
- The appendices include documentation of the planning process. Appendix I lists the critical facilities analyzed in the risk assessment; this appendix is not available to the public for security reasons.

Next Steps

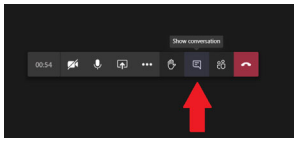
Mr. Subbio reviewed the following next steps in the HMP update process with attendees:

- Mr. Bak will provide information on the mitigation action to address the County EOC's vulnerability.
- Tetra Tech will put the finishing touches on the draft HMP by about October 21, 2022.
- Tetra Tech aims to submit the HMP to Pennsylvania Emergency Management Agency (PEMA) for review on or about October 21, 2022.
- After PEMA completes its review, Tetra Tech will make any required changes and submit the plan to the Federal Emergency Management Agency (FEMA) for formal review; submission is estimated to be in mid-November 2022.

With no further questions, Mr. Boyce, Mr. Bak, and Mr. Subbio thanked attendees for their time and participation. The meeting concluded at 7:15 p.m.

Welcome

- Please add your name, title, and organization(s) to the chat window.
  - Bring your mouse to the lower part of the screen until a set of buttons appears.
  - Click **Show conversation**.



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TETRA TECH

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Delaware County Hazard Mitigation Plan

2022 Update

Plan Draft Review Meeting

October 18, 2022
6:30 – 8:00 p.m.

2

Agenda

- Welcome
- Review the Planning Process
- Review the Document
- Next Steps
- Questions

3

Review the Planning Process

- Planning Team Kickoff Meeting
  - November 16, 2021
- Risk Assessment Update
  - November 16, 2021– June 13, 2022
  - Risk Assessment Review Meeting: June 14, 2022
- Mitigation Strategy Update
  - November 16, 2021 – September 18, 2022
  - Mitigation Strategy Workshop: June 29, 2022
- Develop the HMP Document
  - November 16, 2021 – September 18, 2022
- Public Review Period
  - September 18 – October 18, 2022

4

Review the Planning Process

Delaware County Departments/Organizations				
• Executive Director	• Conservation District	• Emergency Services	• LEPC	• Planning
• Public Relations	• Public Works			
Municipalities and Special District				
• Aldan Borough	• Aston Township	• Bethel Township	• Brookhaven Borough	• Chadds Ford Township
• Chester City	• Chester Heights Borough	• Chester Township	• Clifton Heights Borough	• Concord Township
• Darby Borough	• Darby Township	• Eddystone Borough	• Haverford Township	• Marcus Hook Borough
• Marple Township	• Media Borough	• Middletown Township	• Newtown Township	• Prospect Park Borough
• Radnor Township	• Ridley Park Borough	• Ridley Township	• Rutledge Borough	• Springfield Township
• Swarthmore Borough	• Thornbury Township	• Tinicum Township	• Upland Borough	• Upper Chichester Township
• Upper Darby Township	• Upper Providence Township	• Yeadon Borough	• Brandywine Conservancy and Museum of Art	

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Review the Planning Process

Neighboring Jurisdictions			
• Chester County Department of Emergency Services	• Montgomery County Planning Commission	• Montgomery County Public Safety	• Philadelphia Office of Emergency Management
Regional Stakeholders			
• Delaware Valley Regional Planning Commission	• Eastern Delaware County Stormwater Collaborative	• Southeastern Pennsylvania Transit Authority	• US Coast Guard
Commonwealth and Federal Agencies			
• Federal Emergency Management Agency Region 3	• Pennsylvania Department of Environmental Protection	• Pennsylvania Emergency Management Agency	

6

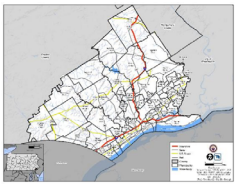
Review the Planning Process

Hospitals/Healthsystems				
• Crozer Health	• Main Line Health			
Fire Departments				
• Chester City Fire Company	• Ogden Fire Company	Upper Darby Fire Company # 3		
Police Departments				
• Eddystone Police Department	• Radnor Township Police			
Other Stakeholders				
• Adelphia	• Aqua America	• Boeing	• Braskem	• Constellation Energy
• Energy Transfer	• Hepaco	• Iceworks	Lewis	Liberty Electric
• Menzies	• MIPC, LLC, a subsidiary of Monroe Energy	• Monroe Energy	SKC Hangar	

7

Review the Document

- Section 1: Introduction
  - Background
  - Purpose
  - Scope
- Section 2: County Profile
  - Geography and Environment
  - Community Facts
  - Population and Demographics
  - Land Use and Development
  - Data Sources and Limitations



8

Review the Document

- Section 3: Planning Process
  - Update Process and Participation Summary
  - The Planning Team
  - Meetings and Documentation
  - Public and Stakeholder Participation
  - Multi-Jurisdictional Planning

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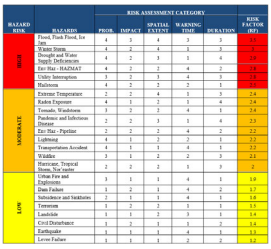
Review the Document

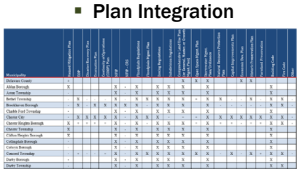
- Section 4: Risk Assessment
  - Update Process Summary
  - Hazard Identification
  - Hazard Profiles
  - Hazard Vulnerability Summary



10

Review the Document

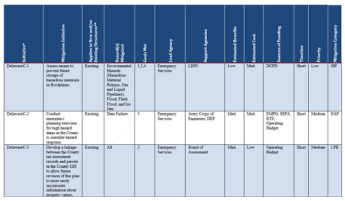
- Section 5: Capability Assessment
  - Comprehensive Planning
  - Emergency Management
  - Participation in the NFIP
  - Community Rating System (CRS)
  - Administrative and Technical Capability
  - Political Capability
  - Financial Capability
  - Education and Outreach
  - Self-Assessment
  - Plan Integration



11

Review the Document

- Section 6: Mitigation Strategy
  - Update Process Summary
  - Mitigation Goals and Objectives
  - Identification and Analysis of Mitigation Techniques
  - Mitigation Action Plan



12

Review the Document

- Section 7: Plan Maintenance Procedures
  - Monitoring, Evaluating, and Updating the Plan
    - Information Requests
    - Worksheets
    - Annual Review Meeting
  - Continued Public Involvement
- Section 8: Plan Adoption


Delaware County Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Delaware County, Pennsylvania

WHEREAS, the municipalities of Delaware County, Pennsylvania, are most vulnerable to natural and human-made hazards, which may result in loss of life and property, economic hardship, and threats to public health and safety; and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and adopt [illegible] as a prerequisite to receiving post disaster Hazard Mitigation Grant Program funds; and

WHEREAS, Delaware County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post disaster Hazard Mitigation Grant Program funds; and

WHEREAS, the Delaware County Hazard Mitigation Planning Committee has prepared the Hazard Mitigation Plan in coordination with other County departments, local municipal officials, and the citizens of Delaware County; and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Delaware County Hazard Mitigation Plan; and

WHEREAS, the Hazard Mitigation Plan identifies [illegible] mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments.

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Delaware that:

- The 2022 Delaware County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the county; and
- The respective officials and agencies of Delaware County identified in the implementation strategy of the 2022 Delaware County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2022

ATTEST: DELAWARE COUNTY COMMISSIONERS

By: _____

By: _____

By: _____

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Review the Document

- Appendices
  - Authorities and References
  - Local Plan Review Crosswalk
  - Meeting Documentation
  - Municipal Participation Documentation
  - Public and Stakeholder Participation
  - Adoption Resolutions
  - Blank Mitigation Action Worksheet
  - Completed Mitigation Action Worksheets
  - Critical Facilities (not publicly available)

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Next Steps

- Finishing touches
  - October 19-21, 2022
- Submission to PEMA
  - October 21, 2022
- Submission to FEMA Region III
  - On or about November 11, 2022

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Questions?

Thank you for your time!

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tony.subbio@tetratech.com

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AGENDA

DELAWARE COUNTY 2022 HAZARD MITIGATION PLAN UPDATE

Plan Draft Review Meeting

October 18, 2022 | 6:30 – 8:00 p.m.

1. **Welcome**
2. **Review the Planning Process**
3. **Review the Document**
4. **Next Steps**
    a. Finishing touches
    b. Submission to PEMA
    c. Submission to FEMA
5. **Questions**

APPENDIX D. MUNICIPAL PARTICIPATION DOCUMENTATION

Appendix D includes copies of worksheets submitted by each participating municipality during the development of the Delaware County Hazard Mitigation Plan.

Hazard Identification and Risk Evaluation Worksheet

Name: Ray Stiles **Title:** Emergency Management Coordinator

Jurisdiction: Bethel Township **Email:** Ray.Stiles@Betheltwp.com

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	TD Ida (August 2021)
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	Corona Virus
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	
Dam Failure	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Capability Assessment Survey

Name:	**Ray Stiles**	**Title:**	**Emergency Management Coordinator**
Jurisdiction:	**BETHEL Township**	**Email:**	**Ray.Stiles@Betheltwp.com**
Phone Number:	**610 960-8041**		

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan					
Emergency Operations Plan	**X**	**01/2019**		**Bethel Twp Emergency Management**	**2022 EOP Under Development**
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations	**X**	**09/2015**		**Bethel Township Engineer**	
Floodplain Management Plan	**X**	**09/2015**		**Bethel Township Engineer**	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Zoning Regulations	X	2021		Bethel Twp Zoning	Zoning regulations updated yearly
Subdivision Regulations	X	2021		Bethel Twp Planning	Subdivision regulations updated yearly
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	2006		Bethel Twp & Engineer	
Open Space Management Plan (or Parks/Rec or Greenways Plan)			X	Bethel Township	
Stormwater Management Plan / Ordinance	X	08/2013		Bethel Twp & Engineer	
Natural Resource Protection Plan	X	01/2000		Bethel Twp & Engineer	Land Disturbance Activities Ordinance
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan	X	12/1999			Historic Preservation Ordinance
Farmland Preservation					
Building Code	X	06/2004		Bethel Twp Code	Adopted Construction Code and IBC
Fire Code	X			Fire Marshal	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		**Bethel Township Engineer**	GD Houtman & Sons Inc.
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Contract with Engineer Company	GD Houtman & Sons Inc.
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Contract with Engineer Company	GD Houtman & Sons Inc.
Emergency Manager	X		Emergency Management	Ray Stiles E.M.C
Floodplain Manager	X		**Bethel Township Engineer**	GD Houtman & Sons Inc.
Land Surveyors	X		**Bethel Township Engineer**	GD Houtman & Sons Inc.
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program				
Grant writers or fiscal staff to handle large or complex grants	X		Bethel Twp Asst. Mgt Township Treasurer Township Engineer Township Supervisors	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes	X		Bethel Tax Collector	Fire Tax
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Bethel Fire Company	Fire Safety / Prevention
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability	X		
Financial Capability	X		
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name:	**Ray Stiles**	**Title:**	**Emergency Management Coordinator**
Jurisdiction:	**BETHEL Township**	**Email:**	**Ray.Stiles@Betheltwp.com**

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	***Recommended Action***	***Yes/No***	***Comments***
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	NO	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	NO	
c. Does the municipality support requests for map updates?	If yes, specify how.	NO	
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	NO	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	NO	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	NO	

2. FLOODPLAIN MANAGEMENT			
Requirement	***Recommended Action***	***Yes/No***	***Comments***
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	NO	Twp does not have Special Flood Hazard Areas
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	All proposed developments are required to provide any pertinent flood plain information on the drawings for review by Township professionals. Enforced by Township Engineer and Building Inspector/Code Official
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	All proposed developments are required to provide any pertinent flood plain information on the drawings for review by Township professionals. Enforced by Township Engineer and Building Inspector/Code Official
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	All subdivision and land development plans are recorded. Enforced by Township Engineer and Building Inspector/Code Official
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	During permit review and inspection processes.
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	NO	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	NO	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	NO	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	NO
Is the floodplain management an auxiliary function?	Community FPA	NO
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	NO
Are there any outstanding compliance issues (i.e., current violations)?		NO
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		NO
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	0
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	0
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	N/A
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	NO
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name:	Ray Stiles	Title:	Emergency Management Coordinator
Jurisdiction:	BETHEL Twp	Email:	Ray.Stiles@Betheltwp.com

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal	**Educate residents of potential pipeline emergencies**	
Objective	Make pipeline information available via social media / twp website	

Goal	**Identify low land / potential flooding areas**	
Objective	Review past flooding events	
Objective	Mitigate if possible	

Suggested Additional Goals and/or Objectives		Comments
Goal	**Emphasize Local / County Emergency Alerting System**	
Objective	Highlight EAS and suggest subscription	

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	x					
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.	x					
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).	X					

Hazard Identification and Risk Evaluation Worksheet

Name: Steven Schultz **Title:** Emergency Management coordinator

Jurisdiction: Brookhaven Borough **Email:** SSchultzem27@gmail.com

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	I	
Flood (riverine, flash, stormwater, and ice jam)	I	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	I	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	I	
Dam Failure	NC	

Environmental Hazards – Hazardous Materials Releases	I	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- Coastal Erosion
- Expansive Soils
- Invasive Species

Human-Caused

- Building and Structure Collapse
- Cyber Terrorism
- Disorientation
- Drowning
- Environmental Hazards – Coal Mining
- Environmental Hazards – Conventional Oil/Gas Wells
- Environmental Hazards – Gas and Liquid Pipelines
- Environmental Hazards – Unconventional Oil/Gas Wells
- Mass Food/Animal Feed Contamination
- Nuclear Incident
- Opioid Addiction Response
- War and Criminal Activity

Additional Comments:

No Additional Comments

Delaware County Planning Team
Risk Assessment Review Meeting

Jurisdiction Risk - Brookhaven Borough **(Municipality)**

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
>	<	>	>	>	>	>	>	>	>	>	<	>	>	>	>	>	>	>	>	>	>	>

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Capability Assessment Survey

Name: Steven Schultz
Title: Emergency Management Coordinator
Jurisdiction: Brookhaven Borough
Email: SSchultzEM27@gmail.com
Phone Number: 610 909 5494

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X	2016		County EMA	Brookhaven Borough is a part of the County mitigation Plan
Emergency Operations Plan	X	2020	X	Brookhaven Borough	2022 Version is in processing
Disaster Recovery Plan					
Evacuation Plan	X	2020		Brookhaven EMA Borough	part of emergency operations Plan
Continuity of Operations Plan	X	2020		Brookhaven EMA Borough	part of emergency operations Plan
NFIP	X			Brookhaven Borough	
NFIP – Community Rating System	X	2022		Brookhaven EMA Borough	Update 2022 (9)
Floodplain Regulations	X	2022		Brookhaven codes Borough	updates as needed
Floodplain Management Plan					
Zoning Regulations	X	2022		Brookhaven inspecters office Borough	

Subdivision Regulations					
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)					
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance					
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	X			Brookhaven Borough Codes / inspectors	
Fire Code	X			Brookhaven Borough Fire Marshalls Office	
Other					

2.

Administrative and Technical Capability: Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X		
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Brookhaven Borough Engineer	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Brookhaven Borough Engineer	
Emergency Manager	X		Brookhaven Borough	
Floodplain Manager	X		Brookhaven EMA/ engineers	
Land Surveyors	X		Brookhaven Engineer	
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants		X		
Other				

3.

Financial Capability: Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees	X		Brookhaven Borough Public Works/Sewer Dept.	
Stormwater Utility Fees	X		Brookhaven Borough Public Works/ Sewer Dept	
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Brookhaven PFSO/ Fire Department.	
Public-private partnership initiatives addressing disaster-related issues	X		Brookhaven EMA	Works with local schools and vendors for disaster Assistance
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Brookhaven EMA	Brookhaven Fire Department
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Steven Schultz **Title:** Emergency Management Coordinator

Jurisdiction: Brookhaven Borough **Email:** SSchultzem27@gmail.com

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.		
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.		
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.		
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.		
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.		

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	yes	Brookhaven Berough Inspecters office
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	yes	Brookhaven engineer
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	yes	Brookhaven engineer and inspecters office
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	yes	Brookhaven engineer Inspectors office EMA
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	yes	Brookhaven Inspecters office's code officals enforce code compliance.
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	yes	Brookhaven participates in CRS

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	yes	Yearly letters to homes in the SFHA
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	yes	As updates are avilable SFHA residents are informed.
c. Does the municipality provide general assistance to	If yes, specify how.	yes	Brookhaven EMA speaks with the home owners in the SFHA

community members regarding insurance issues?			

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	NO
Is the floodplain management an auxiliary function?	Community FPA	yes
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	education
What are the barriers to running an effective NFIP program in the community?	Community FPA	education
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	yes
Are there any outstanding compliance issues (i.e., current violations)?		None known at this time
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		NO
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	meet, written by Borough code official/engineer
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Borough Inspectors office

Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	12
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	Yes
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	9
What categories and activities provide CRS points and how can the class be improved?		Better community out reach.
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	yes

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Steven Schultz

Title: emergency Management Coordinator

Jurisdiction: Brookhaven Borough

Email: SSchultzem27@gmail.com

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	
Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	

Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress / Unknown	In Progress / Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						

Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						

Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						

Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.			X			
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						

Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.			X			
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						

Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						

Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.			X			
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.						
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						

Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Capability Assessment Survey

Name: William Rigby **Title:** Commissioner

Jurisdiction: City of Chester Emergency Management **Email:** wrigby@chesterfire.net

Phone Number: 610-447-7765

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan					
Emergency Operations Plan	**X**	**6/1/2019**		**City of Chester EM**	
Disaster Recovery Plan	**X**	**6/1/2019**		**City of Chester EM**	
Evacuation Plan	**X**	**6/1/2019**		**City of Chester EM**	
Continuity of Operations Plan	**X**	**6/1/2019**		**City of Chester EM**	
NFIP	**X**	**3/1/2022**			
NFIP – Community Rating System	**X**				
Floodplain Regulations					
Floodplain Management Plan	**X**		**X**		**Working with Upland to fix Kerlin Street Bridge**
Zoning Regulations	**X**				

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations					
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)			X	City Engineer	
Open Space Management Plan (or Parks/Rec or Greenways Plan)			X	City Parks	
Stormwater Management Plan / Ordinance	X			Delcora	Tunnel project to begin 2023-2028
Natural Resource Protection Plan	X			Delaware County	
Capital Improvement Plan	X	2022		City Engineer	
Economic Development Plan	X	2022		CEDA	
Historic Preservation Plan	X	2013		Delaware County	
Farmland Preservation	X			Delaware County	Land Stewardship Assistance
Building Code	X	2009	X	Chester City Council	In progress to adopt 2018 IBC
Fire Code	X	2009	X	Chester City Council	In progress to adopt 2018 IFC
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		City Engineer	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		City Engineer	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		City Engineer	
Emergency Manager	X		City of Chester Fire HQ	
Floodplain Manager		X		
Land Surveyors				
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants	X		City Grant writer	John Sly
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Finance Department	
Community Development Block Grants (CDBG)	X		Chester Economic Development Authority	
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds	X		Finance	
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X	Bureau of Fire	Looking into Certification
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Bureau Of fire	Fire Prevention Department
Public-private partnership initiatives addressing disaster-related issues				
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Citizen CORP, Red Cross	
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: William Rigby **Title:** Commissioner

Jurisdiction: City of Chester Emergency Management **Email:** wrigby@chesterfire.net

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	PEMA
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	YES	2022
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	NO	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	NO	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	NO	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	No	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.		
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.		

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	Yes	Social media, Red Cross,
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their	If yes, specify how.	NO	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
insurance rates?			
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	NO	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	YES
Are there any outstanding compliance issues (i.e., current violations)?		NO
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		
Regulation		

Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	DIGITAL
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Meet regulations
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name:William Rigby

Title: Commissioner

Jurisdiction: City Of Chester

Email: wrigby@cheserfire.net

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
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Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
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Existing Mitigation Action			Status					Review Comments
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Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
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Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	X					
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding		Yes Delcora has a large storm water project for the next 10 years	Yes, projected to start fall 2022			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.		X	X			*3 sites in the city 2 are registered w the county as cooling and warming*
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: Lawrence B. Ward **Title:** Emergency Management Coordinator

Jurisdiction: Chester Heights Borough **Email:** larry@garnetvalley.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	I	Global Warming
Flood (riverine, flash, stormwater, and ice jam)	I	Increase in the number of severe storms
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	Weather Changes
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	COVID
Radon Exposure	NC	
Subsidence, Sinkhole	I	More storms causing roadways to undermine
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Dam Failure	NC	
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	D	Utility Co adding Resilience to grid

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- X Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- X Cyber Terrorism
- ☐ Disorientation
- X Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- X Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- X Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Jurisdiction Risk – Chester Heights Borough_____ (Municipality)

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
<	=	=	=	<	>	=	>	=	=	<	=	=	=	=	=	<	=	=	>	=	>	=

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Capability Assessment Survey

Name: Lawrence B. Ward **Title:** Emergency Management Coordinator

Jurisdiction: Chester Heights Borough **Email:** larry@garnetvalley.org

Phone Number: 610-656-2660

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan			**X**	**Chester Heights Borough**	**In Progress**
Emergency Operations Plan			**X**	**Chester Heights Borough**	**In Progress**
Disaster Recovery Plan			**X**	**Chester Heights Borough**	**In Progress**
Evacuation Plan			**X**	**Chester Heights Borough**	**In Progress**
Continuity of Operations Plan			**X**	**Chester Heights Borough**	**In Progress**
NFIP					
NFIP – Community Rating System					
Floodplain Regulations	**X**	**1/1/2000**		**Chester Heights Borough**	
Floodplain Management Plan					
Zoning Regulations	**X**	**1/1/2012**		**Chester Heights Borough**	**Being review by Council**

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	X	1/1/2000		Chester Heights Borough	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	1/1/2015	X	Chester Heights Borough	
Open Space Management Plan (or Parks/Rec or Greenways Plan)			X	Chester Heights Borough	
Stormwater Management Plan / Ordinance	X	1/1/2010		Chester Heights Borough	
Natural Resource Protection Plan			X	Chester Heights Borough	
Capital Improvement Plan			X	Chester Heights Borough	
Economic Development Plan					
Historic Preservation Plan			X	Chester Heights Borough	
Farmland Preservation			X	Private Land Owners	
Building Code	X	10/1/2018		Chester Heights Borough	
Fire Code	X	10/1/2018		Chester Heights Borough	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X		
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X			
Emergency Manager	X			
Floodplain Manager		X		
Land Surveyors	X			
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants		X		
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Chester Heights Borough	
Community Development Block Grants (CDBG)	X		Chester Heights Borough	
Special Purpose Taxes		X	Chester Heights Borough	
Gas / Electric Utility Fees		X	Chester Heights Borough	
Water / Sewer Fees		X	Chester Heights Borough	
Stormwater Utility Fees		X	Chester Heights Borough	
Development Impact Fees	X		Chester Heights Borough	
General Obligation, Revenue, and/or Special Tax Bonds	X		Chester Heights Borough	
Partnering Arrangements or Intergovernmental Agreements	X		Chester Heights Borough	
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X	Chester Heights Borough	
StormReady certification		X	Chester Heights Borough	
Natural disaster or safety related school programs		X	Chester Heights Borough	
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Chester Heights Borough	
Public-private partnership initiatives addressing disaster-related issues		X	Chester Heights Borough	
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Neighbors Alliance	
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability	X		
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Lawrence B. Ward **Title:** Emergency Management Coordinator

Jurisdiction: Chester Heights Borough **Email:** larry@garnetvalley.org

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	No	
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	Through our Borough Engineer
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	No	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	No	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Borough Engineer & Borough Secretary

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	Building & Codes Officer
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	Planning Commission
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	No	
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	Building & Codes Officer
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	No	
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	Yes	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	No
Is the floodplain management an auxiliary function?	Community FPA	Yes
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	All done by a 3rd Party Building Inspector
What are the barriers to running an effective NFIP program in the community?	Community FPA	Money & Personnel
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Mostly
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	FEMA Minimums
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	All done through 3rd Party Building Inspector
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Unknown
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Zero
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	1
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	Buildings around the Chester Creek
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	No
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Lawrence B. Ward

Title: Emergency Management Coordinator

Jurisdiction: Chester Heights Borough

Email: Larry@garnetvalley.org

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	Clear Debris from the creek bed such as trees and other obstacles to the flow of the water in the Chester Creek & the West Branch or the Chester Creek
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	Westlake Plastics has removed all equipment from the parts of the building that flood.
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	Review with property Owners regarding keeping all areas clear of material in flood prone areas.
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.			X			
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.		X				
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.			X			
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.			X			
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.	X					
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).			X			
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop		X				

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.				X		
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.			X			
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).				X		
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.				X		
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.			X			
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.			X			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.			X			
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).				X		
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.				X		
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.		X				
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.			X			
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems			X			
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.			X			
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.				X		

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.	X					
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.			X			
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.			X			
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.	X					
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.		X				
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.		X				
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.			X			
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.	X					
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.			X			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.			X			
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.			X			
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.				X		
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.				X		
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.	X					
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.	X					
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.			X			
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.		X				
Delaware County	Action 39	Identify special populations requiring additional emergency response.			X			
Delaware County	Action 40	Evaluate means to enhance response capability for residents.			X			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.			X			
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.		X				
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester City; Collingdale Borough; Chester Heights Borough ,Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding		X				
Chadds Ford Township; Chester Heights Borough, Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.		X				
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester Heights Borough, Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.		X				
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.		X				
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Chester Heights Borough, Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.		X				
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.		X				
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.			X			
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: John Gould **Title:** Emergency Management Coordinator

Jurisdiction: Clifton Heights Borough **Email:** jgould@cliftonheightspa.gov

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	Covid/ Monkey Pox
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	I	Same increase as rest of county
Dam Failure	NA	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NA	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☒ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Spotted Lantern Flies

Jurisdiction Risk -Clifton Heights Borough

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=	>	>	=	=	=

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Hazard Identification and Risk Evaluation Worksheet

Name: Fred Field Title: EMC

Jurisdiction: Concord Township Email: ffield@concordtownship.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	I	Heavy Rain in short time span
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	Resulting flooding Wind = Loss of electrical power
Landslide	NC	
Lightning Strike	I	Increased number of structures = increased chance of damage
Pandemic	I	As per COVID
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	I	As per tornado at next Twp. (Thornbury Twp.)
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Dam Failure	NC	
Environmental Hazards – Hazardous Materials Releases	NC I	1 SARA site Increased highway incidents due to increased traffic.
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	I	Increased Traffic
Urban Fire and Explosion	NC	
Utility Interruptions	I	Increased number of locations requiring electrical power.

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- X Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- X Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Under Natural – Spotted Lantern Fly can cause issues with vineyards

Under Human Caused – (7) active pipelines run thru the Township, (1) being changed from Petroleum to natural gas.

Jurisdiction Risk - CONCORD TOWNSHIP **(Municipality)**

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
=	>	>	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	>	=	>	>	=

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Capability Assessment Survey

Name: Fred Field

Title: EMC

Jurisdiction: Concord Township

Email: ffield@concordtownship.org

Phone Number: 610-459-8911 office – 610-633-7213 cell

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**	**3/7/17**		**County EMA**	
Emergency Operations Plan			**X**	**TWP EMA**	**80% Complete**
Disaster Recovery Plan					
Evacuation Plan					**Incident Dependent**
Continuity of Operations Plan			**X**	**TWP Staff**	**Constantly Changing**
NFIP					
NFIP – Community Rating System					
Floodplain Regulations	**X**	**March 2016**		**Code Dept.**	
Floodplain Management Plan	**X**	**March 2016**		**Code Dept.**	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop -ment		
Zoning Regulations	X	Dec 2015		Township Council	
Subdivision Regulations	X	Dec 2015		Township Council	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	OCTOBER 2013		Township Council Planning Commission	
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	July 2020		Township Council Open Space Steering Committee	
Stormwater Management Plan / Ordinance	X	Aug 2018		Engineering Dept.	
Natural Resource Protection Plan					
Capital Improvement Plan	X	Jan 2022		Township Staff	5 Year Plan
Economic Development Plan					
Historic Preservation Plan	X	Dec 1998		Historical Commission	
Farmland Preservation			X		Ordinance hearing scheduled
Building Code	X	2015		Code Dept.	
Fire Code	X	2015		Fire Marshal	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Planning Commission Engineering Dept.	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Engineering Dept. Fire Marshal Emergency Management	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Code Dept. Fire Marshal Engineering Dept.	
Emergency Manager	X		Emergency Management	
Floodplain Manager	X		Code Dept.	
Land Surveyors	X		Engineering Dept.	
Scientists or staff familiar with the hazards of the community	X		Emergency Management Fire Marshal	
Personnel skilled in GIS and/or FEMA's HAZUS program	X		Engineering Dept.	
Grant writers or fiscal staff to handle large or complex grants	X		Engineering Dept. Township Staff	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Finance Dept.	
Community Development Block Grants (CDBG)	X		Finance Dept.	
Special Purpose Taxes	X		Township Council	
Gas / Electric Utility Fees		X		
Water / Sewer Fees	X		Township Council Sewer Dept.	
Stormwater Utility Fees		X		
Development Impact Fees	X		Township Council	
General Obligation, Revenue, and/or Special Tax Bonds	X		Township Council	
Partnering Arrangements or Intergovernmental Agreements	X		Township Council Township Public Works Township Staff Emergency Management	
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs	X		Garnet Valley School District	
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Township Staff Fire Marshal Fire Dept.	
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Thru County EMA: Medical Reserve Corp Amateur Radio	
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Fred Field **Title:** EMC

Jurisdiction: Concord Township **Email:** ffield@concordtownship.org

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	YES	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.		
c. Does the municipality support requests for map updates?	If yes, specify how.	YES	In person & Email
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.		
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	YES	Via Engineering Dept.
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.		

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	YES	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	YES	Code Dept.
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	YES	Engineering Dept.
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	YES	Code Dept. & Engineering Dept.
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	YES	Code Dept. & Engineering Dept.
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	YES	Plan Review & Initial Inspection & Follow-up Inspection
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	YES	Zoning & Building Regulations control building & storage in flood areas.

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	YES	Newsletter & Website

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	NO	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	NO	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	Via Code Dept. & Engineering Dept.
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Land Development plan review thru Engineering Dept. & Planning Commission. Building Plan Review Thru Cide Dept.
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	YES
Are there any outstanding compliance issues (i.e., current violations)?		NO
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Review by Engineering Dept. & Code Dept.
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Information not available.
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Information not available
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	Information not available
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	Information not available
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	NO
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Fred Field

Title: EMC

Jurisdiction: Concord Township

Email: ffield@concordtownship.org

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	# 1.5 Need to check for LP and/or fuel oil tanks that may be located in the flood areas.
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	# 2.2 Need to develop list.
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	# 4.1 & 4.2 Part of Zoning & Land Development Ordinances.
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	# 5.3 Via Engineering & Code regulations: - Plans review - Initial Inspections - Follow-up Inspections
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	# 6.1 Continuous & prior to forecasted Events.
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	# 6.2 By Fire Dept. training & standard Operating procedures.
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	# 7.1 During major snow events - Open up for emergency response, Then clean up.
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal	**Have PECO elevate priority for electrical power outages that effect traffic signals at major intersections.**	
Objective	Safety Issue – Having personnel manually direct traffic at major intersections.	
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.			X			Few buildings in flood areas.
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.			X			
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.			X			*Township & Fire Dept*
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						*By pipeline training meetings*
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).			X			*By Township newsletter and website*

Capability Assessment Survey

Name: Nicole Whitaker **Title:** Township Manager

Jurisdiction: Township of Darby **Email:** Nicole. whitaker@darbytwp.org

Phone Number: 610-586-1514

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop -ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan					
Emergency Operations Plan					
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP	**x**	**11/18/09**		**Third Party**	
NFIP – Community Rating System					
Floodplain Regulations	**x**	**6/10/15**		**Third Party**	
Floodplain Management Plan					
Zoning Regulations	**x**	**12/12/07**			**Currently have engaged a consultant to prepare new**

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	x	8/2016		Planning	Utilize County Ordinance
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	x	5/1975			
Open Space Management Plan (or Parks/Rec or Greenways Plan)			x	Planning	Awarded Grant; Creating RFP for consultant
Stormwater Management Plan / Ordinance	x		x	Third Party	New ordinance to be adopted Sept 2022
Natural Resource Protection Plan					n/a
Capital Improvement Plan			X		
Economic Development Plan			X		
Historic Preservation Plan					n/a
Farmland Preservation					n/a
Building Code	x	12/08/10		Licenses and Inspections	Utilize UCC
Fire Code	x	11/16/09		Fire Marshal	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	x		Third Party	
Planners or engineers (with natural and/or human caused hazards knowledge)	x		Third Party	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	x		Third Party	
Emergency Manager	x		Emergency Management	
Floodplain Manager	x		Third Party	
Land Surveyors	x		Third Party	
Scientists or staff familiar with the hazards of the community				
Personnel skilled in GIS and/or FEMA's HAZUS program	x		Third Party	
Grant writers or fiscal staff to handle large or complex grants	x		Third Party	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		x		
Community Development Block Grants (CDBG)	x		Third Party	
Special Purpose Taxes		x		
Gas / Electric Utility Fees		x		
Water / Sewer Fees	x		Tax Collector	Sanitary Sewer only
Stormwater Utility Fees		x		
Development Impact Fees		x		
General Obligation, Revenue, and/or Special Tax Bonds				Not sure what this means…
Partnering Arrangements or Intergovernmental Agreements	x		Administration	Eastern Delaware County Stormwater Collaborative; Delco COG;Darby Creek Joint Authority
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification				
StormReady certification		x		
Natural disaster or safety related school programs	x		Southeast Delco school district	
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	x		Local fire companies and fire marshal	
Public-private partnership initiatives addressing disaster-related issues		x		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		x		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		x	
Administrative and Technical Capability		x	
Financial Capability	x		
Education and Outreach	x		

Hazard Identification and Risk Evaluation Worksheet

Name: Robert Gliem **Title:** EMC

Jurisdiction: Eddystone Borough **Email:** rgliem@comcast.net

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Landslide	NC	
Lightning Strike	NC	
Pandemic	D	Mitigation efforts of 2021 decreased community impact
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	
Dam Failure	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

NC

Capability Assessment Survey

Name: Robert Gliem **Title:** Emergency Management Coordinator

Jurisdiction: Eddystone Borough **Email:** rgliem@comcast.net

Phone Number: 610.874.1100

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**	**03/25/2022**		**County EMA / Eddystone EMA**	Interim update in 2022 revised mitigation strategy
Emergency Operations Plan	**X**	**03/25/2022**		**County EMA / Eddystone EMA**	Interim update in 2022 revised mitigation strategy
Disaster Recovery Plan			**X**		
Evacuation Plan	**X**	**04/01/2011**		**County EMA / Eddystone EMA**	Interim update in 2011 revised mitigation strategy
Continuity of Operations Plan	**X**	**04/01/2011**		**County EMA / Eddystone EMA**	Interim update in 2011 revised mitigation strategy
NFIP	**X**	**03/25/2022**		**Engineer/ Council / Code Enforcement**	Interim update in 2022 revised mitigation strategy
NFIP – Community Rating System	**X**	**03/25/2022**		**Engineer/ Council / Code Enforcement**	Interim update in 2022 revised mitigation strategy
Floodplain Regulations	**X**	**03/25/2022**		**Engineer/ Council / Code Enforcement**	Interim update in 2022 revised mitigation strategy
Floodplain Management Plan	**X**	**03/25/2022**		**Engineer/ Council / Code Enforcement**	Interim update in 2022 revised mitigation strategy
Zoning Regulations	**x**	**04/01/2011**		**Engineer/ Council / Code Enforcement**	Interim update in 2022 revised mitigation strategy

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations			X		
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)			X		
Open Space Management Plan (or Parks/Rec or Greenways Plan)			X		
Stormwater Management Plan / Ordinance	X	04/01/2020		Engineer/ Council / Code Enforcement	
Natural Resource Protection Plan			X		
Capital Improvement Plan			X		
Economic Development Plan	X	04/01/2020		Engineer/ Council / Code Enforcement/Financial Services	
Historic Preservation Plan			X		
Farmland Preservation			X		
Building Code	X	01/01/2019		Engineer/ Council / Code Enforcement	
Fire Code	X	01/01/2019		Engineer/ Council / Code Enforcement	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Catania Engineering / Code Enforcement / Council	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Catania Engineering / Code Enforcement / Council	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Catania Engineering / Code Enforcement / Council	
Emergency Manager	X		Code / Fire Marshall	
Floodplain Manager	X		Catania Engineer	
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants	X		Police Department / Financial Services	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Financial Services	
Community Development Block Grants (CDBG)	X		Catania Engineer / Council	
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Eddystone Fire Department	
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Community Action Group / County EMA	
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability	X		
Education and Outreach	X		

Mitigation Strategy 5-Year Mitigation Plan Review

Name:Robert Gliem | Title:EMS

Jurisdiction:Eddystone Borough | Email:rgliem@comcast.net

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding		X	X			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.						
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: Andrew Weldon **Title:** Borough Manager

Jurisdiction: Borough of Marcus Hook **Email:** aweldon@marcushookboro.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	I	More frequent oppressive heat events
Flood (riverine, flash, stormwater, and ice jam)	I	The Borough experiences flooding during heavy, concentrated rain events at our riverfront park as well as 4th and Market/Green Streets and Viscose Village.
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	More frequent and stronger hurricanes/tropical storms
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	COVID-19
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	I	There have been a handful of civil

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
		disturbances in the area since the last plan update.
Dam Failure	NC	
Environmental Hazards – Hazardous Materials Releases	I	Given the proximity of local industry to residential housing this is probably the highest level in the county/state of Pennsylvania.
Levee Failure	NC	
Terrorism	I	The magnitude of impact is the reason we scored this as increased. Again, due to proximity of local industry to residential areas of Borough.
Transportation Accidents	I	Magnitude of impact is increased due to many tanker trucks traversing through the Borough.
Urban Fire and Explosion	I	Given the proximity of local industry to residential housing this is probably the highest level in the county/state of Pennsylvania.
Utility Interruptions	I	The Borough experienced one or two utility interruptions in the last 5 years.

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

X Coastal Erosion
☐ Expansive Soils
☐ Invasive Species

Human-Caused

☐ Building and Structure Collapse
X Cyber Terrorism
☐ Disorientation
☐ Drowning
☐ Environmental Hazards – Coal Mining
☐ Environmental Hazards – Conventional Oil/Gas Wells
X Environmental Hazards – Gas and Liquid Pipelines/STORAGE TANKS and UNDERGROUND CAVERNS
☐ Environmental Hazards – Unconventional Oil/Gas Wells
☐ Mass Food/Animal Feed Contamination
☐ Nuclear Incident
☐ Opioid Addiction Response
☐ War and Criminal Activity

Additional Comments:

Capability Assessment Survey

Name: Andrew Weldon **Title:** Borough Manager

Jurisdiction: Borough of Marcus Hook **Email:** aweldon@marcushookboro.org

Phone Number: 610-485-1341

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**	**4/3/2017**		**County EMA**	**Borough adopted County's 2016 Hazard Mitigation Plan**
Emergency Operations Plan	**X**	**7/5/2006**	**X**	**Emer Mgmt Coordinator**	**Borough has existing plan, currently updating**
Disaster Recovery Plan	**N**				
Evacuation Plan	**X**	**7/5/2006**	**X**	**Emer Mgmt Coordinator**	**Borough has existing plan, currently updating**
Continuity of Operations Plan	**N**				
NFIP	**X**	**2005**		**Administration**	
NFIP – Community Rating System	**N**				
Floodplain Regulations	**X**			**Code Enforcement Officer**	
Floodplain Management Plan	**X**			**Code Enforcement Officer**	
Zoning Regulations	**X**	**10/3/2005**		**Zoning Officer**	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	X	2005		Zoning Officer	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	10/7/2002		Admin/Borough Council	
Open Space Management Plan (or Parks/Rec or Greenways Plan)	N				While not yet under development, the Borough received a County grant for a mini-parks, recreation, and open space plan that will hopefully completed in 2022.
Stormwater Management Plan / Ordinance	X	5/1/2006		Code Enforcement Officer	
Natural Resource Protection Plan	N				
Capital Improvement Plan	N				
Economic Development Plan	N				
Historic Preservation Plan	N				
Farmland Preservation	N				
Building Code	X	7/5/2004		Building Code Official	
Fire Code	X	7/5/2004		Fire Marshal	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Director of Planning & Development	
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Charles Catania Jr. is appointed as the Borough's building code official/building inspector	
Emergency Manager	X		Robert Kersey Sr.	The individual holding this position will possibly change in 2022.
Floodplain Manager	X		Robert Hughes, Code Enforcement Officer	
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants		X		
Other		X		

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Borough of Marcus Hook	
Community Development Block Grants (CDBG)	X		Delco Office of Housing and Community Development	
Special Purpose Taxes	X		Special Fire Tax	
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements	X		Trainer Borough	Trainer Borough and Marcus Hook Borough have an agreement to pay 50/50 for Marcus Hook Trainer Fire Dept loan and insurance expenses
Other		X		

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Marcus Hook Trainer Fire Dept	
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Marcus Hook/Trainer/Lower Chichester Environmental Advisory Council	
Other		X		

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Andrew Weldon **Title:** Borough Manager

Jurisdiction: Borough of Marcus Hook **Email:** aweldon@marcushookboro.org

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes	Adopted by Borough Council on August 3, 2015.
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	Yes	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	Yes	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their	If yes, specify how.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
insurance rates?			
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	Yes	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	Yes
Is the floodplain management an auxiliary function?	Community FPA	No
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Permit review, inspections
What are the barriers to running an effective NFIP program in the community?	Community FPA	Staffing
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		No
Regulation		

Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	Paper
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Yes, based on state model ordinance
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Any property located within the special flood hazard area, would need a floodplain permit in addition to building permit.
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Unsure, looking at flood map it appears 9
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Unknown
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	Unknown
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	Unknown
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	No
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Andrew Weldon

Title: Borough Manager

Jurisdiction: Borough of Marcus Hook

Email: aweldon@marcushookboro.org

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	Keep
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	Keep
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	Keep
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	Keep
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	Keep
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	Keep
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	Keep
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information “capture” at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding		X – Borough has completed stormwater improvements in Viscose Village, however there are still stormwater flooding issues at 4th Street and Market/Green Streets which have not been addressed.				
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.			X – Borough of Marcus Hook does this on a continuous basis.			
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: THOMAS MURRAY **Title:** GM. MGT. COORD. MA TOL

Jurisdiction: MARPLE TWP. **Email:** TJMURRAY7501@GMAIL.COM

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	
Dam Failure	NC	
Environmental Hazards –	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☒ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

SPOTTED LANTERN FLY CAN DAMAGE TREES

Capability Assessment Survey

Name: THOMAS MURRAY

Title: EMERGENCY MGT. COORDINATOR

Jurisdiction: MARPLE TWP

Email: TJMURRAY7501@GMAIL.COM

Phone Number: 610-613-3036

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X				
Emergency Operations Plan	X				
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP	X	2019			
NFIP – Community Rating System	X	2019			
Floodplain Regulations	X	2019			
Floodplain Management Plan	X	2019			
Zoning Regulations	X				

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	X	UPDATE YEARLY			
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X				
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X				
Stormwater Management Plan / Ordinance	X				
Natural Resource Protection Plan	X				
Capital Improvement Plan	X				
Economic Development Plan	X				
Historic Preservation Plan	X				
Farmland Preservation	N/A				
Building Code	X				
Fire Code	X				
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		ENG	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		"	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		"	
Emergency Manager	X		ADMINISTRATIVE/MARPLE TWP	
Floodplain Manager	X		ENG	
Land Surveyors	X		"	
Scientists or staff familiar with the hazards of the community	X		CONTRACTED SVC.	
Personnel skilled in GIS and/or FEMA's HAZUS program	X		ENG	
Grant writers or fiscal staff to handle large or complex grants	X		ENG & TWP STAFF	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Codes & Zoning	
Community Development Block Grants (CDBG)	X			
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees	X			
Stormwater Utility Fees		X		
Development Impact Fees	X			
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements	X			
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		SOCIAL MEDIA	
Public-private partnership initiatives addressing disaster-related issues	X			
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X			
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Financial Capability	X		
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: THOMAS MURRAY **Title:** EMERGENCY MGT. COORDINATOR

Jurisdiction: MARPLE TWP **Email:** TJMURRAY7501@GMAIL.COM

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING

Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	YES	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	NO	
c. Does the municipality support requests for map updates?	If yes, specify how.	YES	WORKING THRU ENGINEERING UPDATES ALL GIS
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	NO	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	YES	QUARTERLY COMMUNITY MEETINGS
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	YES	ENGINEERING DEPT

2. FLOODPLAIN MANAGEMENT

Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	YES	FLOOD PLANE PROTECTION ORD.

2. FLOODPLAIN MANAGEMENT

Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	YES	ENGINEERING DEPT
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	YES	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	YES	
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	YES	
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	YES	

3. FLOOD INSURANCE

Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	YES	QUARTERLY NEWSLETTER, MEETINGS
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their	If yes, specify how.	YES	

4. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
insurance rates?			
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	YES	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	YES PENNONI ENG.
Is the floodplain management an auxiliary function?	Community FPA	YES
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	AS DESCRIBED
What are the barriers to running an effective NFIP program in the community?	Community FPA	NONE
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	YES
Are there any outstanding compliance issues (i.e., current violations)?		NO
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		NOT AT THIS TIME
Regulation		

Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	BOTH
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	MEET
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	SUBMIT TO ENG FOR REVIEW / APPROVAL THRU ZONING & ENGINEER + COMMISSION

Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	1 CONDO COMMUNITY
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	1
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	5
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	N/A

Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	YES
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	2
What categories and activities provide CRS points and how can the class be improved?		2
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	NO

Mitigation Strategy 5-Year Mitigation Plan Review

Name: THOMAS MURRAY

Title: EMERGENCY MGT COORDINATOR

Jurisdiction: MARPLE TWP.

Email: TJMURRAY7501@GMAIL.COM

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.			X			
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.			X			
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.			X			
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: John McMullan **Title:** Township Manager

Jurisdiction: Middletown Township **Email:** jmcmullan@middletowndelcopa.gov

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	Covid 19
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	
Dam Failure	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box (boxes) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- **X** Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

There are multiple gas, liquid & HVL pipelines operating in Middletown Township.

Capability Assessment Survey

Name: John McMullan **Title:** Township Manager

Jurisdiction: Middletown Township **Email:** jmcmullan@middletowndelcopa.gov

Phone Number: 610-565-2700

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**	**12/12/2016**		**County EMA**	**Currently being revised**
Emergency Operations Plan	**X**	**9/27/2021**		**Township EMC**	**Updated annually**
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System	**X**	**12/14/2009**		**Township Planning & Development**	
Floodplain Regulations	**X**	**8/24/2015 (Updated)**		**Township Planning & Development**	
Floodplain Management Plan					
Zoning Regulations	**X**	**7/13/2020 (Updated)**		**Township Planning & Development**	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	X	3/22/2010 (Updated)			
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	10/15/2020			
Open Space Management Plan (or Parks/Rec or Greenways Plan)			X		
Stormwater Management Plan / Ordinance	X	12/9/2019			
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	X	10/1/2018			2015 IBC adopted by the State
Fire Code	X	2/10/2004			
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		**Twp. Planning & Development**	
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		**Twp. Planning & Development**	
Emergency Manager	X		**Manager's Office**	
Floodplain Manager	X		**Twp. Planning & Development**	
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program	X		**Twp. Planning & Development**	
Grant writers or fiscal staff to handle large or complex grants	X		**Twp. Planning & Development**	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		**Township Manager**	**As updated information relative to water usage, fire safety, household preparedness and environmental education is forwarded, it is posted immediately on the Township website.**
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Financial Capability	X		
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: John McMullan **Title:** Township Manager

Jurisdiction: Middletown Township **Email:** jmcmullan@middletowndelcopa.gov

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	**Yes**	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	**Yes**	**Adopted w/Ordinance 709 –on 12/14/09**
c. Does the municipality support requests for map updates?	If yes, specify how.	**Yes**	**The Township files the updates**.
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	**Yes**	**If anything were to be identified**
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	**No**	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	**Yes**	**Planning & Development**

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	**Yes**	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	**Yes**	**Planning & Development**
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	**Yes**	**Planning & Development**
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	**Yes**	**Planning & Development**
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	**Yes**	**Planning & Development**
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	**Yes**	**Planning & Development**
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	**No**	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	**Yes**	**Website**
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their	If yes, specify how.	**Yes**	**They are informed if they request information.**

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
insurance rates?			
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	**Yes**	**We assist if/when requested.**

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	**No**
Is the floodplain management an auxiliary function?	Community FPA	**No**
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	**N/A**
What are the barriers to running an effective NFIP program in the community?	Community FPA	**N/A** **Lack of resources/Staff Funding**
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	**Yes**
Are there any outstanding compliance issues (i.e., current violations)?		**No**
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		
Regulation		

Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	**Both**
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	**Meet**
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	**NFIP**
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	**None**
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	**Unknown**
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	**Tunbridge Apartment Complex on Glen Riddle Road.**
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	**Unknown**
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	**No**
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: John McMullan

Title: Township Manager

Jurisdiction: Middletown Township

Email: jmcmullan@middletowndelcopa.gov

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	**There has not been repetitive-loss properties in Middletown Township** **There are no hazardous material storage facilities in the floodplain in the Township.**
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	**Fixed generators have been installed at critical facilities throughout Middletown Township.**
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	**Conduct a training class for first responders for a leak on pipelines transporting HVLs through the Township & the County.**
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	**Pre-storm notification system has been very successful.**
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.				X		**Updated 7/13/20**
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.						
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: Jean Bail **Title:** Emergency Management Coordinator

Jurisdiction: Newtown Township **Email:** Jean.bail@jefferson.edu

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	I	
Flood (riverine, flash, stormwater, and ice jam)	I	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	
Radon Exposure	NC	
Subsidence, Sinkhole	I	
Tornado/Windstorm	I	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Dam Failure	D	Low impact sites, 2 Drexel Lodge; 1 Greer Park
Environmental Hazards – Hazardous Materials Releases	I	
Levee Failure	D	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	D	PECO work ongoing to decrease impact

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Jurisdiction Risk - _____Newtown_____ (Municipality)

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
=	-	=	=	-	-	=	=	=	=	-	-	=	=	=	=	=	=	=	-	=	-	=

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Capability Assessment Survey

Name: Jean Bail **Title:** EMC

Jurisdiction: Newtown Township **Email:** Jean.bail@jefferson.edu

Phone Number: 610-299-0683

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan			**x**		
Emergency Operations Plan	**x**	**12/21**		**township**	
Disaster Recovery Plan					
Evacuation Plan			**x**		**Internal and external to township plans in development**
Continuity of Operations Plan			**x**		**IP phones can go remote, leadership facilities public works, police, fire need to think through – immediate timeframe, MOU progress? Talk with COG sample electric agreement?**
NFIP	**yes**				**2013 ordinance**
NFIP – Community Rating System	**no**				**Ordinance not CRS**
Floodplain Regulations	**yes**				

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop -ment		
Floodplain Management Plan			x		
Zoning Regulations	yes			process of review	
Subdivision Regulations	yes				
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	yes	2016			
Open Space Management Plan (or Parks/Rec or Greenways Plan)	yes	2020			
Stormwater Management Plan / Ordinance	yes	2013			both
Natural Resource Protection Plan	Yes				comp plan
Capital Improvement Plan	x			Working plan	IT, Vehicles has plan
Economic Development Plan					
Historic Preservation Plan	yes	2022			
Farmland Preservation	no				Garrett Williamson foarm
Building Code	yes				
Fire Code	yes	2021			
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	x		contracts	
Planners or engineers (with natural and/or human caused hazards knowledge)	x			
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	x			
Emergency Manager	x			
Floodplain Manager	x			
Land Surveyors	x			
Scientists or staff familiar with the hazards of the community	x			
Personnel skilled in GIS and/or FEMA's HAZUS program				County resources
Grant writers or fiscal staff to handle large or complex grants	x			
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	x			
Community Development Block Grants (CDBG)		x		
Special Purpose Taxes	x			Hydrant/street light
Gas / Electric Utility Fees				
Water / Sewer Fees	x			
Stormwater Utility Fees		x		
Development Impact Fees				
General Obligation, Revenue, and/or Special Tax Bonds	x			Notes not bonds
Partnering Arrangements or Intergovernmental Agreements	x			School resource officer, FBI task force, SWAT,
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		x		
StormReady certification		x		
Natural disaster or safety related school programs		x		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)			Fire safety october	
Public-private partnership initiatives addressing disaster-related issues	x		Riddle EMS, ARES/ACES ham radio group	
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.				
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Financial Capability			X
Education and Outreach			x

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Jean Bail **Title:** Emergency Management Coordinator

Jurisdiction: Newtown Township **Email:** Jean.bail@jefferson.edu

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes	
c. Does the municipality support requests for map updates?	If yes, specify how.	yes	None received
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	Yes	Township engineer
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	Yes	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	None received

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	Building code office
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	yes	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	yes	BCO/engineer
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	yes	BCO/property files
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	Codes monitirs
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	Yes	Ordinances Not CRS

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	N0	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	Yes	No changes have occurred so far
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	no	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**noComments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	no
Is the floodplain management an auxiliary function?	Community FPA	yes
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	3rd party
What are the barriers to running an effective NFIP program in the community?	Community FPA	Political will, low impact
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	yes
Are there any outstanding compliance issues (i.e., current violations)?		no
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	yes
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Code review
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	Ordinance not CRS
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Jean Bail | Title: Emergency Management Coordinator

Jurisdiction: Newtown Township | Email: jean.bail@jefferson.edu

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	Pumping stations equipped with generators
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	Storm water plan in process
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	Codes enforcement , not permitted in floodplain.
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	Pump stations monitored
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	n/a
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	n/a
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	Being done as part of Evacuation plan 2022
Goal 4	**Promote disaster resistant future development.**	Through Codes/Ordinances
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	Periodic update to plans
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						Ordinance not CRS in use

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information “capture” at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems						Expand everbridge use. Facebook/neighbor to neighbor
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						Reassess High school and sites that volunteer as shelters
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.		X				Newtown is purchasing property in wetland areas to create environmental safety and storm water management areas
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding		X				*ADD NEWTOWN to list 32 areas identified, will work through the areas as priority and funding obtained for remediation.*
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						*GOSHEN RD/BOOT stretch needs elevation, beginning exploration of options for this area*
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.		x				*ADD NEWTOWN*

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.		x				*Add Newtown*
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						*Monitor conditions/Newtown*
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.		IP				
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.		IP				
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: Patrick Oconnell **Title:** EMC

Jurisdiction: Borough of Prospect Park **Email:** poconnell@prospectparkborough.com

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Landslide	NC	
Lightning Strike	NC	
Pandemic	NC	
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	
Dam Failure	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- X Building and Structure Collapse
- X Cyber Terrorism
- ☐ Disorientation
- X Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- X Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- X Opioid Addiction Response
- X War and Criminal Activity

Additional Comments:

Capability Assessment Survey

Name: Patrick OConnell **Title:** EMC

Jurisdiction: Borough of Prospect Park **Email:** poconnell@prospectparkborough.com

Phone Number: 610-476-4311

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop -ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**	**9-3-21**		**EMC**	
Emergency Operations Plan	**X**	**12-4-07**		**EMC**	
Disaster Recovery Plan					
Evacuation Plan	**X**	**12-4-07**		**EMC**	
Continuity of Operations Plan	**X**	**1-4-22**		**EMC**	
NFIP					
NFIP – Community Rating System					
Floodplain Regulations					
Floodplain Management Plan					
Zoning Regulations	**X**	**11-30-20**		**Planning**	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	X	11-30-20		Planning	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)					
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance	X	1-30-18		Borough Engineer	
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan			X	Planning	
Historic Preservation Plan			X	Planning	
Farmland Preservation					
Building Code	X	1-1-99		Planning	
Fire Code	X	3-3-20		Fire Marshall	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		**Borough Engineer**	
Planners or engineers (with natural and/or human caused hazards knowledge)				
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		**Borough Engineer**	
Emergency Manager	X		EMC	
Floodplain Manager	X		**Borough Engineer**	
Land Surveyors	X		**Borough Engineer**	
Scientists or staff familiar with the hazards of the community				
Personnel skilled in GIS and/or FEMA's HAZUS program				
Grant writers or fiscal staff to handle large or complex grants				
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
Community Development Block Grants (CDBG)	X		Planning	
Special Purpose Taxes				
Gas / Electric Utility Fees				
Water / Sewer Fees	X		Planning	
Stormwater Utility Fees				
Development Impact Fees	X		Planning	
General Obligation, Revenue, and/or Special Tax Bonds				
Partnering Arrangements or Intergovernmental Agreements	X		Council	
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X			
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Financial Capability	X		
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Elizabeth A. Catania, PE, F.NSPE **Title:** Borough Engineer/Floodplain Administrator

Jurisdiction: Prospect Park Borough **Email:** eac@cataniaengineering.com

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes	
c. Does the municipality support requests for map updates?	If yes, specify how.	N/A	Have had no map update requests from Borough or Property owner
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	N/A	Have had no map update requests from Borough or Property owner
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	Yes	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Borough Office

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	No	
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	Floodplain Administrator/Borough Engineer (third party)
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	Floodplain Administrator/Borough Engineer (third party)
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	Borough Office
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	Borough Engineer Review/Code Enforcement Office
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	Yes	• Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA
			•

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	No
Is the floodplain management an auxiliary function?	Community FPA	Yes, third party consultant
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Necessary inspections are completed by Borough staff and as necessary forwarded for future action
What are the barriers to running an effective NFIP program in the community?	Community FPA	None
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book unknown

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	Paper
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Meet minimum requirements through ordinance
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	None specified
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Information not available
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Information not available
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	Approx 18
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	None
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	No
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Patrick OConnell | Title: EMC

Jurisdiction: Borough of Prospect Park | Email: poconnell@prospectparkborough.com

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information “capture” at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding				XX		
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.			XX			
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: Sgt. Christopher A. Gluck #301 **Title:** Emergency Management Coordinator

Jurisdiction: Radnor Township, Delaware County, PA **Email:** cgluck@radnor.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	I	More Frequency – Increased areas of flooding due to larger storms
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	Larger Storms bringing higher rain totals to our area
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	COVID-19
Radon Exposure	NC	
Subsidence, Sinkhole	NC	
Tornado/Windstorm	I	More Frequency
Wildfire	NC	
Winter Storm	I	More Frequency
Human-Caused Hazards		
Civil Disturbance	I	Increased Response by Police
Dam Failure	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- X Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- X Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- X Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Invasive Species – Bamboo, Spotted Lantern Fly, Emerald Ash borer

Drowning - Due to the increased rain totals from more frequent storms there has been an increase in flooding. There is a need to outfit our Public Works members with helmets and personal floatation devices as a member fell into an open manhole while attempting to clear drains during a major storm.

Opioid Addiction Response – Incidents where heroin/fentynal have been involved have shown an increase over the years. The increase has had such an impact that Narcan is now issued to Police Departments within Delaware County to assist with quicker response and life saving efforts.

Jurisdiction Risk - Radnor Township **(Municipality)**

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=	>	=

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Capability Assessment Survey

Name: Sgt. Christopher A. Gluck #301 **Title:** Emergency Management Coordinator

Jurisdiction: Radnor Township, Delaware County, PA **Email:** cgluck@radnor.org

Phone Number: 610-688-5606 x 107

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop -ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**	**12/12/2016**		**County EMA**	
Emergency Operations Plan	**X**	**10/26/2020**		**Radnor OEM**	
Disaster Recovery Plan					**Not at this time**
Evacuation Plan					**Not at this time**
Continuity of Operations Plan					**Not at this time**
NFIP	**X**				**Unknown adoption date**
NFIP – Community Rating System					**Not at this time**
Floodplain Regulations	**X**	3/14/2011		**Engineering/Community Development – Radnor TWP**	
Floodplain Management Plan					**Not at this time**

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Zoning Regulations	X	11/22/2021		Community Development – Radnor TWP	
Subdivision Regulations	X	1983		Engineering – Radnor TWP	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	6/16/2003	X	Community Development – Radnor TWP	Update approved for 2022
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	10/2014		Parks & Rec – Radnor TWP	
Stormwater Management Plan / Ordinance	X	2005		Engineering – Radnor TWP	Tentative update in 2022
Natural Resource Protection Plan	X	3/2/2021		Radnor TWP	"Green Team" Climate Plan
Capital Improvement Plan	X	2014	X	Finance – Radnor TWP	
Economic Development Plan	X	2008		Finance – Radnor TWP	
Historic Preservation Plan					Unsure
Farmland Preservation					Unsure
Building Code	X	10/1/2018		Community Development – Radnor TWP	
Fire Code	X	2/22/2010		Community Development – Radnor TWP	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Community Development – Radnor TWP	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		TWP Engineer – Radnor TWP	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		TWP Engineer – Radnor TWP	
Emergency Manager	X		Radnor OEM/Radnor Police/Radnor TWP	
Floodplain Manager	X		Steve Norcini/Engineering/Radnor TWP	
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X	TWP Staff Member	Pending Hire 2022
Grant writers or fiscal staff to handle large or complex grants	X		Melissa Conn/Finance/Radnor TWP	Oversee Grants
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		TWP Manager/BOC - Radnor TWP	
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees	X		Finance – Radnor TWP	Sewer Only
Stormwater Utility Fees	X		Finance – Radnor TWP	
Development Impact Fees	X		Parks & Recreation Fees New Subdivision / Land Development	
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs	X		Radnor Police	Active Shooter/Safety Assessment
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		X		
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		CERT Team, Environmental Advisory Council, Board of Health	
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Financial Capability		X	
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Sgt. Christopher A. Gluck #301 **Title:** Emergency Management Coordinator

Jurisdiction: Radnor Township, Delaware County, PA **Email:** cgluck@radnor.org

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.		Unsure
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	Engineering review of outside engineering firms
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	No	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	No	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Engineering

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	No	

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	Community Development/Engineering with appropriate approvals
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	No	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		Unaware of any
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	No	
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	Enforced by complaints
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	
Are there any outstanding compliance issues (i.e., current violations)?	No	
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Have Requirements unknown match
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Zone Hearing Board is needed in most cases
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Unknown
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Unknown
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	Unknown
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	Unknown
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	Unknown
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Sgt. Christopher A. Gluck #301 | Title: Emergency Management Coordinator

Jurisdiction: Radnor Township, Delaware County, PA | Email: cgluck@radnor.org

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information “capture” at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.	X					
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding						
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.		X	X			*S Wayne Ave Flood Reduction Project N Wayne Area Floodplain Creation Project*
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.			X			*Free Fans through COSA/Wayne Senior Center*
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

Hazard Identification and Risk Evaluation Worksheet

Name: Jeff Stayrooks Title: Twp Mgr.

Jurisdiction: Thornbury Twp. Email: Jeffs@thornbury.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	N/C	
Earthquake	N/C	
Extreme Temperatures (heat and cold)	N/C	
Flood (riverine, flash, stormwater, and ice jam)	I	RECENT RAINS HAVE BEEN HIGH INTENSITY for short Period of TIME
Hailstorm	N/C	
Hurricane, Tropical Storm, Nor'easter	I	"
Landslide	N/C	
Lightning Strike	N/C	
Pandemic	I	COVID-19
Radon Exposure	N/C	
Subsidence, Sinkhole	N/C	
Tornado/Windstorm	I	OCT. 2019
Wildfire	N/C	
Winter Storm	N/C	
Human-Caused Hazards		
Civil Disturbance	N/C	
Dam Failure	N/C	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	N/C	
Levee Failure	N/C	
Terrorism	N/C	
Transportation Accidents	I	DUE to Increased Traffic
Urban Fire and Explosion	N/C	
Utility Interruptions	I	DUE to Storms

ThomasBury

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☒ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☒ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☒ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

We Have Seen An Increase in dead trees and their negative impact on Power/ communication Interruptions. We are working on A plan to Address trees in the R.O.W.

Thornbury

Hazard Identification and Risk Evaluation Worksheet

Name: Jeffrey T. Seagraves **Title:** Township Manager

Jurisdiction: Thornbury Township **Email:** Jeff@thornbury.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	I	RECENT RAINS HAVE BEEN HIGH INTENSITY FOR SHORT PERIODS OF TIME
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	I	
Landslide	NC	
Lightning Strike	NC	
Pandemic	I	FIRST IN RECENT MEMORY
Radon Exposure	NC	
Subsidence, Sinkhole	I	STORMSEWERS AGING AND ALSO HIGH INTENSITYSTORMS
Tornado/Windstorm	I	OCTOBER 2019 TORNADO
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Dam Failure	NC	
Environmental Hazards – Hazardous Materials Releases	I	MATERIALS NOW FLOWING THROUGH THE PIPELINES IN OUR TOWNSHIP HAVE INCREASED
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Capability Assessment Survey

Name: Jeff Seagraves
Title: Township Manager
Jurisdiction: Thornbury Township
Email: Jeff@thornbury.org
Phone Number: 610-399-8383 x 104

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X	4/5/2017		COUNTY EMA	
Emergency Operations Plan	X	1/7/2019		TWP	
Disaster Recovery Plan	X	N/A		I.T. Consultant	PLANS ARE FOR COMPUTERS/SERVERS
Evacuation Plan	X	1/7/2019		TWP	PLAN ARE GENERAL
Continuity of Operations Plan	X	1/7/2019		TWP	
NFIP					
NFIP – Community Rating System					
Floodplain Regulations	X	8/19/2015		TWP	
Floodplain Management Plan	X	8/19/2015		TWP	
Zoning Regulations	X	3/17/2021		TWP	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop -ment		
Subdivision Regulations	X	9/20/2018	~~2018~~		
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X		X	TWP	PLAN to Renew JAN/FEB 2022
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	2007		TWP	
Stormwater Management Plan / Ordinance	X	9/19/2012		TWP	
Natural Resource Protection Plan	X	9/19/2012		TWP	
Capital Improvement Plan	X	1/3/2021		TWP STAFF	
Economic Development Plan	NO	—	—	—	
Historic Preservation Plan	X	7/20/2005		HIST. COMMISSION	
Farmland Preservation	NO	—			
Building Code	X	6/16/2014		Building Inspector	
Fire Code	X	5/17/2017		Fire Marshall	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X	USE 3rd Party Consultants	
Planners or engineers (with natural and/or human caused hazards knowledge)		X	" "	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)		X	" "	
Emergency Manager	X		EMC AND ASST EMC	
Floodplain Manager	X		TWP ENGINEER	
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants		X		
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		TWP ADMIN	
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees	X		TWP	
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements	X		Sewer Agreements	
Other				

Thornbury

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		Newletters and Website INFO	
Public-private partnership initiatives addressing disaster-related issues	X		work with I.T. Professionals	
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		TWP EAC	
Other				

Thornbury

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability			X
Education and Outreach		X	

Thornbury

Capability Assessment Survey

Name: Jeffrey T. Seagraves **Title:** Township Manager

Jurisdiction: Thornbury Township **Email:** Jeff@Thornbury.org

Phone Number: 610-399-8383 ext 104

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**x**	**4/5/2017**		**County EMA**	
Emergency Operations Plan	**x**	**1/7/2019**		**Township**	
Disaster Recovery Plan	**x**	**N/A**		**IT Consultant**	**Plans are for computers/servers**
Evacuation Plan	**x**	**1/7/2019**		**Township**	
Continuity of Operations Plan	**x**	**1/7/2019**		**Township**	
NFIP	**x**	**7/5/17**		**FEMA**	**Started 4/27/73**
NFIP – Community Rating System					
Floodplain Regulations	**x**	**8/19/2015**		**Thornbury Township**	
Floodplain Management Plan	**x**	**8/19/2015**		**Thornbury Township**	
Zoning Regulations					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Subdivision Regulations	x	6/20/15		Thornbury Township	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	x	2022	x	Thornbury Township	
Open Space Management Plan (or Parks/Rec or Greenways Plan)	x	2007		Thornbury Township	
Stormwater Management Plan / Ordinance	x	2012		Thornbury Township	
Natural Resource Protection Plan	x	2012		Thornbury Township	
Capital Improvement Plan	x	2021		Thornbury Township	
Economic Development Plan					
Historic Preservation Plan	x	2005		Thornbury Township	
Farmland Preservation					
Building Code	x	2004		Thornbury Township	
Fire Code	x	2017		Thornbury Township	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		x		Third party consultant
Planners or engineers (with natural and/or human caused hazards knowledge)		x		Third party consultant
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)		x		Third party consultant
Emergency Manager	x			EMC
Floodplain Manager		x		Third party consultant
Land Surveyors		x		Third party consultant
Scientists or staff familiar with the hazards of the community		x		
Personnel skilled in GIS and/or FEMA's HAZUS program		x		
Grant writers or fiscal staff to handle large or complex grants		x		
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	x		Township	
Community Development Block Grants (CDBG)		x		
Special Purpose Taxes		x		
Gas / Electric Utility Fees		x		
Water / Sewer Fees	x		Township	
Stormwater Utility Fees		x		
Development Impact Fees		x		
General Obligation, Revenue, and/or Special Tax Bonds		x		
Partnering Arrangements or Intergovernmental Agreements	x		Sewer agreements with neighboring municipalities	
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		x		
StormReady certification		x		
Natural disaster or safety related school programs		x		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	x		Newsletters and website info	
Public-private partnership initiatives addressing disaster-related issues	x		Work with IT professionals	
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	x		TWP EAC, EMC and Assistant EMC	
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		x	
Administrative and Technical Capability		x	
Financial Capability			x
Education and Outreach		x	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Jeffrey T. Seagraves **Title:** Township Manager

Jurisdiction: Thornbury Township **Email:** Jeff@Thornbury.org

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	YES	The Township refers residents and other interested parties to the online FEMA FIRM Mapping for the most up to date mapping.
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	YES	The Township updated its Floodplain Ordinance on 8/19/2015, referencing the most recent FEMA FIRM revision being as the mapping adopted. Current Map Date: 7/5/2017
c. Does the municipality support requests for map updates?	If yes, specify how.	YES	Any development within floodplains or with floodplain changes proposed are reviewed by the Township staff, floodplain administrator, and Township Engineer, any of which may provide comments towards such development.
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	YES	To the extent that any development or work is approved within the floodplain that would require a map revision, Township approval is made conditioned upon the developer or builder obtaining a map revision and FEMA approval prior to construction.
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	YES	The Floodplain Administrator reviews any development that is anticipated to encroach or affect a floodplain though Township permitting processes.
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	NO	The Letters of Map change are found online in the Township Adopted most recent FEMA FIRM revision, which also lists any LOMCs

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*

2. FLOODPLAIN MANAGEMENT			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	YES	
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	YES	
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	YES	All subdivision proposals and development proposals containing at least 50 lots or at least five acres, whichever is the lesser, in identified floodplain areas where base flood elevation data are not available shall be supported by hydrologic and hydraulic engineering analyses that determine base flood elevations and floodway information.
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	YES	Regulated by the Township Floodplain Ordinance and reviewed by the Township Floodplain Administrator, Township Zoning Officer, and the Township Engineer
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	YES	Building & Codes Dept: The elevation of the proposed lowest floor is indicated on the application for a building permit. Any permits within floodplain areas are flagged within the Townships Building Permit Manager online database and required to comply with the Township Floodplain Ordinance.
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	YES	All work within floodplains is Regulated by the Township Floodplain Ordinance and reviewed by the Township Floodplain Administrator, Township Zoning Officer, and the Township Engineer. Any permits within floodplain areas are flagged within the Townships Building Permit Manager online database and required to comply with the Township Floodplain Ordinance.
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA	If yes, specify activities.	YES	Prohibitions on chemicals, hospitals, nursing homes and jails are listed within the Township Floodplain ordinance.

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*

3. FLOOD INSURANCE			
Requirement	*Recommended Action*	*Yes/No*	*Comments*
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	YES	Through newsletters and periodic public review and updates of the Floodplain Ordinance.
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	YES	Upon receiving map changes from FEMA, the Township reviews the changes and notifies any affected residents.
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	YES	The Township office is open and available to answer any questions 5 days a week M-F.

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	**Source of Information**	**Comments**
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	The Township Floodplain Administrator is a licensed professional engineer in the state of PA
Is the floodplain management an auxiliary function?	Community FPA	The Township Floodplain Administrator is a third party consultant and also the Township Engineer.
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	All work within floodplains is Regulated by the Township Floodplain Ordinance and reviewed by the Township Floodplain Administrator, Township Zoning Officer, and the Township Engineer through building permits, grading permits, and the subdivision and land development processes. All permitted work is inspected by the Township and their consultants to ensure code compliance.
What are the barriers to running an effective NFIP program in the community?	Community FPA	None known
Compliance History		
Topic	**Source of Information**	**Comments**
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	YES

Are there any outstanding compliance issues (i.e., current violations)?		NO
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book UNKNOWN
Is a CAV or CAC scheduled or needed?		NO
Regulation		
Topic	**Source of Information**	**Comments**
Are the FIRMs digital or paper?	Community FPA	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Yes – Floodplains with no elevations determined are required to have studies performed to determine flood elevations and related development effects prior to development.
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	All work within floodplains is Regulated by the Township Floodplain Ordinance and reviewed by the Township Floodplain Administrator, Township Zoning Officer, and the Township Engineer through building permits, grading permits, and the subdivision and land development processes.
Insurance Summary		
Topic	**Source of Information**	**Comments**
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Not Tracked
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Not Tracked
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	The Township Permit Manager software program tracks properties with floodplains and alerts Township Staff if a permit within a floodplain area is requested.
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	None known
Community Rating System		
Topic	**Source of Information**	**Comments**
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	NO
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	n/a
What categories and activities provide CRS points and how can the class be improved?		n/a

Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	n/a

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Jeffrey T. Seagraves | Title: Township Manager

Jurisdiction: Thornbury Township | Email:Jeff@thornbury.org

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal	**Promote readiness for pipeline leaks**	
Objective	Provide public awareness of pipeline locations	
Objective	Provide early warning opportunities for pipeline leaks	
Objective	Provide evacuation readiness for residents and facilities near pipelines.	

Goal	**Decrease utility outages**	
Objective	Increase public awareness about their responsibility for vegetation management	
Objective	Develop strategy to promote proactive measures for hazardous tree removal in right of Way	
Objective	Coordinate utility company resources for better use of resources	

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.			x			
Delaware County	Action 40	Evaluate means to enhance response capability for residents.			x			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.			x			
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding			x			

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.			x			
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.			x			
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.			x			
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.						
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.	x					
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.						
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.						
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.			x			
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.		x				

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.	x					
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).			x			

Hazard Identification and Risk Evaluation Worksheet

Name: Daniel Smith **Title:** Public Safety Offical

Jurisdiction: Borough of Upland, PA **Email:** DSmith@uplandboro.org

PART I

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Natural Hazards		
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	I	
Hailstorm	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Landslide	NC	
Lightning Strike	NC	
Pandemic	NC	
Radon Exposure	NC	
Subsidence, Sinkhole	I	
Tornado/Windstorm	NC	
Wildfire	NC	
Winter Storm	NC	
Human-Caused Hazards		
Civil Disturbance	NC	
Dam Failure	NC	

Identified Hazards 2016 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? *NC = No Change; I = Increase; D = Decrease* *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	Additional Comments
Environmental Hazards – Hazardous Materials Releases	NC	
Levee Failure	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosion	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- ☐ Coastal Erosion
- ☐ Expansive Soils
- ☐ Invasive Species

Human-Caused

- ☐ Building and Structure Collapse
- ☐ Cyber Terrorism
- ☐ Disorientation
- ☐ Drowning
- ☐ Environmental Hazards – Coal Mining
- ☐ Environmental Hazards – Conventional Oil/Gas Wells
- ☐ Environmental Hazards – Gas and Liquid Pipelines
- ☐ Environmental Hazards – Unconventional Oil/Gas Wells
- ☐ Mass Food/Animal Feed Contamination
- ☐ Nuclear Incident
- ☐ Opioid Addiction Response
- ☐ War and Criminal Activity

Additional Comments:

Jurisdiction Risk - __Borough of Upland, Pa_____ (Municipality)

Civil Disturbance	Dam Failure	Drought and Water Supply Deficiencies	Earthquake	Environmental Hazards - Hazardous Materials Releases	Environmental Hazards - Gas/Liquid Pipelines	Extreme Temperature	Flood, Flash Flood, and Ice Jam	Hailstorm	Hurricane, Tropical Storm, Nor'easter	Landslide	Levee Failure	Lightning Strike	Pandemic and Infectious Disease	Radon Exposure	Subsidence, Sinkhole	Terrorism	Tornado, Windstorm	Transportation Accident	Urban Fire and Exposure	Utility Interruption	Wildfire	Winter Storm
1.4	1.7	2.9	1.3	2.8	2.2	2.4	3.5	2.5	2.0	1.4	1.2	2.2	2.3	2.4	1.6	1.5	2.4	2.2	1.9	2.8	2.1	3.0
=	<	=	=	>	>	=	>	=	=	<	<	=	=	=	>	=	=	=	=	=	<	=

> Your municipality's risk from this hazard is greater than the county's risk as a whole

< Your municipality's risk from this hazard is less than the county's risk as a whole

= Your municipality's risk from this hazard is about the same as the county's risk as a whole

Capability Assessment Survey

Name: Daniel Smith **Title:** Public Safety Official

Jurisdiction: Borough of Upland, Pa **Email:** DSmith@uplandboro.org

Phone Number: 610-874-7317

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develo p-ment		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	**X**			**Delaware County EMA**	
Emergency Operations Plan	**X**	**8/30/2022**		**Borough of Upland**	**Resolution # 15 of 2022**
Disaster Recovery Plan	**X**	**8/30/2022**		**Borough of Upland**	**Emergency Operations Plan – Res 15 of 2022**
Evacuation Plan	**X**	**8/30/2022**		**Borough of Upland**	**Emergency Operations Plan – Res 15 of 2022**
Continuity of Operations Plan					
NFIP	**X**			**Borough of Upland**	**Ordinance 4 of 2015** https://ecode360.com/12308935
NFIP – Community Rating System			**X**	**Borough of Upland**	**In Process**
Floodplain Regulations	**X**			**Borough of Upland**	**Ordinance 4 of 2015** https://ecode360.com/12308935
Floodplain Management Plan	**X**			**Borough of Upland**	**Ordinance 4 of 2015** https://ecode360.com/12308935

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Develop-ment		
Zoning Regulations	X	5/8/2012		Borough of Upland	Ordinance 7 of 2012 https://ecode360.com/12311163
Subdivision Regulations	X	6/14/2022		Borough of Upland	Upland Borough SALDO – Ordinance #3 of 2022
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	6/14/2022		Borough of Upland	Upland Borough SALDO – Ordinance #3 of 2022
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	6/14/2022		Borough of Upland	Upland Borough SALDO – Ordinance #3 of 2022
Stormwater Management Plan / Ordinance	X	9/13/2022		Borough of Upland	Upland Borough Ordinance # 5 of 2022
Natural Resource Protection Plan					
Capital Improvement Plan			X	Borough of Upland	In process
Economic Development Plan					
Historic Preservation Plan				Delaware County	
Farmland Preservation					N/A
Building Code	X			Upland Borough / Building Code Official	
Fire Code	X			Upland Borough / Public Safety Official	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Borough of Upland Professional Staff	Solicitor / Upland Borough Planning Commission
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Borough of Upland Professional Staff	Solicitor / Upland Borough Planning Commission
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Borough of Upland Professional Staff	Catania Engineering Associates, Inc.
Emergency Manager	X		Borough of Upland Public Safety Official	
Floodplain Manager	X		Borough of Upland Public Safety Official	
Land Surveyors	X		Borough of Upland Professional Staff	Catania Engineering Associates, Inc.
Scientists or staff familiar with the hazards of the community	X		Borough of Upland	Council members / Employees
Personnel skilled in GIS and/or FEMA's HAZUS program		X		IN PROCESS
Grant writers or fiscal staff to handle large or complex grants	X		Upland Borough Public Safety Official	
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
Community Development Block Grants (CDBG)			**Upland Borough with Delaware County**	
Special Purpose Taxes		**X**		
Gas / Electric Utility Fees		**X**		
Water / Sewer Fees		**X**		
Stormwater Utility Fees		**X**		
Development Impact Fees				
General Obligation, Revenue, and/or Special Tax Bonds				
Partnering Arrangements or Intergovernmental Agreements	**X**			**Multi-Disciplinary – Aug 2009**
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification				
StormReady certification				
Natural disaster or safety related school programs				
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)				
Public-private partnership initiatives addressing disaster-related issues				
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.				
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach	X		

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Daniel Smith

Title: Public Safety Official

Jurisdiction: Borough of Upland, PA

Email: DSmith@uplandboro.org

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing hazard mitigation plan. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Goals and Objectives		Comments
GOAL 1	**Reduce the possible injury/death and damage to existing community assets due to flooding.**	
Objective 1.1	Identify and evaluate protection of existing critical facilities with the highest relative vulnerability in the 1% annual chance floodplain.	
Objective 1.2	Identify and evaluate strategies for repetitive-loss properties.	
Objective 1.3	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 1% annual chance floodplain.	
Objective 1.4	Address identified data limitations regarding lack of detailed information about individual structures located in the 1% annual chance floodplain.	
Objective 1.5	Identify and evaluate protection for hazardous material storage in the floodplain.	
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather and other identified hazards.**	
Objective 2.1	Identify vulnerable buildings and critical facilities; develop a comprehensive approach to reducing the possibility of damage and loss of function to those structures (and potential threat to residents) due to the effects of severe weather.	
Objective 2.2	Assess availability of backup power resources (generators) for critical facilities.	
Objective 2.3	Evaluate communities that require warning systems and temporary shelters.	
Objective 2.4	Provide public outreach/education for manufactured homeowners on proper anchoring.	
Objective 2.5	Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, presence of basement, compliance with current building codes, etc.	

Goal 3	**Increase disaster resistance of facilities and infrastructure in the County.**	
Objective 3.1	Identify and evaluate strategies for protection of repetitive-loss properties and other disaster-prone facilities, infrastructure, and properties through the implementation of cost-effective and technically feasible mitigation projects.	
Objective 3.2	Increase the capabilities of Delaware County's GIS system to produce estimates of hazard-related damage.	
Objective 3.3	Work with neighboring counties, states, and the federal government to address widespread hazards that can affect multiple communities.	
Objective 3.4	Examine, evaluate, and publicize current evacuation routes (such as through installation of signage).	
Goal 4	**Promote disaster resistant future development.**	
Objective 4.1	Direct new development away from high hazard areas.	
Objective 4.2	Provide education and training for municipal officials on the need to promote disaster resistant development.	
Goal 5	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**	
Objective 5.1	Provide public education to increase awareness of hazards and opportunities for mitigation.	
Objective 5.2	Promote partnerships between municipalities and the County to continue to develop a Countywide approach to identifying and implementing mitigation actions.	
Objective 5.3	Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 6	**Improve Response and Recovery Capabilities.**	
Objective 6.1	Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	
Objective 6.2	Work with municipalities to educate them about hazards and risk in order to improve response capability of County and municipal fire, police, and emergency services personnel.	
Goal 7	**Improve long-term response to extreme weather events and other hazards.**	
Objective 7.1	Prepare for post-storm or event scenarios and identify future development strategies to reduce risk.	
Objective 7.2	Integrate Hazard Mitigation Plan Goals and Objectives into local comprehensive and land use planning efforts.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		

Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing hazard mitigation plan and identify its status as "No Progress / Unknown," "In Progress / Not Yet Complete," "Continuous," "Completed," or "Discontinued." Include review comments for each action.

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 1	Identify existing critical facilities with the highest relative vulnerability.						
Delaware County	Action 2	Conduct cost-benefit analysis of protection of critical facilities.						
Delaware County	Action 3	Work with municipal floodplain managers to identify existing repetitive-loss and substantial-damage properties.						
Delaware County	Action 4	Conduct a cost-benefit analysis of protection of repetitive-loss assets.						
Delaware County	Action 5	Work with municipal officials to increase awareness among property owners including informational mailings to property owners in the 1% annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Property elevation, dry flood proofing, and wet flood-proofing.						
Delaware County	Action 6	Evaluate at the municipal level the suitability of the Community Rating System (CRS)1 for insurance premium reduction (and flood damage reduction).						
Delaware County	Action 7	Work with PEMA and FEMA to hold a municipal CRS workshop						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 8	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.						
Delaware County	Action 9	Obtain information for all remaining structures in the 1% annual chance floodplain to determine the best property protection methods to promote with individual property owners. Techniques for gathering information over time should include developing and implementing a program for integrated information "capture" at key points in normal municipal administrative procedures, including applications for building permits at municipal offices.						
Delaware County	Action 10	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).						
Delaware County	Action 11	Evaluate alternative methods to minimize risk from hazardous material existing storage areas.						
Delaware County	Action 12	Assess means to prevent future storage of hazardous materials in floodplains.						
Delaware County	Action 13	Conduct a qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 14	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.						
Delaware County	Action 15	Identify critical facilities and infrastructure with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, fire, police, rescue, emergency management, water pumping stations, sewage treatment plants, phone lines).						
Delaware County	Action 16	Assess availability of backup power resources (generators) for critical facilities with a high vulnerability to the effects of power outage.						
Delaware County	Action 17	Upgrade backup power resources as necessary at critical facilities.						
Delaware County	Action 18	Identify communities with the highest relative vulnerability to the effects of severe weather and prepare an implementation plan.						
Delaware County	Action 19	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • “Reverse 911” systems						
Delaware County	Action 20	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.						
Delaware County	Action 21	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 22	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.						
Delaware County	Action 23	Identify existing critical facilities and infrastructure with the highest relative vulnerability to hazards.						
Delaware County	Action 24	Conduct cost-benefit analysis for protection of vulnerable critical facilities and infrastructure.						
Delaware County	Action 25	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.						
Delaware County	Action 26	Identify funding sources for hazard mitigation equipment, software, and data purchasing and software training.						
Delaware County	Action 27	Work closely with assessment office to determine how best to apply current data to the needs of emergency management.						
Delaware County	Action 28	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.						
Delaware County	Action 29	Develop multi-use trails that can serve evacuation routes in the event of an emergency.						
Delaware County	Action 30	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas, especially steep slopes and floodplains.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 31	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.						
Delaware County	Action 32	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.						
Delaware County	Action 33	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.						
Delaware County	Action 34	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.						
Delaware County	Action 35	Identify and publicize success stories as part of an overall consistent public relations program.						
Delaware County	Action 36	Convene regular meetings of the HMSC to discuss issues and progress related to the implementation of the plan.						
Delaware County	Action 37	Renew and expand commitments to hazard mitigation planning among partner organizations.						
Delaware County	Action 38	Increase awareness by residents of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (i.e., website, mailings, workshops, media coverage) and education.						
Delaware County	Action 39	Identify special populations requiring additional emergency response.						
Delaware County	Action 40	Evaluate means to enhance response capability for residents.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 41	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.						
Brookhaven Borough; Lower Chichester, Upper Chichester Township	Action 42	Update municipal zoning code to strengthen it to promote disaster-resistant development.						
All Communities	Action 43	Acquire, elevate, flood-proof or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.						
Colwyn Borough	Action 44	Reduce urban fire hazard in borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.						
Chester City; Collingdale Borough; Eddystone Borough, Edgmont Township; Marcus Hook Borough; Norwood Borough; Prospect Park Borough; Trainer Borough; Upland Borough; Upper Darby Township; Yeadon Borough	Action 45	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding		X				*Applying for ARPA grant to repair*

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Chadds Ford Township; Edgmont Township; Aston Township	Action 46	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.						
Haverford Township; Lansdowne Borough; Trainer Borough	Action 47	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.						
Collingdale Borough; Folcroft Borough; Lansdowne Borough; Marple Township; Morton Borough; Parkside Borough; Radnor Township; Springfield Township	Action 48	Explore opportunities to mitigate flooding and drainage problems in the municipality.						
Morton Borough	Action 49	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).						
Swarthmore Borough	Action 50	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.						
Upper Providence Township	Action 51	Explore projects to mitigate washout of Farnum Road from flooding.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Brookhaven Borough; Chester Heights Borough; Darby Borough; Norwood Borough; Ridley Park Borough	Action 52	Clean up debris in streams and along stream banks and bridges in municipality.						
Collingdale Borough	Action 53	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.						
Darby Borough	Action 54	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.						
Glenolden Borough; Middletown Township; Swarthmore Borough; Upland Borough	Action 55	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.	X					
Upper Darby Township	Action 56	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.						
Ridley Township	Action 57	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.						
Glenolden Borough, Colwyn Borough	Action 58	Purchase a backup generator for the police station.						
Upper Darby Township	Action 59	Conduct flood level monitoring along Naylor's Run Creek.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Upper Darby Township	Action 60	Continue planning of disbursement locations as part of Disaster Relief Drug Distribution Program.						
Media Borough	Action 61	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.						
Media Borough, Ridley Park Borough	Action 62	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.						
Aston Township	Action 63	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.						
Delaware County	Action 64	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.						
Delaware County	Action 65	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.						
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough; Upland Borough	Action 66	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.	X					
Rutledge Borough	Action 67	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
All Communities	Action 68	Conduct outreach to vulnerable populations during periods of extreme temperature, including establishing and promoting accessible heating or cooling centers in the community.						
Delaware County	Action 69	Educate residents about the importance of installing and maintaining smoke detectors and fire extinguishers on each floor of their home or other buildings.						
Ridley Park Borough	Action 70	Dredge silt from Ridley Park Lake.						
Delaware County, Colwyn Borough, Tinicum Township	Action 71	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.						
Aston Township, East Lansdowne Township, Haverford Township	Action 72	Develop and implement a radon exposure prevention program.						
Chester Township	Action 73	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.						
Trainer Borough	Action 74	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.						
Delaware County	Action 75	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.						
Delaware County	Action 76	Conduct pipeline planning efforts to address pipelines and associated storage and transfer facilities.						

Existing Mitigation Action			Status					Review Comments
			No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Delaware County	Action 77	Update and complete inventory of domestic wells located in Delaware County.						
Bethel Township, Chadds Ford Township, Concord Township, Millbourne Borough, and Thornbury Township	Action 78	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).						

APPENDIX E. PUBLIC AND STAKEHOLDER DOCUMENTATION

Appendix E includes meeting invitations, documentation of outreach to stakeholders, and other information related to public and stakeholder outreach conducted during the development of the Delaware County Hazard Mitigation Plan.

From: Bak, Larry
To: Larry Bak
Cc: Subbio, Tony
Subject: HMP - Worksheets Email
Date: Wednesday, March 9, 2022 4:16:36 PM
Attachments: Capability Assessment.docx
Hazard Ident and Risk Eval Worksheet.docx
Local Compliance Checklist NFIP.docx
Mitigation Strategy Review.docx

Resend of previous email with worksheets

Best Regards,
Larry Bak
Deputy Director, Delaware County Emergency Management
Chair, Delaware County LEPC
Chief, Delaware County Hazmat
610-565-8700
Please reply to bakl@co.delaware.pa.us

Good Morning - I hope you are doing well. We conducted our Planning Team Kickoff Meeting webinar for the HMP update on November 16. Thank you again to everyone who attended. During the webinar, we briefly discussed the attached set of information gathering worksheets for each municipality to complete. Completing these worksheets is a big part of your municipality's participation in the planning process.

The worksheets are:

1. Hazard Identification and Risk Evaluation Worksheet – to tell us how your municipality's vulnerability to different hazards has changed. Please describe how your municipality's vulnerability to the hazards listed on pages 1 and 2 has changed. On page 3, identify other hazards that you're concerned about and provide any comments.
2. Capability Assessment Survey – to tell us about the plans, regulations, staff, and other resources you have that can be used to mitigate hazards. Identify the plans and regulations you have in place, what staff capabilities you have, what funding you have or could use to carry out mitigation projects, what outreach capabilities you have and programs you participate in, and how you would rate your municipality's capabilities in each of those areas. For the staff capabilities, identify if the staff is internal, volunteer, contracted, or County or Commonwealth personnel who you reach out to.
3. Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP) – to document how your municipality administers its floodplain management program. Ask your floodplain administrator to provide information about how they carry out floodplain management in your municipality.

4. Mitigation Strategy 5-Year Mitigation Plan Review – to provide feedback on the goals and objectives of the 2016 HMP, and to report progress on mitigation actions that were included in that version of the HMP. For the actions on pages 5-15, you only need to provide an update on the actions that have your municipality listed in the first column.

I would appreciate it if you would work with your fellow officials to fill out and return these worksheets to me by Friday, December 10. If you cannot meet the deadline, please just reach out to me.

Thank you so much for your time, and any information you can offer.

If you have any questions, please contact me or Tony Subbio, our consultant from Tetra Tech. He can be reached at tony.subbio@tetratech.com.

From: Bak, Larry
To: Bak, Larry
Cc: Subbio, Tony
Subject: Another resend
Date: Wednesday, March 9, 2022 4:18:29 PM

"We want to hear from you! Where do flooding and other hazards impact our communities? Please let us know by identifying those locations in a simple map survey here: https://arcg.is/1jryu11. This information will help make our communities safer. Thank you!"

Best Regards,
Larry Bak
Deputy Director, Delaware County Emergency Management
Chair, Delaware County LEPC
Chief, Delaware County Hazmat
610-565-8700
Please reply to bakl@co.delaware.pa.us

ObjectID	Problem Type	Name of Location	Describe the Location	Describe the problem:	What group is responsible to help resolve this problem?	Does this problem affect a critical facility or lifeline?	Please identify the name of the critical facility/lifeline.	Provide your name and title	Long	Lat
1	flooding_rain	homes	2925 Moser St (Moser Street between Clearview Lane/Highwoods Dr & Hillside Ln)	During large water events, the stormwater behind the houses completely fills up, causes the entire backyards to completely fill with water. At times has entered the homes in this location. Additionally has flooded the road during very large storm events.	municipality	no		Caroline Kerr - MIPC Maintenance Lead	-75.44364639	39.8635809
2	erosion	Chester Creek Bank	550 Chester Creek, Brookhaven	Chester creek floods during large storms and washes out both sides of the creek banks. many trees have fallen on the bank and flow down the creek during large storms.	municipality	no		Caroline Kerr - MIPC Maintenance Lead	-75.41307458	39.8732596
3	dam_failure	Crum Creek near Plush Mills Retirement Community	39.911100, -75.358946	The dam seems to be in disrepair and when heavy rain events occur. Erosion occurs along our pipeline right of way.	Not sure who owns the dam.	yes	Petroleum pipeline	John Bowen, Pipeline Safety Lead	-75.358946	39.9111

From: Bak, Larry
To: Subbio, Tony; Huch, Chris; Boyce, Tim; Senkow, Sara; Clark, Thomas J; Payne, Brigid; Heacock, Jason
Cc: Wilwol, Karen; Magargee, Ed; Shaffer, Thomas P.; Locke, Francine
Subject: Re: NHMP Risk Assessment Virtual Public Meeting
Date: Tuesday, June 7, 2022 11:37:49 AM
Attachments: NHMP Risk Assmt. Brief.pdf

This will be a virtual public meeting, the attached PDF may be circulated as needed.

Delaware County is updating its Hazard Mitigation Plan (HMP).

The HMP documents the county's vulnerability to natural and manmade hazards, and the county's and municipalities' strategies to reduce that vulnerability. There will be an informational public webinar to discuss the hazards we face and the planning effort on June 14, 2022 from 6:00-8:00 p.m. All interested residents, businesses, and other stakeholders are invited to attend.
Please visit https://www.delcopahmp.com/ for the meeting link.

Adoption of the County's Hazard Mitigation Plan is essential if you wish to apply for hazard mitigation funds using the Federal Pre-disaster or Post-disaster Mitigation programs. Projects for Post-Disaster Mitigation need to be outlined in the Hazard Mitigation Plan. They may be submitted through the planning website.

Contact Larry Bak at Delaware County Emergency Services at (610) 565-8700 for more information.

Best Regards,
Larry Bak
Deputy Director, Delaware County Emergency Management
Chair, Delaware County LEPC
Chief, Delaware County Hazmat
610-565-8700
Please reply to bakl@co.delaware.pa.us

Microsoft Teams meeting

Join on your computer or mobile app
Click here to join the meeting

Join with a video conferencing device
669489687@t.plcm.vc
Video Conference ID: 116 741 723 8
Alternate VTC instructions

Or call in (audio only)

+1 724-790-6118,,724960291# United States, New Castle

Phone Conference ID: 724 960 291#

Find a local number | Reset PIN

Learn More | Meeting options

County of Delaware
Department of Emergency Services
360 North Middletown Road,
Media, PA 19063

Memorandum:

Date: June 7th, 2022

To: All concerned

From: J.L. Bak

Re: Delaware County Hazard Mitigation Plan Risk Assessment Briefing

Delaware County is updating its Hazard Mitigation Plan (HMP).

The HMP documents the county's vulnerability to natural and manmade hazards, and the county's and municipalities' strategies to reduce that vulnerability. There will be an informational public webinar to discuss the hazards we face and the planning effort on June 14, 2022 from 6:00-8:00 p.m. All interested residents, businesses, and other stakeholders are invited to attend.
Please visit https://www.delcopahmp.com/ for the meeting link.

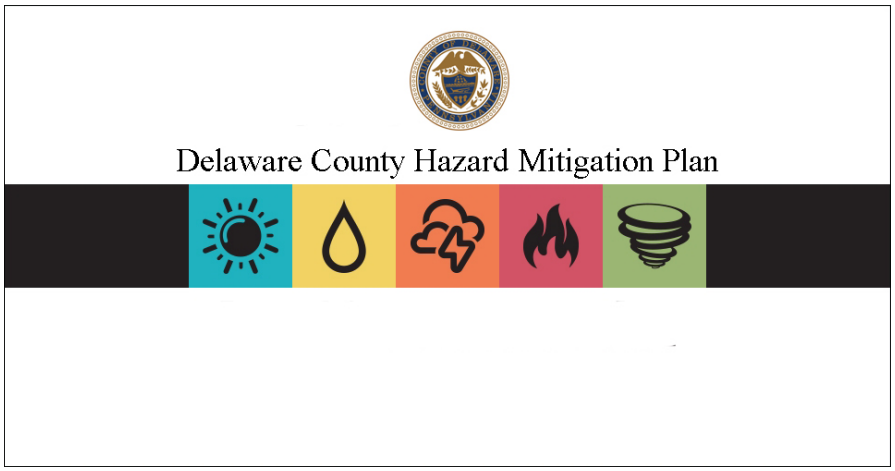
Adoption of the County's Hazard Mitigation Plan is essential if you wish to apply for hazard mitigation funds using the Federal Pre-disaster or Post-disaster Mitigation programs. Projects for Post-Disaster Mitigation need to be outlined in the Hazard Mitigation Plan. They may be submitted through the planning website.

Contact Larry Bak at Delaware County Emergency Services at (610) 565-8700 for more information.

Delaware County Hazard Mitigation Plan - Public Notice

Released: August 22, 2022

Delaware County and its municipalities are updating the Delaware County Hazard Mitigation Plan (HMP). The HMP is designed to make our community more resistant to losses from natural and man-made disasters, and to enable the County and municipalities to be eligible for federal funding for qualifying mitigation projects. The updated risk assessment is available on the HMP project website, https://www.delcopahmp.com/, under the “Explore the Plan” link. A recording of the meeting held to review the results of the risk assessment can be found under the “Meetings” link. All interested parties are invited to review and provide comments on the risk assessment using the “Questions” form on the website. For more information, please contact Larry Bak at Delaware County Emergency Services at (610) 565-8700.



PUBLIC RELATIONS NAVIGATION

- Press Releases
- County Newsletter
- Use of County Facility Form

Questions about COVID-19 vaccines? call the Delaware County Health Depa Wellness Line: 484-276-2100.

Adrienne Marofsky, Director
Government Center, 226A
201 W. Front St.
Media, PA 19063
Phone: 610-891-4943
delcopr@co.delaware.pa.us

Contact Us

201 West Front Street,
Media, PA 19063

8:30AM - 4:30PM
Monday - Friday

610-891-4000

webmaster@co.delaware.pa.us

Press Releases

What's the latest news from County Council and Delaware County Government...View our Press Releases:
Read more ➞

Quick Links

- Juror eResponse
- Crisis Connection
- Substance Abuse and Recovery Task Force
- Delco Alert

About Delaware Cou

Delaware County, presently con over 184 square miles divided ir nine municipalities is the oldest section of Pennsylvania.

Read more ➞

Delaware County Hazard Mitigation Plan – Public Information

August 22, 2022, 8:40 AM

Released: August 22, 2022

Delaware County and its municipalities are updating the Delaware County Hazard Mitigation Plan (HMP). HMP is designed to make our community more resistant to damage from natural and man-made disasters, and to enable counties and municipalities to qualify for federal funding for qualified mitigation projects. The updated risk assessment is available on the HMP project website, https://www.delcopahmp.com/ under the link "Explore the plan". Recordings of the meeting held to review the results of the risk assessment can be found under the "Meetings" link. All interested parties are invited to review the risk assessment and provide comments using the "Question" form on the website. For more information, please contact Larry Beck at Delaware County Emergency Services at (610) 565-8700.

#Delaware #County #Hazard #Mitigation #Plan #Public #Information #Source #Delaware County Hazard Mitigation Plan – Public Information

LATEST NEWS

Jersey City NJ group organizes charity run for Ukrainian orphanages

Jersey City NJ group organizes charity run for Ukrainian orphanages

Respondent who beat officer with Trump flag on January 6 sentenced to 46 months in prison

Respondent who beat officer with Trump flag on January 6 sentenced to 46 months in prison

Missouri school district reinstates spanking while parents recover

SHOW MORE

From: Bak, Larry
To: Subbio, Tony
Subject: Re: Advertisement Request
Date: Tuesday, September 27, 2022 3:58:40 PM
Attachments: image.png

Proof of publication

Best Regards,
Larry Bak
Deputy Director, Delaware County Emergency Management
Chair, Delaware County LEPC
Chief, Delaware County Hazmat
610-565-8700
Please reply to bakl@co.delaware.pa.us

From: Jackson, Lisa L. <JacksonLisaL@co.delaware.pa.us>
Sent: Monday, September 26, 2022 17:20
To: Bak, Larry <BakL@co.delaware.pa.us>
Cc: Boyce, Tim <BoyceT@co.delaware.pa.us>; Coogan, Anne <CooganA@co.delaware.pa.us>; Ryan, Linda <RyanL@co.delaware.pa.us>; Walker, Rosalyn <WalkerR@co.delaware.pa.us>
Subject: FW: (EXTERNAL) Re: Advertisement Request

Mr. Bak,
Per your request, below, please find the proof of publication for the 2022 Delaware County Hazard Mitigation Plan (HMP) for your records. For any further assistance, questions, and/or concerns, please contact me. Thanks.

Lisa L. Jackson, QPA
Director of Central Purchasing
County of Delaware
Government Center Building
201 W. Front Street, Room 228
Media, PA 19063
T: 610.891.4427
F: 610.566.8565
E: jacksonlisal@co.delaware.pa.us

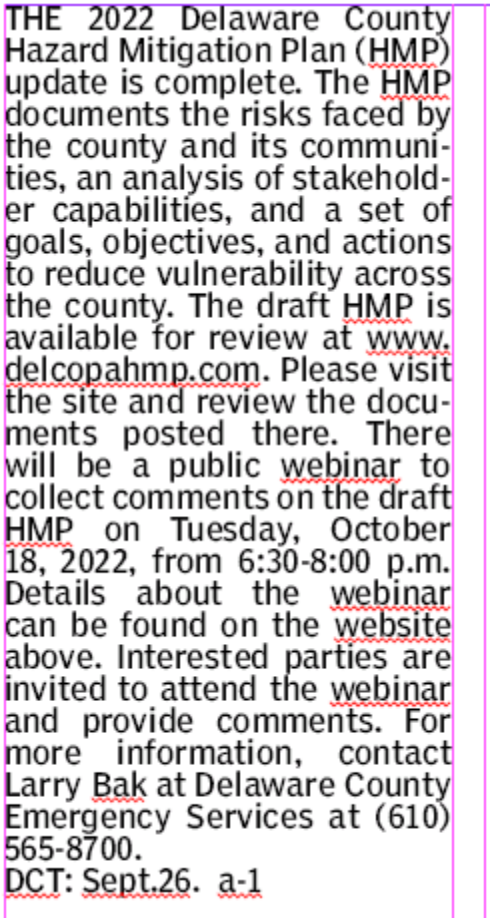
From: mdenatale@medianewsgroup.com <mdenatale@medianewsgroup.com> **On Behalf Of** Delco Times Legals
Sent: Wednesday, September 21, 2022 4:55 PM

To: Jackson, Lisa L. <JacksonLisaL@co.delaware.pa.us>
Cc: Ryan, Linda <RyanL@co.delaware.pa.us>; Walker, Rosalyn <WalkerR@co.delaware.pa.us>
Subject: (EXTERNAL) Re: Advertisement Request

> **Caution:** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. When in doubt, contact your IT Department

Thank you the following notice has been scheduled to run in the Daily Times Sept 26 the COUNTY OF DELAWARE account will be billed $ 59.00 have a great day

ad# 2379782



THE 2022 Delaware County Hazard Mitigation Plan (HMP) update is complete. The HMP documents the risks faced by the county and its communities, an analysis of stakeholder capabilities, and a set of goals, objectives, and actions to reduce vulnerability across the county. The draft HMP is available for review at www.delcopahmp.com. Please visit the site and review the documents posted there. There will be a public webinar to collect comments on the draft HMP on Tuesday, October 18, 2022, from 6:30-8:00 p.m. Details about the webinar can be found on the website above. Interested parties are invited to attend the webinar and provide comments. For more information, contact Larry Bak at Delaware County Emergency Services at (610) 565-8700.
DCT: Sept.26. a-1

On Wed, Sep 21, 2022 at 2:11 PM Jackson, Lisa L. <JacksonLisaL@co.delaware.pa.us> wrote:

> Good afternoon,
> Please see the attached Ad Request from The County of Delaware to run on 9/26/2022.
> The requested ad is for **Emergency Management Services.**
> At your earliest, please provide the cost and the proof of publication.
> **Details**
> **Department**: The County of Delaware – **Emergency Management Services**
> **Account Number:**

Requested Date(s): 9/26/2022
Thank you.

Lisa L. Jackson, QPA
Director of Central Purchasing
County of Delaware
Government Center Building
201 W. Front Street, Room 228
Media, PA 19063
T: 610.891.4427
F: 610.566.8565
E: jacksonlisal@co.delaware.pa.us

--
Please remember to ONLY USE legals@delcotimes.com for your legal advertising and questions
DEADLINE: IS 1:30 PM MON - FRI.
Thank you

From: Bak, Larry
To: Bak, Larry
Cc: Boyce, Tim; Subbio, Tony; McKnight, Maria
Subject: Final draft review
Date: Monday, September 19, 2022 12:15:27 PM
Attachments: HMP Steering Committee Final Draft.docx

September 19, 2022

RE: Delaware County Hazard Mitigation Plan 2022 Update

Dear Hazard Mitigation Planning Partners,

As you know, the Delaware County Hazard Mitigation Plan (HMP) is currently being updated. We conducted a kickoff meeting on November 16, 2021, reviewed the results of the risk assessment on June 14, 2022, and conducted a mitigation strategy workshop to identify mitigation actions for inclusion in the HMP on June 29, 2022. Thank you to all our partners who participated in the planning process.

We have now completed the draft of the updated HMP. The draft HMP is available for review on the project website, https://www.delcopahmp.com/, under the "Explore the Plan" link. Please visit the site and review the documents posted there.

We will be conducting a public webinar to collect comments on the draft HMP. The webinar will be on Tuesday, October 18, 2022 from 6:30-8:00 p.m. It will be conducted via Microsoft Teams; you do not need to download any software to participate. Details for logging into the webinar are provided on the Calendar on the HMP website.

I would appreciate it if someone from your organization would attend the webinar and participate in the discussion. If you are unable to attend, please send your comments on the draft to me by October 11, 2022.

Thank you for your continued support, and we look forward to seeing you online. Please contact me if you have any questions.

Best Regards,
Larry Bak
Deputy Director, Delaware County Emergency Management
Chair, Delaware County LEPC
Chief, Delaware County Hazmat
610-565-8700
Please reply to bakl@co.delaware.pa.us

County of Delaware
Department of Emergency Services
360 North Middletown Road,
Media, PA 19063

September 19, 2022

RE: Delaware County Hazard Mitigation Plan 2022 Update

Dear Hazard Mitigation Planning Partners,

As you know, the Delaware County Hazard Mitigation Plan (HMP) is currently being updated. We conducted a kickoff meeting on November 16, 2021, reviewed the results of the risk assessment on June 14, 2022, and conducted a mitigation strategy workshop to identify mitigation actions for inclusion in the HMP on June 29, 2022. Thank you to all our partners who participated in the planning process.

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Thank you for your continued support, and we look forward to seeing you online. Please contact me if you have any questions.

Best Regards,

Larry Bak
Deputy Director for Emergency Management

From: WordPress
To: Apgar, Heather; Subbio, Tony
Subject: Delaware County HMP - website comment
Date: Saturday, August 27, 2022 7:04:03 AM

Name

Maria Atanacio

Email

m.atanacio@yahoo.com

Message

Good morning,
I am an MPH student and COVID-19 Disease Investigator for PA. I reside in Yeadon, PA. I just took a look at the Hazard Mitigation Plan and noticed that your COVID-19 vaccine eligibility information should be updated to include children 6 months and older to be eligible for the Pfizer-BioNTech and Moderna vaccine. There is an additional Novavax listed on the CDC website as well.
In addition, I'd like to ask about the air pollution rates in our county and what steps are being taken to address this issue? I have read that the cancer rate in our county is at an elevated level when compared to other parts of the state and country. Thank you for your time and information. Have a wonderful day!

From: WordPress
To: Apgar, Heather; Subbio, Tony
Subject: Delaware County HMP - website comment
Date: Saturday, August 27, 2022 5:26:02 PM

Name

Elizabeth Bradley

Email

bettybradley1952@gmail.com

Message

THE SEWER PIPE ON THE SIDEWALK LID IS BROKEN AND IS FILLING UP WITH TRASH. I TALKED TO SOMEONE FROM THE BOROUGH REQUESTING FOR IT TO BE CLEANED OUT AND TO PUT A LID ON IT BEFORE IT START RUNNING OVER LIKE IT DID BEFORE. HE TOLD ME IT WAS MY RESBONBILITY TO CLEAN IT AND PUT THE COVER ON MYSELF.I AM A SENIOR CITIZEN WITH A DISABILITY. DO YOU KNOW OF ANYONE WHO WOULD DO THAT A PROGRAM THAT I CAN GET THE HELP I NEED. THANK YOU.

Delaware County, along with its municipalities, are in the process of updating the Hazard Mitigation Plan (HMP). Hazard mitigation is any action taken to reduce the loss of life and property by lessening the impact of disasters (natural, technological, and man-made). These include flooding, severe storms, severe winter storms, etc. The HMP provides a "blueprint" by which participating jurisdictions can make coordinated efforts towards reducing losses from natural hazards. It is required by the Federal Emergency Management Agency (FEMA) in order to be eligible for federal grant funding for public and private mitigation projects.

Due to your proximity to Delaware County, the effects of many of these disasters would be similar in your county, and your involvement in this process could reap mutual benefits to both counties. By participating in the review of this plan, you will be engaging in the regional coordination of disaster mitigation planning, which is one of the intents of the Mitigation Planning Regulations (44 CFR 201).

The following survey is designed to help Delaware County gain a better understanding of how their neighboring counties operate day-to-day and during an emergency and helps our neighboring counties be included in the planning process. This survey consists of 27 questions and will take approximately 15 minutes to complete.

The Delaware County HMP Planning Partnership thanks you for taking the time to participate in this information-gathering process. More information about this planning process can be found at the HMP website at: http://www.delcopahmp.com

Delaware County Hazard Mitigation Plan - Neighboring County Survey

General Information

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan. Please note that individual answers will not be published in the plan.

1. Please indicate the county in which you represent

- ○ Chester County, PA
- ○ Philadelphia County, PA
- ○ Montgomery County, PA
- ○ Salem County, NJ
- ○ Gloucester County, NJ
- ○ Other (please specify)

2. Name and Title of Respondent

3. What department do you represent?

4. Please provide your contact information.

Email Address

Phone Number

Emergency Operations and Continuity of Operations Planning

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan.

5. Do you have any shared service agreements or mutual aid agreements in place with Delaware County at the county level for the following?

- [ ] Equipment and staff for debris cleanup and snow removal
- [ ] Emergency staff for evacuations/disaster response
- [ ] Damage assessments
- [ ] Sheltering
- [ ] Other

If you checked any of the above, please explain.

6. Is Delaware County involved in your county's comprehensive emergency operations planning, such as by participating on a planning team, or providing resources during an emergency?

- ( ) Yes
- ( ) No
- ( ) Don't Know
- ( ) N/A

If yes, please explain.

7. Is your county involved in Delaware County's comprehensive emergency operations planning, such as by participating on a planning team, or providing resources during an emergency?

- ( ) Yes
- ( ) No
- ( ) Don't Know
- ( ) N/A

If yes, please explain.

8. Is Delaware County involved in your county’s Continuity of Operations planning, such as by participating on a planning team, providing resources during an emergency, or carrying out some of your county's essential functions for a period of time?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain.

9. Is your county involved in Delaware County's Continuity of Operations planning, such as by participating on a planning team, providing resources during an emergency, or carrying out some of Delaware County's essential functions for a period of time?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain.

10. Thinking about emergency operations and disaster response, please explain how these actions are communicated between counties.

Risk and Vulnerability

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan.

11. Does your county share risk and vulnerability assessments (flood mapping, HAZUS, etc.) with Delaware County?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain

Evacuation and Sheltering

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan.

12. Do you collaborate with Delaware County on establishing evacuation routes and alternate evacuation routes?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain.

13. Do you and Delaware County consult with one another before making evacuation decisions that would impact one another (recommending evacuation routes into neighboring counties)?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain

14. Are evacuation routes maintained to the same level of protection across county lines?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A
- ○ Other (please specify)

15. Do you collaborate with Delaware County on establishing shelters?

- Yes
- No
- Don't Know
- N/A

If yes, please explain.

16. Do you and Delaware County consult with one another before making sheltering decisions that would impact one another (recommending shelters in neighboring counties)?

- Yes
- No
- Don't Know
- N/A

If yes, please explain.

17. Do you and Delaware County share any spaces suitable for temporary housing? This includes locations suitable to place temporary housing units to house residents displaced by a disaster.

- Yes
- No
- Don't Know
- N/A

If yes, please explain.

Information Sharing

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan.

18. Does your county have access to contact information for Delaware County's emergency operation centers at the county and local level?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain.

19. Please describe any situations or hazards that are of a concern to both your County and Delaware County. For example, would flooding along a particular waterway impact both counties, or are there any facilities or infrastructure that would affect both counties if it/they failed?

20. Please explain how information is shared between counties regarding mitigation projects.

21. Is information regarding mitigation shared during the planning and implementation phases of the projects?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain.

Projects, Grants, Education, and Outreach

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan.

22. Are you aware of any projects for the following that requires cross-collaboration between county boundaries?

- [ ] Stormwater projects
- [ ] Watershed projects or planning
- [ ] Floodplain projects or planning
- [ ] Connected roadway improvements
- [ ] Natural infrastructure restoration
- [ ] Outreach (education and outreach campaigns, programs for public information, etc.)
- [ ] Other (please specify)

23. If you selected anything above, please explain.

24. Have your county and Delaware County collaborated on grant applications?

- ( ) Yes
- ( ) No
- ( ) Don't Know
- ( ) N/A

If yes, please explain.

25. Are you aware of any organizations that carry out education and outreach regarding hazards in both counties?

- ○ Yes
- ○ No
- ○ Don't Know
- ○ N/A

If yes, please explain.

26. What are opportunities or ideas to optimize cooperation with Delaware County on emergency management operations and hazard mitigation projects?

Final Thoughts

27. Do you have any relevant questions or comments for Delaware County?

1. Introduction

Delaware County Residents,

A planning committee, along with the support of county, regional and state agencies and stakeholders, has recently been formed to address hazards and disasters that may occur in Delaware County and develop strategies to mitigate against losses. In order to identify and plan for future disasters, we need assistance from the residents of Delaware County.

This questionnaire is designed to help us gauge the level of knowledge local residents already have about hazard/disaster issues. Our questionnaire also asks for information you may have about areas vulnerable to any type of disasters. The information you provide will help us coordinate activities to reduce the risk of injury or property damage in the future.

You will be asked if you live in a floodplain. If you do not know, or are not sure, please check the FEMA website: https://msc.fema.gov/portal/home.

This survey will take approximately 15 minutes to complete.

Thank you for taking the time to participate in this information-gathering process!

2. All-Hazard Information

In this section, we are looking for your input on the types of hazards that impact Delaware County and its residents. Please answer the following questions to help us understand the concerns throughout the County.

1. How concerned are you about the following hazards impacting Delaware County?

	Not Concerned	Somewhat Concerned	Very Concerned	Extremely Concerned
Climate Change	☐	☐	☐	☐
Civil Disturbance	☐	☐	☐	☐
Coastal Erosion	☐	☐	☐	☐
Dam and/or Levee Failure	☐	☐	☐	☐
Drought	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐
Environmental Hazards	☐	☐	☐	☐
Extreme Temperatures	☐	☐	☐	☐
Flooding	☐	☐	☐	☐
Flooding - riverine/flash	☐	☐	☐	☐
Flooding - ice jam	☐	☐	☐	☐
Hailstorm	☐	☐	☐	☐
Hurricane, Tropical Storm, Nor'easter	☐	☐	☐	☐
Invasive Species	☐	☐	☐	☐
Landslide	☐	☐	☐	☐
Lightning Strike	☐	☐	☐	☐
Pandemic and Infectious Disease	☐	☐	☐	☐
Radon Exposure	☐	☐	☐	☐
Subsidence, Sinkhole	☐	☐	☐	☐
Terrorism	☐	☐	☐	☐

	Not Concerned	Somewhat Concerned	Very Concerned	Extremely Concerned
Tornado, Windstorm	☐	☐	☐	☐
Transportation Accidents	☐	☐	☐	☐
Urban Fire and Explosion	☐	☐	☐	☐
Utility Failure	☐	☐	☐	☐
Wildfire	☐	☐	☐	☐
Winter Storm	☐	☐	☐	☐
Other, indicate in comment box below	☐	☐	☐	☐

Other (please specify)

2. In the past 5 years, which of the following types of hazards have you experienced within Delaware County, or sustained damage as a result of each?

	Have Experienced	Have Not Experienced
Climate Change	☐	☐
Civil Disturbance	☐	☐
Coastal Erosion	☐	☐
Dam and/or Levee Failure	☐	☐
Drought	☐	☐
Earthquake	☐	☐
Environmental Hazards	☐	☐
Extreme Temperatures	☐	☐
Flooding	☐	☐
Flooding - riverine/flash	☐	☐
Flooding - ice jam	☐	☐
Hailstorm	☐	☐
Hurricane, Tropical Storm, Nor'easter	☐	☐
Invasive Species	☐	☐
Landslide	☐	☐
Lightning Strike	☐	☐

	Have Experienced	Have Not Experienced
Pandemic and Infectious Disease	☐	☐
Radon Exposure	☐	☐
Subsidence, Sinkhole	☐	☐
Terrorism	☐	☐
Transportation Accidents	☐	☐
Tornado, Windstorm	☐	☐
Urban Fire and Explosion	☐	☐
Utility Failure	☐	☐
Wildfire	☐	☐
Winter Storm	☐	☐
Other, indicate in comment box below	☐	☐

Other (please specify)

3. In the past 5 years, which of the following types of non-natural hazards/disasters have you experienced within Delaware County, or sustained damage as a result of each?

	Have Experienced	Have Not Experienced
Building and Structure Collapse	☐	☐
Civil Disturbance	☐	☐
Cyber Terrorism	☐	☐
Dam Failure/Breaches	☐	☐
Environmental Hazard - Coal Mining	☐	☐
Environmental Hazard - Conventional Oil and Gas Wells	☐	☐
Environmental Hazard - Gas and Liquid Pipelines	☐	☐
Environmental Hazard - Hazardous Materials Releases	☐	☐
Environmental Hazard - Unconventional Oil and Gas Wells	☐	☐
Levee Failure	☐	☐
Mass Food and Animal Feed Contamination	☐	☐
Nuclear Incident	☐	☐
Opioid Addiction Response	☐	☐
Subsidence, Sinkhole	☐	☐
Terrorism	☐	☐
Transportation Accident	☐	☐
Urban Fire and Explosion	☐	☐
Utility Interruption	☐	☐
Other, indicate in comment box below	☐	☐

Other (please specify)

4. How concerned are you about the following non-natural hazards/disasters impacting the County?

	Not Concerned	Somewhat Concerned	Very Concerned	Extremely Concerned
Building and Structure Collapse	☐	☐	☐	☐
Civil Disturbance	☐	☐	☐	☐
Cyber Terrorism	☐	☐	☐	☐
Dam Failure/Breaches	☐	☐	☐	☐
Environmental Hazard - Coal Mining	☐	☐	☐	☐
Environmental Hazard - Conventional Oil and Gas Wells	☐	☐	☐	☐
Environmental Hazard - Gas and Liquid Pipelines	☐	☐	☐	☐
Environmental Hazard - Hazardous Materials Releases	☐	☐	☐	☐
Environmental Hazard - Unconventional Oil and Gas Wells	☐	☐	☐	☐
Levee Failure	☐	☐	☐	☐
Mass Food and Animal Feed Contamination	☐	☐	☐	☐
Nuclear Incident	☐	☐	☐	☐
Opioid Addiction Response	☐	☐	☐	☐
Subsidence, Sinkhole	☐	☐	☐	☐
Terrorism	☐	☐	☐	☐
Transportation Accident	☐	☐	☐	☐
Urban Fire and Explosion	☐	☐	☐	☐
Utility Interruption	☐	☐	☐	☐
Other, indicate in comment box below	☐	☐	☐	☐

Other (please specify)

5. In the last 5 years, were you evacuated from your home as a result of a disaster (e.g. flooding)? If so, how long were you displaced? Did you go to a shelter?

6. How prepared is your household to get along without normal power/heat for one to five days?

- ○ Not at all prepared
- ○ Somewhat prepared
- ○ Very prepared

Please explain

7. Please rank how prepared you feel you and your household are for disaster events likely to occur within your community. Rank on a scale of 1 to 5, with 5 representing the most prepared.

1 (least) 3 5 (most)

8. How do you receive your information concerning a disaster? Check all that apply.

- ☐ County website
- ☐ Municipal website
- ☐ Newspaper
- ☐ Municipal E-Mail
- ☐ Delco Alert
- ☐ Police, Fire, EMS
- ☐ Information Flyers/Brochures
- ☐ Public meetings, workshops, public awareness events
- ☐ Schools/Academic Institutions
- ☐ TV (news)
- ☐ TV (advertising)
- ☐ Radio (news)
- ☐ Radio (advertising)
- ☐ Outdoor Advertisements
- ☐ Internet
- ☐ Social Media
- ☐ Chamber of Commerce
- ☐ Public Library

Other (please specify)

9. Of the answers you provided above, what are the top three methods you use?

10. Do you think that the public is aware of, understands, and takes advantage of emergency warning and notification systems and services (e.g. Delco Alert notifications)?

- ○ Yes
- ○ No
- ○ I don't know

Please explain

11. Do you think that local public education and awareness programs are effective at informing the public on what they should do to be prepared for and reduce their personal risk to disasters?

- ○ Yes
- ○ No
- ○ I don't know

Other (please explain)

12. Which of the following steps has your household taken to prepare for a hazard event? Check all that apply.

- ☐ Made an emergency plan
- ☐ Designated a meeting place
- ☐ Identified utility shutoffs
- ☐ Received first aid/CPR training
- ☐ Prepared a disaster supply kit
- ☐ Installed smoke detectors on each level of home
- ☐ Stored food and water
- ☐ Stored flashlights and batteries
- ☐ Stored battery-operated radio
- ☐ Stored fire extinguisher
- ☐ Registered to receive emergency alerts
- ☐ Stored medical supplies
- ☐ Purchased additional insurance to cover losses (e.g. flood insurance)
- ☐ Received emergency preparedness information from a government source
- ☐ Identified the location of the nearest emergency shelter

Other (please specify)

13. In the past, has your home been damaged by a hazard event? For example, the basement of your home flooded and damaged the hot water heater.

- ○ Yes
- ○ No

If yes, please explain the damage your structure sustained and when it occurred.

14. If you answered 'yes' above, did you report the damages to your local police, fire, or emergency management departments?

- ○ Yes
- ○ No

If you answered 'no', why did you not report the damages?

15. To the best of your knowledge is your property located in a designated floodplain?
If you do not know, or are not sure, please check the FEMA website: https://msc.fema.gov/portal/home.

- ○ Yes ○ No ○ Not Sure

16. If your property is in the floodplain, do you have flood insurance?

- ○ Yes
- ○ No
- ○ N/A

17. If your property is located outside of the floodplain, do you have flood insurance?

- ○ Yes
- ○ No
- ○ N/A

18. If you do NOT have flood insurance, what is the primary reason?

- ☐ I don't need it
- ☐ My property has never flooded
- ☐ It is too expensive
- ☐ Not familiar with it/don't know about it
- ☐ Insurance company will not provide
- ☐ I believe that my homeowners insurance will cover me
- ☐ My property is located on high ground

Other (please specify)

19. Do you or did you have problems getting homeowners/renters insurance due to risks from hazards?

- ○ Yes
- ○ No

If you answered "yes", please identify the hazard risk that caused you to have problems obtaining homeowners/renters insurance.

3. Hazard Mitigation

As defined by FEMA, mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective, we need to take action now - before the next disaster - to reduce human and financial consequences later.

Effective mitigation requires that we all understand local risks, address the hard choices, and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security and self-reliance.

In this section of the survey, we want to hear from you how Delaware County can help mitigate the hazards and become more resilient before the next storm strikes.

20. Please identify any specific vulnerabilities that you are aware of *in your city/township/borough* (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list street names and other specific identifiers if possible.

21. Please identify any specific vulnerabilities that you are aware of *in Delaware County outside of your city/township/borough* (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list city/township/borough, street names, and other specific identifiers if possible.

22. What types of projects do you believe local, county, state or federal government agencies could be doing in order to reduce the damage and disruption of hazards in Delaware County? Select your top three choices.

- [ ] Improve and strengthen critical facilities such as police, schools, hospitals
- [ ] Improve and strengthen infrastructure, such as elevating roadways and improving drainage systems
- [ ] Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.)
- [ ] Install or improve protective structures, such as bulkheads, floodwalls or levees to protect against flooding
- [ ] Replace inadequate or vulnerable bridges and causeways
- [ ] Strengthen codes, ordinances and plans to require higher hazard risk management standards and/or provide greater control over development in high hazard areas
- [ ] Buy out flood prone properties and maintain as open-space
- [ ] Inform property owners of ways they can mitigate damage to their properties
- [ ] Provide better information about hazard risks and high-hazard areas
- [ ] Assist vulnerable property owners with securing funding to mitigate their properties

Other (please specify)

23. Do you feel that Delaware County is doing enough towards reducing hazard risks, climate adaptation, or other mitigation/prevention measures?

- ( ) Yes
- ( ) No
- ( ) I don't know

Please provide details for your answer.

24. If your property were located in a designated high-hazard area (for example, NFIP flood zone) or had received repeated damages from a hazard/disaster event, would you consider any of the following options?

If your response is dependent on certain factors, such as the funding source, please indicate those factors in the following question.

	Yes	No	Unsure
Having your property bought out	○	○	○
Moving your structure to another property or a less risky part of your property	○	○	○
Elevating your structure	○	○	○
Floodproof your structure	○	○	○
Look into other ways to mitigate	○	○	○

Other (please specify)

25. Please select the factor(s) that would influence your decision on the mitigation options listed above (buyout/acquisition, relocation, or elevation).

- ☐ Cost
- ☐ Do not have the means to move/relocate
- ☐ Unaware of available programs
- ☐ Length of process
- ☐ Other (please specify)

26. If you have already spent money to mitigate your home, how much did you spend and on what measures?

27. Which (if any) incentives would motivate you to spend money to protect your home from the possible impacts of a disaster?

28. Please list any additional types of projects you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption in Delaware County.

29. Do you have any other comments, questions or concerns regarding hazard mitigation in Delaware County?

4. General Household Information

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the preparation of this plan.

30. Please indicate in which municipality you live.

- Aldan (B)
- Aston (Twp)
- Bethel (Twp)
- Brookhaven (B)
- Chadds Ford (Twp)
- Chester (C)
- Chester (Twp)
- Chester Heights (B)
- Clifton Heights (B)
- Collingdale (B)
- Colwyn (B)
- Concord (Twp)
- Darby (B)
- Darby (Twp)
- East Lansdowne (B)
- Eddystone (B)
- Edgmont (Twp)
- Folcroft (B)
- Glenolden (B)
- Haverford (Twp)
- Lansdowne (B)
- Lower Chichester (Twp)
- Marcus Hook (B)
- Marple (Twp)
- Media (B)
- Middletown (Twp)
- Millbourne (B)
- Morton (B)
- Nether Providence (Twp)
- Newtown (Twp)
- Norwood (B)
- Parkside (B)
- Prospect Park (B)
- Radnor (Twp)
- Ridley (Twp)
- Ridley Park (B)
- Rose Valley (B)
- Rutledge (B)
- Sharon Hill (B)
- Springfield (Twp)
- Swarthmore (B)
- Thornbury (Twp)
- Tinicum (Twp)
- Trainer (B)
- Upland (B)
- Upper Chichester (Twp)
- Upper Darby (Twp)
- Upper Providence (Twp)
- Yeadon (B)
- Other (please specify)

31. How long have you lived here?

- Less than 1 year
- 1 to 5 years
- 6 to 9 years
- 10 to 19 years
- 20 years or more

32. Do you own or rent your place of residence?

- Own
- Rent

33. What street is your property on? This is optional and will be kept confidential - only used to identify hazard areas such as flooding.

34. If you received real estate disclosure information when you moved into your current residence, did your real estate agent or landlord explain the implications of living in a hazard risk zone and did you understand the information they presented?

- Yes
- No

Other (please specify)

35. Please indicate your age range:

- 18 to 30
- 31 to 40
- 41 to 50
- 51 to 60
- 60 or over

Delaware County Hazard Mitigation Plan - Stakeholder Survey

Delaware County, along with its municipalities, are in the process of updating the Hazard Mitigation Plan (HMP) in order to be eligible for federal grant funding for public and private mitigation projects. The HMP provides a "blueprint" by which participating jurisdictions can make coordinated, cost-effective efforts towards reducing losses from natural and human-caused disasters.

The following survey is designed to help identify general needs for hazard mitigation and resiliency within Delaware County from your perspective, as well as to identify specific projects that may be included in the mitigation plan. Given the ongoing nature of the COVID-19 pandemic, there are questions specific to this hazard at the end of the survey to help inform future decision making.

Please take a few minutes to answer the following questions and provide feedback on potential mitigation that affects your assets, infrastructure, and/or services within Delaware County. Provide as much detail as possible to support your choice in the comments box. Where possible, identify specific areas that need to be improved and your suggestions for possible improvements, especially if there are other important issues that you feel are not covered by this survey.

More information about this planning process and additional mitigation resources may be found at the Delaware County HMP website by going to: http://www.delcopahmp.com

Thank you for supporting the update of this planning process!

General Information

The answers provided in this section will be treated as CONFIDENTIAL and will be used solely for the purpose of preparing this plan. Please note that individual answers will not be published in the plan.

1. Name of your department/office/institution

2. Name of Respondent

3. What is your position/title/role with your department/office/institution?

4. Please provide your contact information.

Email Address

Phone Number

What is your/your organization's role in Delaware County?

5. What category does your facility operation/service fall under?

Other (please specify)

6. Based on the above category, please provide additional description and information as to what your organization does or offers (please explain)

7. Please identify the location of your facility(ies) and/ or primary service area. You may choose more than one if your service area covers multiple communities, or "*Delaware County (entire area)*" if your service area is county-wide:

- [ ] Delaware County (entire area)
- [ ] Aldan (B)
- [ ] Aston (Twp)
- [ ] Bethel (Twp)
- [ ] Brookhaven (B)
- [ ] Chadds Ford (Twp)
- [ ] Chester (C)
- [ ] Chester (Twp)
- [ ] Chester Heights (B)
- [ ] Clifton Heights (B)
- [ ] Collingdale (B)
- [ ] Colwyn (B)
- [ ] Concord (Twp)
- [ ] Darby (B)
- [ ] Darby (Twp)
- [ ] East Lansdowne (B)
- [ ] Eddystone (B)
- [ ] Edgmont (Twp)
- [ ] Folcroft (B)
- [ ] Glenolden (B)
- [ ] Haverford (Twp)
- [ ] Lansdowne (B)
- [ ] Lower Chichester (Twp)
- [ ] Marcus Hook (B)
- [ ] Marple (Twp)
- [ ] Media (B)
- [ ] Middletown (Twp)
- [ ] Millbourne (B)
- [ ] Morton (B)
- [ ] Nether Providence (Twp)
- [ ] Newtown (Twp)
- [ ] Norwood (B)
- [ ] Parkside (B)
- [ ] Prospect Park (B)
- [ ] Radnor (Twp)
- [ ] Ridley (Twp)
- [ ] Ridley Park (B)
- [ ] Rose Valley (B)
- [ ] Rutledge (B)
- [ ] Sharon Hill (B)
- [ ] Springfield (Twp)
- [ ] Swarthmore (B)
- [ ] Thornbury (Twp)
- [ ] Tinicum (Twp)
- [ ] Trainer (B)
- [ ] Upland (B)
- [ ] Upper Chichester (Twp)
- [ ] Upper Darby (Twp)
- [ ] Upper Providence (Twp)
- [ ] Yeadon (B)
- [ ] Other (please specify)

8. Does your organization maintain or manage any of the following within your designated service area? If not, answer "No" at the bottom, otherwise check all that apply.

- [ ] Buildings
- [ ] Roads
- [ ] Bridges
- [ ] Other (please specify)
- [ ] Water/Sewer
- [ ] Stormwater
- [ ] No

Hazard/Damage Identification

9. Looking back at previous hazard events, have buildings/facilities/structures you have worked in and/ or are responsible for been impacted by a hazard (ex. damage/closures/etc.)?

- ○ Yes
- ○ No
- ○ Don't Know

10. If you answered “Yes” to the above question, please describe the event that caused or is causing (if recurring) damage and loss of service/ property. If quantifiable data is available, please provide that as well (number of damaged structures, monetary loss, etc.) (please explain)

11. Looking at where your facilities or services are located in Delaware County, what areas do you believe to be the most vulnerable to hazards? What are these hazards? (please explain).

Preparedness

12. Is your organization covered by any of the following plans? Check all that apply

- [ ] Continuity of Operations Plan
- [ ] Business Continuity Plan
- [ ] Continuity of Government Plan
- [ ] None
- [ ] Emergency Operations Plan
- [ ] Don't Know
- [ ] Other (please specify)

13. Do you believe the facilities and infrastructure for your organization are equipped to handle a disaster and/or resilient to damages?

- ( ) Yes
- ( ) No
- ( ) Maybe
- ( ) Don't Know
- ( ) Other (please specify)

Project Identification

14. Can you identify projects or programs that will reduce your facility/organization’s vulnerability to damages and losses, including loss of operation/service, to hazard events? (Please explain)

15. Can you identify projects or programs that have been recently been implemented to reduce your facility's/organization's vulnerability, damage and losses, including loss of operation/service, to hazard events? (please explain)

COVID-19

COVID-19 has shed light onto our County's strengths and weaknesses. Please answer the following questions.

16. How has your organization been involved in response to this pandemic? (please explain)

17. What specific services/ infrastructure needs to be built/ improved in your organization in order to mitigate damage we have experienced from this pandemic? (please explain)

Final Thoughts

18. Do you have any questions or comments for Delaware County?

APPENDIX F. ADOPTION RESOLUTIONS

Appendix F includes copies of the resolutions passed by Delaware County and participating municipalities to adopt the 2022 Delaware County Hazard Mitigation Plan.

APPENDIX G. BLANK MITIGATION ACTION WORKSHEET

Appendix G includes a blank copy of the Mitigation Action Worksheet that is used to document information on each mitigation action in the 2022 Delaware County Hazard Mitigation Plan.

Mitigation Action Worksheet

Municipality(ies):	**Action**
Action Number:	
Location (address, lat/long)	
Mitigation Technique Category	
Hazard(s) Addressed	
Priority (High, Medium, Low)	
Estimated Cost	
Potential Funding Streams	
Timeline	
Lead Agency/Department	
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Mitigation Technique Category

- Local Plans and Regulations (LPR) – These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
- Structure and Infrastructure Project (SIP) – These actions involve (1) modifying existing structures and infrastructure to protect them from a hazard, or (2) removing 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 includes projects to construct manmade structures to reduce the impact of hazards.
- Natural Systems Protection (NSP) – These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.
- Education and Awareness Programs (EAP) – 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, such as StormReady and Firewise Communities.

Costs:

If an estimated cost is known, please provide or use the following ranges:

Low = < $10,000 *Medium* = $10,000 to $100,000 *High* = > $100,000

If costs have not been estimated, please use the following categories:

Low	Possible to fund under existing budget. Project is part of, or can be part of, an existing on-going program.
Medium	Could budget for under existing work plan, but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
High	Would require an increase in revenue via an alternative source (i.e., bonds, grants, fee increases) to implement. Existing funding levels are not adequate to cover the costs of the proposed project.

Timeline: Short = 1 to 5 years Long-Term = 5 years or greater

OG = On-going program DOF = Depending on funding

APPENDIX H. MITIGATION ACTION WORKSHEETS

Appendix H includes the Mitigation Action Worksheets for the actions identified in Section 6: Mitigation Strategy. The Mitigation Action Worksheets are organized by countywide actions, then actions affecting multiple municipalities, then actions for each of the respective jurisdictions.

Municipality(ies):	Action
Delaware County	Assess means to prevent future storage of hazardous materials in floodplains.
Action Number:	
DelawareC-1	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Environmental Hazards (Hazardous Material Release, Gas and Liquid Pipelines); Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	DCPD
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Conduct emergency planning exercises for high hazard dams in the County to simulate hazard response.
Action Number:	
DelawareC-2	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Dam Failure
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	EMPG; SEPA RTF; Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Army Corps of Engineers; DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Delaware County **Action Number:** DelawareC-3	Develop a linkage between the County tax assessment records and parcels in the County GIS to allow future revision of this plan to more easily incorporate information about property values, construction types, etc.
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Board of Assessment
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Develop multi-use trails that can serve evacuation routes in the event of an emergency.
Action Number:	
DelawareC-4	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	SEPA RTF funding; Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities; PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Develop mutual agreements with neighboring counties to utilize cooperative efforts to mitigate hazards that impact communities beyond political boundaries.
Action Number:	
DelawareC-5	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Develop/update interface between dam owners' inundation mapping and the DCPD's GIS tools.
Action Number:	
DelawareC-6	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Dam Failure
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	County Planning
Support Agency(ies)/ Department(s)	Army Corps of Engineers; PA DEP; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Engage in public education activities about Delaware County's Pandemic Influenza Preparedness and Response Plan.
Action Number:	
DelawareC-7	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Pandemic
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Health
Support Agency(ies)/ Department(s)	Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Evaluate at the municipal level the suitability of the Community Rating System (CRS) for insurance premium reduction (and flood damage reduction).
Action Number:	
DelawareC-8	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, & Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Explore opportunities to improve poor broadband infrastructure throughout the county for increased remote work and learning.
Action Number:	
DelawareC-9	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget; PA DCED
Timeline	Short
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	Utilities
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Hold workshops for governing bodies on the importance of prohibiting development in hazard-prone areas.
Action Number:	
DelawareC-10	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget; PA DCED
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Identify all storage of hazardous materials in floodplains (including non-addressable structures, such as propane tanks).
Action Number:	
DelawareC-11	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Environmental Hazards (Hazardous Material Release); Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	DCPD
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Identify and publicize success stories as part of an overall consistent public relations program.
Action Number:	
DelawareC-12	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Public Information
Support Agency(ies)/ Department(s)	Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Identify areas where healthcare facilities closures have impacted communities and explore mitigation solutions.
Action Number:	
DelawareC-13	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Health; SEPA RTF; Healthcare Coalition
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Identify emerging software systems for loss estimation, and train County staff to use existing HAZUS software and DES damage reporting software.
Action Number:	
DelawareC-14	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam; Earthquake; Hurricane, Tropical Storm, and Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Increase resident awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods can include public outreach (i.e., website, mailings, workshops, media coverage) and education.
Action Number:	
DelawareC-15	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Promote the use of existing warning systems and implement additional warning systems, including: • Text-based community warning systems •Real time weather data for emergency management personnel • NOAA weather radios • "Reverse 911" systems
Action Number:	
DelawareC-16	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipal EMCs
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Provide model ordinances to municipalities that can be used to prohibit development in hazard-prone areas.
Action Number:	
DelawareC-17	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	PA DCED
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Review all capital improvements to ensure that infrastructure improvements are not directed toward areas with identified hazards.
Action Number:	
DelawareC-18	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.
Action Number:	
DelawareC-19	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Planning
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Review County EOP to ensure emergency operations are equipped and prepared for logistical needs during a pandemic response event.
Action Number:	
DelawareC-20	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Pandemic
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Health
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Update and complete inventory of domestic wells located in Delaware County.
Action Number:	
DelawareC-21	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Drought; Utility Interruption
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	PA DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Upgrade backup power resources as necessary at critical facilities.
Action Number:	
DelawareC-22	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Utility Interruption
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	FEMA HMGP; Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Work with municipal officials to increase awareness among manufactured home owners and evaluate how many manufactured homes have been anchored.
Action Number:	
DelawareC-23	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado and Windstorm
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Work with municipal officials to increase awareness among property owners to clear debris from waterways and drainage infrastructure.
Action Number:	
DelawareC-24	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Tornado and Windstorm
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipal Floodplain Administrators; PA DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Work with municipal officials to increase awareness among property owners, including informational mailings to property owners in the 1 percent annual chance floodplain, and sponsor a series of workshops about costs and benefits of: • Acquiring and minimizing the cost of flood insurance coverage, and • Improving property elevation, dry flood proofing, and wet flood-proofing.
Action Number:	
DelawareC-25	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, & Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Work with PEMA and FEMA to hold a municipal CRS workshop.
Action Number:	
DelawareC-26	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, & Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	PEMA, FEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
DelawareC-27	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Hazardous Materials Releases
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	LEPC
Support Agency(ies)/ Department(s)	Emergency Services; Fire Departments; Municipal EMCs
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Acquire, elevate, flood-proof, or relocate (including the potential use of the Mitigation Demolition/Rebuild Process) structures and properties in flood hazard areas.
Action Number:	
DelawareC-28	

Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Municipalities
Timeline	Long
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Conduct a training class for first responders for a leak on pipelines transporting HVLs.
Action Number:	
DelawareC-29	

Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases, Environmental Hazards - Pipeline
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	SEPA RTF funding; Act 165 Funds
Timeline	Short
Lead Agency/Department	Township, Delaware County ES
Support Agency(ies)/ Department(s)	County, EMS
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Conduct qualitative evaluation process to evaluate the ready state of existing shelters and needs for new shelters.
Action Number:	
DelawareC-30	

Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities; American Red Cross
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Develop a climate adaptation plan to identify opportunities to improve resiliency across the County.
Action Number:	
DelawareC-31	

Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Drought; Extreme Temperature; Flood, Flash Flood, & Ice Jam; Hailstorm; Hurricane, Tropical Storm, & Nor'easter; Tornado & Windstorm; Wildfire; and Winter Storm
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget; PA DCED
Timeline	Short
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	Emergency Services; Municipal Planning Boards/Departments
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Develop a strategy to inform new residents and property owners of localized risks and how to prepare (including information on rental flood insurance, when appropriate).
Action Number:	
DelawareC-32	

Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal Floodplain Administrators
Support Agency(ies)/ Department(s)	Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Develop an action plan for reducing the potential losses at identified critical facilities and infrastructure.
Action Number:	
DelawareC-33	

Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Municipalities; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Develop and implement a radon exposure prevention program.
Action Number:	
DelawareC-34	

Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Radon Exposure
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Health; Municipal EMCs; PA DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Aldan Borough, Aston Township, Bethel Township, Brookhaven Borough, Chadds Ford Township, Chester City, Chester Heights Borough, Chester Township, Clifton Heights Borough, Collingdale Borough, Colwyn Borough, Concord Township, Darby Borough, Darby Township, East Lansdowne Borough, Eddystone Borough, Edgmont Township, Folcroft Borough, Glenolden Borough, Haverford Township, Lansdowne Borough, Lower Chichester Township, Marcus Hook Borough, Marple Township, Media Borough, Middletown Township, Millbourne Borough, Morton Borough, Nether Providence Township, Newtown Township, Norwood Borough, Parkside Borough, Prospect Park Borough, Radnor Township, Ridley Park Borough, Ridley Township, Rose Valley Borough, Rutledge Borough, Sharon Hill Borough, Springfield Township, Swarthmore Borough, Thornbury Township, Tinicum Township, Trainer Borough, Upland Borough, Upper Chichester Township, Upper Darby Township, Upper Providence Township, and Yeadon Borough.	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: • Lowest-floor elevation, • Number of stories, • Presence of a basement, and • Market and/or replacement value.
Action Number:	
DelawareC-35	

Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal Floodplain Administrators
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Delaware County, Brookhaven Borough, Lower Chichester, Upper Chichester Township	Update municipal zoning code to strengthen it to promote disaster-resistant development.
Action Number:	
DelawareC-36	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Delaware County, Chester City	Protect the Delaware County Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.
Action Number:	
DelawareC-37	
Location (address, lat/long)	Delaware County Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA, PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	County Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Chester City, Ridley Park	Implement the Delaware County Regional Water Quality Control Authority (DELCORA) wastewater management tunnel project from Chester to Ridley.
Action Number:	
DelawareC-38	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	DELCORA
Timeline	Long
Lead Agency/Department	DELCORA
Support Agency(ies)/ Department(s)	County Engineer; Municipal Engineers; PA DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Delaware County, Colwyn Borough, Tinicum Township	Obtain additional ownership, operation, and maintenance information for levees in Delaware County for the next HMPU.
Action Number:	
DelawareC-39	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Levee Failure
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	USACE
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Edgmont (Twp)	Work with the US Army Reserve Base Sewer Treatment Plant to assess the property to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
DelawareC-40	
Location (address, lat/long)	District Court 32-2-48
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Fire Department, PA DCNR
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Tinicum (Twp)	Work with the FAA to discuss the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
DelawareC-41	
Location (address, lat/long)	FAA PHL ALSF
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Tinicum Township	Work with Amtrak and PennDOT on cleaning up debris in streams and along the PA-420 bridge.
Action Number:	
DelawareC-42	
Location (address, lat/long)	PA-420 bridge
Mitigation Technique Category	Natural Systems Protection (NSP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Floodplain Administrator; PA DEP; PennDOT; Amtrak
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County, Upper Providence Township	Assess the District Court 32-2-46 property to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
DelawareC-43	
Location (address, lat/long)	District Court 32-2-47
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Fire Department, PA DCNR
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brookhaven Borough, Colwyn Borough, Nether Providence Township, Sharon Hill Borough, Upland Borough	Explore opportunities for construction of, repair, or reinforcement of floodwalls or levees to protect homes, businesses, or other structures in or near floodplains.
Action Number:	
DelawareC-44	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam , Levee Failure
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	County Planning
Support Agency(ies)/ Department(s)	USACE
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brookhaven Borough; Chester Heights Borough; Darby Borough; Newtown Township; Norwood Borough; Ridley Park Borough	Clean up debris in streams and along stream banks and bridges in municipality.
Action Number:	
DelawareC-45	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Natural Systems Protection (NSP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Municipal Public Works
Support Agency(ies)/ Department(s)	PA DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chadds Ford Township, Edgmont Township, Aston Township, Newtown Township	Elevate roadways where necessary to allow water to flow underneath of them and reduce roadway flooding.
Action Number:	
DelawareC-46	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC; PA DCED FMP; DVRPC funding
Timeline	Short
Lead Agency/Department	Municipal Public Works
Support Agency(ies)/ Department(s)	PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City, Collingdale Borough, Eddystone Borough, Edgmont Township, Marcus Hook Borough, Newtown Township, Norwood Borough, Prospect Park Borough, Trainer Borough, Upland Borough, Upper Darby Township, Yeadon Borough	Install, repair, or replace culverts or storm sewers in areas of the municipality that experience flooding.
Action Number:	
DelawareC-47	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; Capital Improvements; PennDOT; DVRPC
Timeline	Short
Lead Agency/Department	Highway
Support Agency(ies)/ Department(s)	Municipalities; PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City, Upland Borough, Chester Township, Brookhaven Borough, and Aston Township.	Conduct Flood Study of Lower Chester Creek.
Action Number:	
DelawareC-48	
Location (address, lat/long)	Lower Chester Creek.
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Municipalities, Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Collingdale Borough, Folcroft Borough, Lansdowne Borough, Marple Township, Morton Borough, Newtown Township, Parkside Borough, Radnor Township, Springfield Township	Explore opportunities to mitigate flooding and drainage problems in the municipality.
Action Number:	
DelawareC-49	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA BRIC; Operating Budget
Timeline	Short
Lead Agency/Department	Municipal Floodplain Administrators
Support Agency(ies)/ Department(s)	Municipal Public Works
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township, Lansdowne Borough, Trainer Borough, Newtown Township	Explore opportunities and create stormwater infiltration areas in the municipality such as stormwater detention basins, rain gardens etc.
Action Number:	
DelawareC-50	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal Public Works
Support Agency(ies)/ Department(s)	PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Media Borough, Ridley Park Borough	Develop a shade tree inventory and create a pruning/removal system for trees susceptible to damage from high winds and icing.
Action Number:	
DelawareC-51	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Hurricane, Tropical Storm, and Nor'easter, Winter Storm, and Tornado and Windstorm
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal Public Works
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Create a logistical facility to coordinate logistics during public health emergencies.
Action Number:	
DelawareC-52	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Pandemic
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	Operating budget; CDBG; RACP
Timeline	Long
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	Health
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Delaware County	Create a new Delaware County Emergency Operations Center (EOC).
Action Number:	
DelawareC-53	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating budget; CDBG; RACP
Timeline	Long
Lead Agency/Department	Emergency Services
Support Agency(ies)/ Department(s)	County Administrator, Information Technology, Public Works, Public Relations
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Glenolden Borough, Middletown Township, Swarthmore Borough, Upland Borough	Stabilize, revegetate, or reinforce stream banks in areas of the municipality where necessary.
Action Number:	
DelawareC-54	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Natural Systems Protection (NSP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam, Landslides
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	FEMA BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Municipal Public Works
Support Agency(ies)/ Department(s)	PA DEP; PA DCNR
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Aldan Borough	Discuss with the owner/operator of critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
AldanB-1	
Location (address, lat/long)	Aldan Elementary School, Aldan Historical Commission
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Hazardous Materials Releases
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	County LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ashton Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
AshtonT-1	
Location (address, lat/long)	Aston Free Library, Aston Historical Society, Aston Police Department, Aston Twp Community Center , Green Ridge Fire Company, Holy Family Regional Catholic School, Iceworks, Kindercare Learning Center, Media Children's House, Nalco Water Pretreatment Solutions – Aston, Nuco 2 Supply Llc Aston Depot, Pennell Elementary School, Pyramid Materials
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ashton Borough	Protect the Ashton Beechwood Fire Company to at least the 0.2 percent annual chance flood level.
Action Number:	
AshtonT-2	
Location (address, lat/long)	Ashton Beechwood Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Aston Township	Mitigate identified residences, businesses, Weir Park, Aston Middletown Little League Park, and Lewis H. Fisher Park from the effects of floods, flash floods, and ice jams.
Action Number:	
AstonT-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Bethel Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
BethelT-1	
Location (address, lat/long)	Belmont Senior Center, Bethel Fire Co., Bethel Police Department, Bethel Springs Elementary School, Bethel Township Building, Bethel Township Hose Company, Bethel Township Preservation Society, Booths Corner Market, Laurel Pipeline Company, L.P, Naamans Creek Country Manor, PECO - Foulk Substation
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Bethel Township	Work with pipeline owners to make pipeline information accessible online
Action Number:	
BethelT-2	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Pipeline
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Delaware County ES
Support Agency(ies)/ Department(s)	LEPC; Facility Management
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Bethel Township	Review previous flood occurrences and identify mitigation solutions
Action Number:	
BethelT-3	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC, FMA, Operating Budget
Timeline	Long
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brookhaven Borough	Protect the Brookhaven Treatment Plant to at least the 0.2 percent annual chance flood level.
Action Number:	
BrookhavenB-1	
Location (address, lat/long)	Brookhaven Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Brookhaven Borough	Assess the geology at the Brookhaven Treatment Plant property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
BrookhavenB-2	
Location (address, lat/long)	Brookhaven Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Code Enforcement Officer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brookhaven Borough	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
BrookhavenB-3	
Location (address, lat/long)	Dutton Mill Rd Water Storage Facility
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brookhaven Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
BrookhavenB-4	
Location (address, lat/long)	Brookhaven Fire Company, Brookhaven Municipal Center, Brookhaven Police Department, Brookhaven Treatment Plant, Christian Academy, Coebourn Elementary School, Dutton Mill Rd Water Storage Facility, Kindercare Learning Center, Lowe's Of Brookhaven (#3277), Our Lady of Charity Church, PECO Dutton Mill Rd Sub Station, Real Church - 05000003-1, Thomas Coeburn Elementary School,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chadds Ford Township	Protect the Christian C. Sanderson Museum to at least the 0.2 percent annual chance flood level.
Action Number:	
ChaddsFordT-1	
Location (address, lat/long)	Christian C. Sanderson Museum
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chadds Ford Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ChaddsFordT-2	
Location (address, lat/long)	Brandywine Battlefield Park Association, Brandywine Conservancy & Environmental Management Center, Brinton 1704 House, Calvary Chapel of Delaware County, Chadds Ford HARB, Chadds Ford Historical Society, Christian C. Sanderson Museum, Goddard School, Knights Bridge Sewage Treatment Plant, Nestle Health Science Philadelphia, PECO 202 Sub Station, Ridings Sewage Treatment Plant, Saint Cornelius School, Springhill Farms Sewage Treatment Plant
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Chadds Ford Township	Assess the property of the Calvary Chapel of Delaware County to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChaddsFordT-3	
Location (address, lat/long)	Calvary Chapel of Delaware County
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chadds Ford Township	Assess the property of the Christian C. Sanderson Museum to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChaddsFordT-4	
Location (address, lat/long)	Christian C. Sanderson Museum
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Chadds Ford Township	Assess the property of the Ridings Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChaddsFordT-5	
Location (address, lat/long)	Ridings Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Chadds Ford Township	Assess the property of the Saint Cornelius School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChaddsFordT-6	
Location (address, lat/long)	Saint Cornelius School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Anthem Propane to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-1	
Location (address, lat/long)	Anthem Propane
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Apple Pie Christian Academy to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-2	
Location (address, lat/long)	Apple Pie Christian Academy
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Evonik Corporation to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-3	
Location (address, lat/long)	Evonik Corporation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Exelon Chester Generating Station to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-4	
Location (address, lat/long)	Exelon Chester Generating Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Kimberly Clark PA LLC to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-5	
Location (address, lat/long)	Kimberly Clark PA LLC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the PECO Front St Sub Station to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-6	
Location (address, lat/long)	PECO Front St Sub Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the PQ Corporation Chester to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-7	
Location (address, lat/long)	PQ Corporation Chester
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ChesterC-8	
Location (address, lat/long)	1724 Chester Courthouse, Amtrak/Lamokin Substation, Anthem Propane, Apple Pie Christian Academy, Belvedere Center Genesis Healthcare, Center for Self-Development, Chatham Estates, Chester Apartments, Chester City Fire Company, Chester City Municipal Building, Chester City Police Department, Chester Community Charter School East Campus, Chester Fire Station 82, Chester High School, Chester Historical Preservation Society, Chester Park Barn, Chester Senior Center, Chester Voter Services Center - Vc-2, Del Co Voting Machine Storage Building, Delaware Valley Resource Recovery Facility, Drexel Neumann Academy, Edgemont Senior Apartments, Evonik Corporation, Excelon Front St Sub Station, Exelon Chester Generating Station, Exelon Lamokin Electric Substation, Faith Temple Christian School, Felton Fire Company, Frederick Douglass Christian School, Haven Kindergarten Academy, Institute Of Islamic Studies, J. Lewis Crozer Library, Kimberly Clark Pa LLC, Murphy Ame Church, Norquay, LLC, PECO - Paper Tap Substation, PECO - Tilghman Street Gas Plant, PECO Booth St Sub Station, PECO Engle St Sub Station, PECO Flower St Sub Station, PECO Front St Sub Station, PECO Macdade Blvd Sub Station, PQ Corporation Chester, Ruth L Bennett Community Center, Saint Daniels U.M. Church, Shiloh Baptist Church, Shiloh Development Academy, Stem Academy at Showalter, Stetser Elementary School, Sun Ship Historic Marker, Sun Village Maintenance Garage, The Chester Upland School of The Arts, True Vine Missionary Full Gospel, Verizon Chester A Central Office, Verizon Chester B Central Office, Victory O/T World Baptist Church, WDNR Radio Tower, Wellington Ridge, West Phila Bronze Co Inc, Widener Child Development Center, Widener University - Kirkbride Hall, Widener University - Maintenance Yard, Widener University- Schwartz Center, William Penn Landing Site
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the topography around the Exelon Lamokin Electric Substation to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
ChesterC-9	
Location (address, lat/long)	Exelon Lamokin Electric Substation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the topography around the Widener University- Schwartz Century to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
ChesterC-10	
Location (address, lat/long)	Widener University- Schwartz Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Determine the vulnerability of Chester High School to levee failure and determine appropriate mitigation measures.
Action Number:	
ChesterC-11	
Location (address, lat/long)	Chester High School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Dam and Levee Failure
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the topography around the Evonik Corporation to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
ChesterC-12	
Location (address, lat/long)	Evonik Corporation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the topography around the Dutton Mill Rd Water Storage Facility to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
ChesterC-13	
Location (address, lat/long)	PECO Flower St Sub Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Chester City	Assess the property of the Center for Self-Development to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChesterC-14	
Location (address, lat/long)	Center for Self-Development
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the property of the Felton Fire Company to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChesterC-15	
Location (address, lat/long)	Felton Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the property of the NORQUAY, LLC to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChesterC-16	
Location (address, lat/long)	NORQUAY, LLC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the property of the PECO - Tilghman Street Gas Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChesterC-17	
Location (address, lat/long)	PECO - Tilghman Street Gas Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the property of the Saint Daniels U.M. Church to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChesterC-18	
Location (address, lat/long)	Saint Daniels U.M. Church
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess the property of the William Penn Landing Site to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ChesterC-19	
Location (address, lat/long)	William Penn Landing Site
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess and determine the best action to prevent flooding of roadways near Ridley Creek. The area east of Route 13/Morton Ave and north of 4th Street is particularly susceptible to flooding.
Action Number:	
ChesterC-20	
Location (address, lat/long)	area east of Route 13/Morton Ave and north of 4th Street
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator; PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess and determine the best action to prevent flooding of roadways near 14th St. & Kerlin St.
Action Number:	
ChesterC-21	
Location (address, lat/long)	14th St. & Kerlin St
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess and determine the best action to prevent flooding of roadways near the neighborhood of Parker Manor.
Action Number:	
ChesterC-22	
Location (address, lat/long)	Neighborhood of Parker Manor
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess and determine the best action to prevent flooding of roadways near the 300-block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291.
Action Number:	
ChesterC-23	
Location (address, lat/long)	The 300-block of Kerlin Street; Barclay Street; 3rd & Townsend; and 2nd & Booth/291
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess and determine the best action to prevent flooding of freight rail line serving the waterfront industries.
Action Number:	
ChesterC-24	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess stormwater management infrastructure at the Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant to determine what improvements need to be made, then implement the improvements.
Action Number:	
ChesterC-25	
Location (address, lat/long)	Delaware County Regional Water Control Authority (DELCORA) wastewater treatment plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Floods, Flash Floods, and Ice Jams; Hurricane, Tropical Storm, Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC; PA DCED FMP;
Timeline	Short
Lead Agency/Department	DELCORA
Support Agency(ies)/ Department(s)	Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Assess and determine the best action to mitigate future sea level rise and intense droughts that will cause the saltwater line to extend upstream from the Delaware Bay beyond Chester. Further investigation is needed to determine the future threat to Chester City industries with Delaware River water intakes.
Action Number:	
ChesterC-26	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Floods, Flash Floods, and Ice Jams; Hurricane, Tropical Storm, Nor'easter, Drought
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Planning
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Chester City's Department of Streets and Public Improvement garage to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-27	
Location (address, lat/long)	W. 2nd and Dock Streets
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Department of Streets and Public Improvement
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Protect the Chester City prison to at least the 0.2 percent annual chance flood level.
Action Number:	
ChesterC-28	
Location (address, lat/long)	Chester City Prison
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester City	Study the City of Chester's levee system, from 13th Street to 9th Street, along 14th Street parallel with Parker Street, and at the high school at 10th Street, just east of Parker Street.
Action Number:	
ChesterC-29	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Dam and Levee Failure
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	USACE; PA DEP; Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester Heights Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ChesterHeightsB-1	
Location (address, lat/long)	Chester Heights Camp Meeting, Chester Heights Fire Company, Old St Thomas at Ivy Mills Historic District, Saint Thomas the Apostle School,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester Heights Borough	Discuss with the property owners located within the flood zone to keep property clear of material
Action Number:	
ChesterHeightsB-2	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester Township	Relocate a SWDCMA pump station from the floodway of Chester Creek; elevate the pump station above the base flood elevation and flood proof the structure as appropriate.
Action Number:	
ChesterT-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam ; Environmental Hazards (Hazardous Materials Release)
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Southwest Delaware County Municipal Authority Capital Fund; FEMA HMGP, BRIC, FMA; PA DCED FMP
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Chester Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ChesterT-2	
Location (address, lat/long)	Alloy Surfaces Company Incorporated, Aston Facility, Chester Community Charter School, Chester Community Charter School Aston Campus, Chester Community Charter School West Campus, Chester Township Police Department, Chester Twp Administration Building, Cintas Corporation 100, Comcast Cable-Wallingford Headend, Feltonville Fire Company, Hachik Distributors Inc, PECO Bethel Rd Sub Station, Pyromet, Sunoco Partners Marketing & Terminals, L.P. - Marcus Hook Tank Farm, Toby Farms Elementary School, Toby Farms Intermediate School, Toby Farms Nursery School, Westrock Cp, LLC,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Clifton Heights Borough	Protect the LifeWorks School to at least the 0.2 percent annual chance flood level.
Action Number:	
CliftonHeightsB-1	
Location (address, lat/long)	W. 2nd and Dock Streets
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Clifton Heights Borough	Assess the topography around the LifeWorks School to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
CliftonHeightsB-2	
Location (address, lat/long)	LifeWorks School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Clifton Heights Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
CliftonHeightsB-3	
Location (address, lat/long)	Clifton Heights Borough Hall, Clifton Heights Fire Company, Clifton Heights Police Department, Lifeworks School, McFadden Park, Nicholas School, PECO Maddison Ave Sub Station, Saint Mark's Christian School, Today's Child Community Center, Today's Child Learning Center,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Collingdale Borough	Evaluate Borough's capabilities to respond to urban fires and explosions and make recommendations to increase capabilities.
Action Number:	
CollingdaleB-1	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Urban Fire and Explosion
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Collingsdale Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
CollingdaleB-2	
Location (address, lat/long)	Airgas - Collingdale, BR20 Collingdale, Christ Memorial Classical Academy, Collingdale Community Center, Collingdale Fire Company # 1, Collingdale Fire Company # 2, Collingdale Nazarene Church, Collingdale Police Department, Collingdale Public Library, Harris Elementary, Harris School, Multi-Flex Plating Company, Southeast Academy, Ted Direnzo Montessori School, The Children's Garden,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Colwyn Borough	Reduce urban fire hazard in Colwyn Borough by adding accessible routes for the handicapped in row home areas without existing handicap ramps or sidewalks.
Action Number:	
ColwynB-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Urban fire and explosion
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	PA DCED; Operating Budget
Timeline	Short
Lead Agency/Department	Borough Engineer
Support Agency(ies)/ Department(s)	Code Enforcement Officer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Colwyn Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ColwynB-2	
Location (address, lat/long)	Colwyn Borough Hall, Colwyn Elementary School, Colwyn Fire Company # 1, Colwyn Police Department, Today's Child Learning Center,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Colwyn Borough	Conduct Flood Study at the confluence of Darby Creek and Cobbs Creek.
Action Number:	
ColwynB-3	
Location (address, lat/long)	Darby Creek & Cobbs Creek
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; Planning; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Colwyn Borough	Purchase a backup generator for the police station.
Action Number:	
ColwynB-4	
Location (address, lat/long)	222 Spruce Street
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Utility Interruption
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Police Department
Support Agency(ies)/ Department(s)	Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Protect the Concord Twp Sewage Treatment Plant 1 to at least the 0.2 percent annual chance flood level.
Action Number:	
ConcordT-1	
Location (address, lat/long)	Concord Twp Sewage Treatment Plant 1
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Protect the Fox Valley Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.
Action Number:	
ConcordT-2	
Location (address, lat/long)	Fox Valley Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the topography around the Refresco Beverages US INC to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
ConcordT-3	
Location (address, lat/long)	Refresco Beverages US INC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Aardvark Child Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-4	
Location (address, lat/long)	Aardvark Child Care and Learning Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Concord Township	Assess the property of the Brandywine Youth Club to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-5	
Location (address, lat/long)	Brandywine Youth Club
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Concord Elementary School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-6	
Location (address, lat/long)	Concord Elementary School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Concord Township Historical Commission to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-7	
Location (address, lat/long)	Concord Township Historical Commission
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Concord Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-8	
Location (address, lat/long)	Concord Township Municipal Building
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Concord Twp Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-9	
Location (address, lat/long)	Concord Twp Sewage Treatment Plant 1
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Fox Valley Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-10	
Location (address, lat/long)	Fox Valley Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Garnet Valley Elementary School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-11	
Location (address, lat/long)	Garnet Valley Elementary School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Garnet Valley Middle School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-12	
Location (address, lat/long)	Garnet Valley Middle School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the KinderCare Learning Center to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-13	
Location (address, lat/long)	KinderCare Learning Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Assess the property of the Refresco Beverages Us Inc to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ConcordT-14	
Location (address, lat/long)	Refresco Beverages Us Inc
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Concord Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ConcordT-15	
Location (address, lat/long)	Aardvark Child Care and Learning Center, AT&T-Concordville, Brandywine Specialty Care, Brandywine Youth Club Brinton Manor, CarSense Glen Mills, Concord Beverage Water Tower, Concord Elementary School, Concord Township Historical Commission, Concord Township Municipal Building, Concord Twp Sewage Treatment Plant 1, Concord Twp Sewage Treatment Plant 2, Concordville Fire Association, Continuing Care at Maris Grove, Costco Wholesale #1114, Fox Hill Farms, Fox Valley Sewage Treatment Plant, Garnet Valley High School, Garnet Valley Middle School, Garnett Valley Sewage Treatment Plant, KinderCare Learning Center, Maris Grove, Nicholas Newlin Foundation, PECO Spring Valley Rd Sub Station, Pennington Center, Refresco Beverages Us Inc, Southco Sewage Treatment Plant, St Johns Episcopal Church, Target Store T-2172
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Stabilize flood damaged residences in the municipality through use of tie-backs and relocation of living residences and utilities to first floors.
Action Number:	
DarbyB-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Discuss with owners of AT&T to protect their property to at least the 0.2 percent annual chance flood level.
Action Number:	
DarbyB-2	
Location (address, lat/long)	AT&T
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Assess the topography around the AT&T property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
DarbyB-3	
Location (address, lat/long)	AT&T
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Assess the topography around the Darby Borough Recreation Center to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
DarbyB-4	
Location (address, lat/long)	Darby Borough Recreation Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Borough Engineer
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Assess the topography around the Park Lane Elementary School to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
DarbyB-5	
Location (address, lat/long)	Park Lane Elementary School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
DarbyB-6	
Location (address, lat/long)	Aardvark Child Care and Learning Center, AT&T-Concordville, Brandywine Specialty Care, Brandywine Youth Club Brinton Manor, CarSense Glen Mills, Concord Beverage Water Tower, Concord Elementary School, Concord Township Historical Commission, Concord Township Municipal Building, Concord Twp Sewage Treatment Plant 1, Concord Twp Sewage Treatment Plant 2, Concordville Fire Association, Continuing Care at Maris Grove, Costco Wholesale #1114, Fox Hill Farms, Fox Valley Sewage Treatment Plant, Garnet Valley High School, Garnet Valley Middle School, Garnett Valley Sewage Treatment Plant, KinderCare Learning Center, Maris Grove, Nicholas Newlin Foundation, PECO Spring Valley Rd Sub Station, Pennington Center, Refresco Beverages Us Inc, Southco Sewage Treatment Plant, St Johns Episcopal Church, Target Store T-2172
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Conduct flood study along Darby Creek.
Action Number:	
DarbyB-7	
Location (address, lat/long)	Darby Creek.
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; Planning; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Borough	Conduct flood study along Cobbs Creek.
Action Number:	
DarbyB-8	
Location (address, lat/long)	Cobbs Creek.
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; Planning; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Township	Protect the Darby Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.
Action Number:	
DarbyT-1	
Location (address, lat/long)	Darby Twp Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Township	Protect the Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm to at least the 0.2 percent annual chance flood level.
Action Number:	
DarbyT-2	
Location (address, lat/long)	Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Darby Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
DarbyT-3	
Location (address, lat/long)	Ashland Middle School, Briarcliffe Fire Company, Bumble Bee Preschool and Kindergarten, Darby Township Community Center, Darby Township Elementary School, Darby Township Fire Company, Darby Township Historical Commission, Darby Township Old Municipal Building, Darby Township Police Department, Darby Township School, Darby Twp Sewage Treatment Plant, Evangel Assembly of God Church, Goodwill Fire Company, Kindergarten Center, Sunoco Partners Marketing & Terminals, L.P. - Darby Creek Tank Farm
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
East Lansdowne Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
EastLansdowneB-1	
Location (address, lat/long)	East Lansdowne Basic School, East Lansdowne Borough Hall, East Lansdowne Elementary School, East Lansdowne Fire Company # 1, East Lansdowne Police Department, Vision Academy Charter School,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Eddystone Borough	Protect the PECO 7TH ST SUB STATION to at least the 0.2 percent annual chance flood level.
Action Number:	
EddystoneB-1	
Location (address, lat/long)	PECO 7TH ST SUB STATION
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Eddystone Borough	Assess the topography around the PECO - Baldwin Service Building property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
EddystoneB-2	
Location (address, lat/long)	The PECO - Baldwin Service Building
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Eddystone Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
EddystoneB-3	
Location (address, lat/long)	Baker Petrolite, Boeing Sub Station, Del Monte Fresh Produce Company, Eddystone Elementary School, Eddystone Fire Company, Eddystone Police Department, Exelon Fire and Rescue, Exelon Power Plant, Liberty Electrical Company Electrical Plant, Liberty Electric Power LLC, Light House Hall, PECO 7TH St Sub Station, PECO - Baldwin Service Building, Penn Terminals, LLC,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Edgemont Fire Company to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-1	
Location (address, lat/long)	Edgemont Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Edgmont Township Municipal Building to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-2	
Location (address, lat/long)	Edgmont Township Municipal Building
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Edgemont USARC to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-3	
Location (address, lat/long)	Edgemont USARC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the El Buen Samaritano Church to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-4	
Location (address, lat/long)	El Buen Samaritano Church
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Health Care Ctr at White Horse Village to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-5	
Location (address, lat/long)	Health Care Ctr at White Horse Village
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Neumann University to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-6	
Location (address, lat/long)	Neumann University
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the PECO Graddyville Rd Sub Station to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-7	
Location (address, lat/long)	PECO Graddyville Rd Sub Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Runnymeade Farms Sewage Treatment Plant 1 to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-8	
Location (address, lat/long)	Runnymeade Farms Sewage Treatment Plant 1
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Runnymeade Farms Sewage Treatment Plant 2 to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-9	
Location (address, lat/long)	Runnymeade Farms Sewage Treatment Plant 2
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Runnymeade Farms Sewage Treatment Plant 4 to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-10	
Location (address, lat/long)	Runnymeade Farms Sewage Treatment Plant 4
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the US Army Reserve Base Sewer Treatment Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-11	
Location (address, lat/long)	US Army Reserve Base Sewer Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the property of the Whitehorse Village Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
EdgemontT-12	
Location (address, lat/long)	Whitehorse Village Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Assess the topography around the Colonial Pennsylvania Plantation property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
EdgemontT-13	
Location (address, lat/long)	Colonial Pennsylvania Plantation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Edgmont Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
EdgemontT-14	
Location (address, lat/long)	Edgemont Fire Company, Edgemont USARC, Edgmont Township Municipal Building, El Buen Samaritano Church, Health Care Ctr At White Horse Village, Neumann University, PECO Graddyville Rd Sub Station, Runnymeade Farms Sewage Treatment Plant 2, Runnymeade Farms Sewage Treatment Plant 4, US Army Reserve Base Sewer Treatment Plant, Whitehorse Village Sewage Treatment Plant,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Folcroft Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
FolcroftB-1	
Location (address, lat/long)	Bullen Companies, Cork Industries, INC., Delcroft Elementary School, East Penn Manufacturing Co. Folcroft Fire Company # 1, Folcroft Police Department, Folcroft Public Library, Folcroft Union Church , KinderCare Learning Center, White Cap, Ltd. (WC186)
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Glenolden Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
GlenoldenB-1	
Location (address, lat/long)	Amtrak/Glenolden Substation, Glenolden Elementary School, Glenolden Fire Company # 1, Glenolden Historical Commission, Glenolden Library, Glenolden Police Department, PECO Knowles Ave Sub Station, PECO - Macdade Substation, Verizon Glenolden Co., Walter M. Senkow Elementary
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Glenolden Borough	Purchase a backup generator for the police station.
Action Number:	
GlenoldenB-2	
Location (address, lat/long)	38 E Boon Ave
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Utility Interruption
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Police Department
Support Agency(ies)/ Department(s)	Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township	Assess and determine the best action to prevent flooding of roadways near the apartment complex along the Darby Creek at West Chester Pike and Lawrence Road
Action Number:	
HaverfordT-1	
Location (address, lat/long)	West Chester Pike and Lawrence Road
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator; PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township	Assess the topography around the Haverford Township Administration Build property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
HaverfordT-2	
Location (address, lat/long)	Haverford Township Administration Build
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Township Engineer
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township	Assess the property of the Haverford Twp Community Center to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
HaverfordT-3	
Location (address, lat/long)	Haverford Twp Community Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
HaverfordT-4	
Location (address, lat/long)	American Legion Nunan-Slook 338, Annunciation Church, Armenian Martyrs Cong Church, Bon Air Fire Co., Bon Aire Fire Company, Brookline Fire CompanyBryn Mawr Extended Care Center, Bryn Mawr Terrace, Campbell Ave Water Storage Facility, Cardinal Foley School, Chatham Park Elementary School, Chestnutwold Elementary School, Child Guidance Elementary Ed. Program, Crestwood, Friendly Faces Day Care, Haverford College, Haverford Friends School, Haverford High School, Haverford Monthly Meeting Of Friends, Haverford Police Department, Haverford Township Administration Build, Haverford Township Historical Society, Haverford Township Middle School, Haverford Twp Community Center, Haverford Twp. Library, Havertown PCP Site, Keep Kindergarten, Kindred Hospital Philadelphia-Havertown, Little Eagle Daycare, Llanerch Fire Company, Lowe's Of Havertown (#3169), Lynnewood Elementary School, Manoa Community Church, Manoa Elementary School, Manoa Fire Company, Normandy Park Building, Oakmont Fire Company # 1, Old Haverford Friends Meeting, Old Sacred Heart School, PECO Eagle Rd Sub Station, PECO Landover Rd Sub Station, PECO West Chester Pike Sub Station, Play And Learn, Sacred Heart School, Saint Faith Preschool and Kindergarten, St James United Church of Christ, The Grange, Trinity Christian Church, Westgate Hills Rehab & Nursing Center, WHHS
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township	Develop Flood Mitigation Study for Wynnefield Drive (Cobbs Creek)
Action Number:	
HaverfordT-5	
Location (address, lat/long)	Wynnefield Drive (Cobbs Creek)
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Consultant
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Haverford Township	Discuss and assess with property owner in the flood zone about possible mitigation solutions including elevations and acquisitions
Action Number:	
HaverfordT-6	
Location (address, lat/long)	1744 Burmont Road
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Municipal EMC; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Lansdowne Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
LansdowneB-1	
Location (address, lat/long)	20th Century Club, Ardmore Avenue Elementary School, Historic Lansdowne Theater Corporation, Lansdowne Borough HARB, Lansdowne Fire Company, Lansdowne Friends School, Lansdowne Montessori School, Lansdonwe Police Department, Lansdowne Public Library, PECO Union Ave Sub Station, Penn Wood High School, Peppers Pharmacy, SS. Cyril & Philomena School, Today's Child Learning Center, Verizon Lansdowne Co (Pa24650)
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Lower Chichester Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
LowerChichesterT-1	
Location (address, lat/long)	Delaware Bay & River Cooperative Inc., Esschem INC., Honeywell International Inc., Linwood Elementary School, Linwood Fire Company, Linwood Youth Center, Lower Chichester Police Department, Nalco Water Pretreatment Solutions, PECO Laughead Ave Sub Station, PECO - Linwood Substation, PECO Ormond St Sub Station, Sonrise Christian Day School, Sun Oil Refinery Sub Station,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marcus Hook Borough	Protect the Marcus Hook Community Center to at least the 0.2 percent annual chance flood level.
Action Number:	
MarcusHookB-1	
Location (address, lat/long)	Marcus Hook Community Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marcus Hook Borough	Protect the Marcus Hook Energy Center to at least the 0.2 percent annual chance flood level.
Action Number:	
MarcusHookB-2	
Location (address, lat/long)	Marcus Hook Energy Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marcus Hook Borough	Protect the Sun Oil Fire Brigader to at least the 0.2 percent annual chance flood level.
Action Number:	
MarcusHookB-3	
Location (address, lat/long)	Sun Oil Fire Brigade
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marcus Hook Borough	Protect the Sunoco LLC - Race Fuels to at least the 0.2 percent annual chance flood level.
Action Number:	
MarcusHookB-4	
Location (address, lat/long)	Sunoco LLC - Race Fuels
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marcus Hook Borough	Protect the Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex to at least the 0.2 percent annual chance flood level.
Action Number:	
MarcusHookB-5	
Location (address, lat/long)	Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marcus Hook Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
MarcusHookB-6	
Location (address, lat/long)	Braskem / Marcus Hook, Marcus Hook Community Center, Marcus Hook Elementary, Marcus Hook Energy Center, Marcus Hook Fire Company, Marcus Hook Historical Commission, Marcus Hook Municipal Building , Marcus Hook Police Station, Marcus Hook Recreation Center, MARY M. CAMPBELL LIBRARY, PECO - Blueball Substation, PECO - Marcus Hook Substation, PECO - Post Substation, Plank House, Sun Oil Fire Brigade, Sunoco LLC - Race Fuels, Sunoco Partners Marketing & Terminals, L.P. Marcus Hook Industrial Complex, Viscose Fire Company
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marple Township	Assess the topography around the Broomall Rehabilitation and Nursing Center property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
MarpleT-1	
Location (address, lat/long)	Broomall Rehabilitation and Nursing Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marple Township	Assess the property of the Broomall Presbyterian Village to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MarpleT-2	
Location (address, lat/long)	Broomall Presbyterian Village
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Marple Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
MarpleT-3	
Location (address, lat/long)	1696 Thomas Massey House, AT&T, Broomall Fire Company, Broomall Manor, Broomall Presbyterian Village, Broomall Rehabilitation & Nursing Center, Cardinal O'Hara High School, Charles H. Russell Elementary School, Chesterbrook Academy, CHI Institute, Children In The Son Learning Center, Etta Natalie Rosenblatt Preschool, Grayson School, Hillview Nursery School, Jay W. Worrall Elementary School, Marple Historical Society, Marple Municipal Building, Marple Police Department, Marple Public Library, Marple Twp Water Storage Facility, Meadows At Martins Run, Miss Annette's Creative Nursery, Paxon Hollow Middle School, PECO Chester Pike Sub Station, PECO New Ardmore Ave Sub Station, PECO Reed Rd Sub Station, Saint Pius X School, Sproul Rd Water Storage Facility, St Luke Greek Orthodox Church, The Home Depot Store #4181, Wesley Enhanced Living Main Line Rehab and Skilled Nursing
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Media Borough	Provide for operable, storm shutters on portions of municipal government center used for emergency operations command center and civilian shelter.
Action Number:	
MediaB-1	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Hurricane, Tropical Storm, and Nor'easter; Winter Storm; and Tornado and Windstorm
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Media Borough	Assess the property of the Blue Route Vineyard Community Church to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MediaB-2	
Location (address, lat/long)	Blue Route Vineyard Community Church
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Media Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
MediaB-3	
Location (address, lat/long)	AT&T, Blue Route Vineyard Community Church, Christ Episcopal Church Child Care Program, Crew Kids Choice Day Care & Learning Center, Ethel Mason Child Development Center, Heritage Commission of Delaware County, Media Borough HARB, Media Community Center, Media Elementary School, Media Fire Company, Media Historic Archives Commission, Media Police Department, Media Providence Friends School, Media Voter Services Center, Media-Upper Providence Library, Nativity BVM Church, PA Veterans Museum Media Amory, Sterling Health Care & Rehab Center, Today's Child Learning Center, Verizon MEDIA Co., Youth Way Water Storage Facility
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Children's Academy to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-1	
Location (address, lat/long)	Children's Academy
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Easter Seals of Southeastern Pa to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-2	
Location (address, lat/long)	Easter Seals of Southeastern Pa
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Fair Acres Geriatric Center to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-3	
Location (address, lat/long)	Fair Acres Geriatric Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Glenwood Elementary School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-4	
Location (address, lat/long)	Glenwood Elementary School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Hanson Aggregates PA LLC to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-5	
Location (address, lat/long)	Hanson Aggregates Pa LLC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Hunter Street Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-6	
Location (address, lat/long)	Hunter Street Water Storage Facility
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Rocky Run Fire Company to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-7	
Location (address, lat/long)	Rocky Run Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Middletown Free Library to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-8	
Location (address, lat/long)	Middletown Free Library
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Middletown Township	Assess the property of the Middletown Montessori School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-9	
Location (address, lat/long)	Middletown Montessori School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Middletown Municipal Building to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-10	
Location (address, lat/long)	Middletown Municipal Building
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Middletown Township Historical Society to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-12	
Location (address, lat/long)	Middletown Township Historical Society
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Middletown Township	Assess the property of the Middletown Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-13	
Location (address, lat/long)	Middletown Water Storage Facility
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Monticello House to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-14	
Location (address, lat/long)	Monticello House
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Oakbridge Terrace at Lima Estates to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-15	
Location (address, lat/long)	Oakbridge Terrace at Lima Estates
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the PECO Middletown Rd Sub Station 1 to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-16	
Location (address, lat/long)	PECO Middletown Rd Sub Station 1
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Riddle Hospital to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-17	
Location (address, lat/long)	Riddle Hospital
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Riddle Memorial Hospital to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-18	
Location (address, lat/long)	Riddle Memorial Hospital
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Riddle Memorial Hospital-Based SNF to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-19	
Location (address, lat/long)	Riddle Memorial Hospital-Based SNF
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Simon Youth Academy to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-20	
Location (address, lat/long)	Simon Youth Academy
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Assess the property of the Pennsylvania State University-Brandywine Campus to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-21	
Location (address, lat/long)	The Pennsylvania State University-Brandywine Campus
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Middletown Township	Assess the property of the Willowbrooke Court at Lima Estates to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
MiddletownT-22	
Location (address, lat/long)	Willowbrooke Court at Lima Estates
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Middletown Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
MiddletownT-23	
Location (address, lat/long)	Aqua Pa - Ridley Creek Water Treatment Plant, Children's Academy, Easterseals Southeastern Pennsylvania, Elwyn Davidson School, Fair Acres Geriatric Center, Glenwood Elementary School, Hanson Aggregates Pa LLC., Hunter Street Water Storage Facility, Indian Lane Elementary School, Lanchford Hall at Tyler Arboretum, Lenni Fire Company # 1, Lima Fire Company, Middletown Fire Company, Middletown Free Library, Middletown Montessori School, Middletown Municipal Building, Middletown Township Historical Society, Middletown Water Storage Facility, Monticello House, Oakbridge Terrace at Granite Farms Estates, Oakbridge Terrace at Lima Estates, PA State Police, Painter Library at Tyler Arboretum, PECO Baltimore Pike Sub Station, PECO Middletown Rd Sub Station 1, Penncrest High School, Riddle Memorial Hospital, Roosevelt Community Center, Simon Youth Academy, The Development Center at Elwyn, The Pennsylvania State University-Brandywine Campus, Wawa Beverage Company, Willowbrooke Court at Granite Farms Estates, Willowbrooke Court at Lima Estates
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Millbourne Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
MillbourneB-1	
Location (address, lat/long)	Millbourne Borough Hall, Milbourne Fire Company, Millbourne Police Department,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Morton Borough	Explore opportunities to improve pedestrian safety at the intersection of Route 420 and Yale/Morton Avenues (near railroad area).
Action Number:	
MortonB-1	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Transportation Accident
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget; PA DCED
Timeline	Short
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Morton Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
MortonB-2	
Location (address, lat/long)	Morton Borough Hall, Morton Fire Company, Morton Police DepartmentMorton Train Station, Step by Step Learning Center and Child Care
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Nether Providence Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
NetherProvidenceT-1	
Location (address, lat/long)	Garden City Fire Co 1, Garden City Fire Company, Helen Kate Furness Library, Media Shopping Center, Mother of Providence Regional Catholic School, Nether Providence Elementary School, Nether Providence Historical Commission, Nether Providence Historical Society, Nether Providence Middle School, Nether Providence Police Department, PECO Harvey Rd Sub Station, South Media Fire Company, Strath Haven High School, Strath Haven Middle School, Thomas Leiper House, Wallingford Elementary School, Wallingford Nursing & Rehabilitation Ctr, Wilson Of Wallingford Inc
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the topography around the Melmark School property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
NewtownT-1	
Location (address, lat/long)	Melmark School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the Garretts Way Day Care and Learning Center to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-2	
Location (address, lat/long)	Garretts Way Day Care and Learning Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the Malvern School of Newtown Square to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-3	
Location (address, lat/long)	Malvern School of Newtown Square
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the Newtown Square Penn Railroad Museum to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-4	
Location (address, lat/long)	Newtown Square Penn Railroad Museum
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the Newtown Twp. Water Storage Facility to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-5	
Location (address, lat/long)	Newtown Twp. Water Storage Facility
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the SAP AMERICA INC to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-6	
Location (address, lat/long)	SAP AMERICA INC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the Square Tavern to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-7	
Location (address, lat/long)	Square Tavern
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Assess the property of the WRNB Radio Tower to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
NewtownT-8	
Location (address, lat/long)	Square Tavern
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
NewtownT-9	
Location (address, lat/long)	BPG Real Estate Investors Straw Party 1, L.P., Chesterbrook Academy, Culbertson Elementary School, Delaware County Christian School, Garretts Way Day Care and Learning Center, Gauntlett Center, Lyondel Chemical Fire Brigade, Malvern School of Newtown Square, Marple-Newtown Senior High School, Netwon Township Police Department, Newtown Public Library, Newtown Square Fire Company # 1, Newtown Square Penn Railroad Museum, Newtown Square Presbyterian Nursery School, Newtown Twp. Water Storage Facility, Octagonal School at Dunwoody Village, Saint Anastasia School, Sap America Inc., Springton Lake Montessori School, Square Tavern, Stratford Friends School, The Episcopal Academy, Verizon Larchmont Co., William Hood Dunwoody Care Center, William S. Culbertson Elementary School, WRNB
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Develop and maintain local Stormwater Management Plan
Action Number:	
NewtownT-10	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	PA DCED
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Develop and maintain local Emergency Evacuation Plan
Action Number:	
NewtownT-11	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	PennDOT; LEPC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Newtown Township	Explore opportunities to improve pedestrian safety at the intersection of Terazzo Rd. to Chapel Rd.
Action Number:	
NewtownT-11	
Location (address, lat/long)	Terazzo Rd. to Chapel Rd.
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Transportation Accident
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget; PA DCED
Timeline	Short
Lead Agency/Department	Planning
Support Agency(ies)/ Department(s)	PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Norwood Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
NorwoodB-1	
Location (address, lat/long)	ABC & Me Learning Center, Equipment Trade Service Co Inc., Norwood Borough Hall, Norwood Elementary School, Norwood Fire Company, Norwood Historical Society Inc., Norwood Police Department, Norwood Public Library, VFW Post 7213
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Parkside Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ParksideB-1	
Location (address, lat/long)	Parkside Elementary School, Parkside Fire Company # 1, Parkside Police Department, PECO Houston Rd Sub Station
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Prospect Park Borough	Protect the Concord Township Sewer Department to at least the 0.2 percent annual chance flood level.
Action Number:	
ProspectParkB-1	
Location (address, lat/long)	Concord Township Sewer Department
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Prospect Park Borough	Assess the geology at the Morton Homestead property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
ProspectParkB-2	
Location (address, lat/long)	Morton Homestead
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Code Enforcement Officer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Prospect Park Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ProspectParkB-3	
Location (address, lat/long)	Concord Township Sewer Department, Interboro Athletic Field House, Interboro Kindergarten Academy, Interboro High School, Morton Homestead, Prospect Park Health & Rehab Residence, Prospect Park Police Department, Prospect Park Fire Company, Propect Park Elementary School, Prospect Park Historical Society, Prospect Park Library
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Radnor Township	Protect the Main Line Montessori to at least the 0.2 percent annual chance flood level.
Action Number:	
RadnorT-1	
Location (address, lat/long)	Main Line Montessori
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Radnor Township	Assess the topography around the Radnor Police Department property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
RadnorT-2	
Location (address, lat/long)	Radnor Police Department
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Township Engineer
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Radnor Township	Assess the property of the WYBF Radio Tower to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
RadnorT-3	
Location (address, lat/long)	WYBF Radio Tower
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Radnor Township	Assess the property of the Saint David's Episcopal Day School to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
RadnorT-4	
Location (address, lat/long)	Saint David's Episcopal Day School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Radnor Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
RadnorT-5	
Location (address, lat/long)	Academy Of Notre Dame De Namur, Agnes Irwin School, Archbishop Carroll High School, AT&T Corp, Cabrini University, Central Nursery School, Cheder Chabad, Hilltop Preparatory School, Ithan Elementary School, Jack M. Barrack Hebrew Academy, JUDITH CREED HORIZONS FOR ACHIEVING IND, Lane Montessori School, Main Line Classical Academy, Main Line Montessori, PECO Aldwyn Ln Sub Station, Radnor Elementary School, Radnor Fire Company, Radnor High School, Radnor Historical Society, Radnor Middle School, Radnor Police Department, RADNOR TOWNSHIP BUILDING, Radnor Township HARB, RADNOR TWP. LIBRARY, RADNOR UNITED METHODIST CHURCH, Saint David's Episcopal Day School, Saint Katharine Of Siena, ST MARY'S EPISCOPAL CHURCH, SULPIZIO GYMNASIUM, THE ROSEMONT PLAZA APTS, Valley Forge Military Academy, Verizon WAYNE CO (PA21170), Villanova University, W235AP Radio Tower, WAYNE CENTER, Wayne Elementary School, WAYNE PRESBYTERIAN CHURCH - 36001001-1, Wayne Presbyterian Nursery School, WXVU Radio Tower, WYBF Radio Tower
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Park Borough	Dredge silt from Ridley Park Lake.
Action Number:	
RidleyParkB-1	
Location (address, lat/long)	Ridley Park Lake
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Municipal Floodplain Administrator; PA DEP; PA DCNR
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Park Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
RidleyParkB-2	
Location (address, lat/long)	Christ Episcopal Church, Conner-Williams Nursing Home, Lakeview Elementary School, Ridley Middle School, Ridley Park Borough, Ridley Park Fire Company, Ridley Park HARB, Ridley Park Historical Commission, Ridley Park Historical Society, Ridley Park Library, Ridley Park Police Department, Saint James Regional Catholic School, Southco, Inc. - Concordville, Taylor Hospital, Verizon RIDLEY PARK CO (PA24320)
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Park Borough	Upgrade the Ward Street bridge to allow heavier traffic to travel on the road.
Action Number:	
RidleyParkB-3	
Location (address, lat/long)	Ward Street bridge
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Transportation Accident
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Long
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Modernize traffic lights at intersections that are hazardous for pedestrian crossing.
Action Number:	
RidleyT-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Transportation Accident
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	Operating Budget; Capital Improvements Budget; DVRPC
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Boeing Fire Brigade to at least the 0.2 percent annual chance flood level
Action Number:	
RidleyT-2	
Location (address, lat/long)	Boeing Fire Brigade
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Boeing - Philadelphia property to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.
Action Number:	
RidleyT-3	
Location (address, lat/long)	Boeing - Philadelphia
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Eddystone Generating Station to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.
Action Number:	
RidleyT-4	
Location (address, lat/long)	Eddystone Generating Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Eddystone Marine and Rail Terminal Company L.L.C to at least the 0.2 percent annual chance flood level and mitigate against sea level rise.
Action Number:	
RidleyT-5	
Location (address, lat/long)	Eddystone Marine and Rail Terminal Company L.L.C
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Sellers Ave. Sewage Treatment Plant to at least the 0.2 percent annual chance flood level.
Action Number:	
RidleyT-6	
Location (address, lat/long)	Sellers Ave Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Sure Power Philadelphia structure to at least the 0.2 percent annual chance flood level.
Action Number:	
RidleyT-7	
Location (address, lat/long)	Sure Power Philadelphia
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Protect the Water's Edge (Old Rookies River Rm) to at least the 0.2 percent annual chance flood level.
Action Number:	
RidleyT-8	
Location (address, lat/long)	Water's Edge (Old Rookies River Rm)
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Assess the geology at the Boeing - Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
RidleyT-9	
Location (address, lat/long)	Boeing - Philadelphia
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Code Enforcement Officer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Assess the geology at the Eddystone Generating Station property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
RidleyT-10	
Location (address, lat/long)	Eddystone Generating Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Code Enforcement Officer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Assess the geology at the Eddystone Marine and Rail Terminal Company L.L.C property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
RidleyT-11	
Location (address, lat/long)	Eddystone Marine and Rail Terminal Company L.L.C
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Code Enforcement Officer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Ridley Township	Assess the geology at the Sure Power Philadelphia property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
RidleyT-12	
Location (address, lat/long)	Sure Power Philadelphia
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Code Enforcement Officer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Ridley Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
RidleyT-13	
Location (address, lat/long)	Amosland Elementary School, Art of Growing Nursery School, Boeing - Philadelphia, Boeing Fire Brigade, Buxmont Academy/Woodlyn Center, Church of Atonement Day School, Church of Christ, Concordville Operations Center, Eddystone Generating Station, Eddystone Marine and Rail Terminal Company L.L.C, Fizzano Brothers Concrete Products, Inc., Folsom Fire Company, Grace Park Elementary, Grace Park School - 38002003-1, Holmes Fire Company, Holy Spirit Lutheran Church , Knights Of Columbus, Leedom Elementary School, Leedom Fire Company, Marine Corps Reserve Center Folsom, Maxim Crane Works L. P., Milmont Fire Company, Notre Dame De Lourdes, Our Lady of Angels Regional School, Our Lady of Fatima Church, PECO - Woodlyn Substation, PECO Chester City Sub Station, PECO Fairview Rd Sub Station, PECO Springfield Ave Sub Station, Ridley Community Center, Ridley High School, Ridley Township Police Department, Ridley Twp. Public Library, S.M. Vauclain Fire Company, Sellers Ave Sewage Treatment Plant, Sure Power Philadelphia, The Discovery Tree, The Home Depot Store #4142, Water's Edge (Old Rookies River Rm), Woodlyn Elementary School, Woodlyn Fire Company, WRSD Radio Tower, YMCA Ridley Area Children's Corner Kindergarten
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Rose Valley Borough	Protect the Old Mill Polling Site to at least the 0.2 percent annual chance flood level
Action Number:	
RoseValleyB-1	
Location (address, lat/long)	Old Mill Polling Site
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Rose Valley Borough	Assess the property of the School in Rose Valley to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
RoseValleyB-2	
Location (address, lat/long)	School in Rose Valley
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Rose Valley Borough	Assess the property of the Rose Valley Treatment Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
RoseValleyB-3	
Location (address, lat/long)	Rose Valley Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Rose Valley Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
RoseValleyB-4	
Location (address, lat/long)	Rose Valley Museum & Historical Society, Rose Valley Treatment Plant, The School in Rose Valley
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Rutledge Borough	Install an emergency generator at the Borough Hall to supply electric for an emergency evacuation center.
Action Number:	
RutledgeB-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Rutledge Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
RutledgeB-2	
Location (address, lat/long)	Rutledge Community Center and Rutledge Fire Company
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Sharon Hill Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
SharonHillB-1	
Location (address, lat/long)	Academy Park High School, ES OPCO USA LLC – PH, PECO Chester Pike Sub Station, PECO - Sharon-Hill Substation, Sharon Hill Elementary School, Sharon Hill Fire Company, Sharon Hill Historical Commission, Sharon Hill Historical Society, Sharon Hill Police Department, Sharon Hill Public Library, Today's Child Learning Center
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Springfield Township	Assess and determine the best action to prevent flooding of roadways from the Darby Creek, particularly West Rolling Road and Doe Run Lane are susceptible to flooding.
Action Number:	
SpringfieldT-1	
Location (address, lat/long)	West Rolling Road and Doe Run Lane
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP, Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Springfield Township	Protect the Littler Friends Child Care to at least the 0.2 percent annual chance flood level
Action Number:	
SpringfieldT-2	
Location (address, lat/long)	Littler Friends Child Care
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Springfield Township	Assess the topography around the Aqua Pa - Crum Creek Water Treatment Plant property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
SpringfieldT-3	
Location (address, lat/long)	Aqua Pa - Crum Creek Water Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Municipal EMC, Code Enforcement, Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Springfield Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
SpringfieldT-4	
Location (address, lat/long)	Aqua Pa - Crum Creek Water Treatment Plant, AQUA PA - Springfield Transportation Garage, Baltimore Pike Water Storage Facility, Bj's Wholesale Club #056, Church Of The Redeemer, E.T. Richardson Middle School, Friends Meetinghouse, Harlee Manor Nursing & Rehab Center, Harvey Sabold Elementary School, Holy Cross School, Life Discovery School Kindergarten, Littler Friends Child Care, New Destiny Christian Center, Office Suites At Stoney Creek, Old Central School, PECO - Morton Substation, PECO Baltimore Pike Sub Station, PECO Church Rd Sub Station, PECO Springfield Rd Substation, PECO Sproul Rd Sub Station, PECO Thomson Ave Sub Station, Public Works Building, Saint Francis Of Assisi School, Scenic Hills Elementary School, Scott Kia Of Springfield, Springfield Baptist Church, Springfield Country Club, Springfield Fire Company, Springfield Hanby Masonic Lodge 767, Springfield High School, Springfield Historical Society, Springfield Hospital, Springfield Hospital At The Healthplex, Springfield Library, Springfield Municipal Building, Springfield Police Department, Springfield Township Fire Co, Springfield Twp. Library, Target Store T-1136, Target Store T-2312, The Home Depot Store #4114, Tree Of Life Church, Verizon Springfield Co (Pa24690), West Ave Water Storage Facility
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Swarthmore Borough	Create and distribute an educational pamphlet about the Borough's floodplain regulations and the importance of floodplain regulations.
Action Number:	
SwarthmoreB-1	
Location (address, lat/long)	N/A
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Swathmore Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
SwarthmoreB-2	
Location (address, lat/long)	Cades, Friends Historical Library, George Crothers Memorial School at Cades, Swarthmore Borough Hall, Swarthmore Fire Company, Swarthmore Historical Society, Swarthmore Library, Swarthmore Police Department, Swarthmore-Rutledge School, The Kids Place, Trinity Cooperative Day Nursery, WSRN-FM
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Thornbury Township	Discuss and assess with the property owner the topography around the Home Depot Store #4121 property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
ThornburyT-1	
Location (address, lat/long)	Home Depot Store #4121
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Thornbury Township	Assess the property of the Bethlehem United Methodist Church to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ThornburyT-2	
Location (address, lat/long)	Bethlehem United Methodist Church
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Thornbury Township	Assess the property of the Stonybank Community Church to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ThornburyT-3	
Location (address, lat/long)	Stonybank Community Church
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Thornbury Township	Assess the property of the Home Depot Store #4121 to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ThornburyT-4	
Location (address, lat/long)	The Home Depot Store #4121
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Thornbury Township	Assess the property of the Thornbury Historical Society to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ThornburyT-5	
Location (address, lat/long)	Thornbury Historical Society
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Thornbury Township	Assess the property of the Thornbury Twp Sewage Treatment Plant to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
ThornburyT-6	
Location (address, lat/long)	Thornbury Twp Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Thornbury Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
ThornburyT-7	
Location (address, lat/long)	Bethlehem United Methodist Church, Cheyney College Sewage Treatment Plant, Glen Mills School, Glen Mills School Sewage Treatment Plant, Malvern School of Glen Mills, Stonybank Community Church, The Home Depot Store #4121, Thornbury Historical Commission, Thornbury Historical Society, Thornbury Township Municipal Bldg, Thornbury Twp Sewage Treatment Plant, Wzze
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the FAA to protect the FAA PHL ALSF at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-1	
Location (address, lat/long)	FAA PHL ALSF
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the FAA to protect the FAA PHL ATCT at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-2	
Location (address, lat/long)	FAA PHL ATCT
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Protect the Lester Fire Company to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-3	
Location (address, lat/long)	Lester Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the Messina Electric property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-4	
Location (address, lat/long)	Messina Electric - 45002000-1
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the Philadelphia Fuel Facility Inc property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-5	
Location (address, lat/long)	Philadelphia Fuel Facility Inc
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the Philadelphia International Airport property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-6	
Location (address, lat/long)	Philadelphia International Airport
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the PHL-CDF property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-7	
Location (address, lat/long)	PHL-CDF
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the SKC Hangar (Tenants Assoc.) property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-8	
Location (address, lat/long)	SKC Hangar (Tenants Assoc.)
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-9	
Location (address, lat/long)	Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Protect the Tinicum Police Department to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-10	
Location (address, lat/long)	Tinicum Police Department
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Protect the Tinicum Public Library to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-11	
Location (address, lat/long)	Tinicum Public Library
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Protect the Tinicum Twp Sewage Treatment Plant to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-12	
Location (address, lat/long)	Tinicum Twp Sewage Treatment Plant
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Protect the Tinicum Twp Water Storage Facility to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-13	
Location (address, lat/long)	Tinicum Twp Water Storage Facility
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the UNITED AIRLINES-PHL property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-14	
Location (address, lat/long)	UNITED AIRLINES-PHL
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Work with the owners to protect the Western Fumigation (B-2) property to at least the 0.2 percent annual chance flood level
Action Number:	
TinicumT-15	
Location (address, lat/long)	Western Fumigation (B-2)
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Discuss with the owners of the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property their risk and vulnerability to levee failure and possible protective measures.
Action Number:	
TinicumT-16	
Location (address, lat/long)	Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam, Levee Failure
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Discuss with the owners the geology at the FAA PHL ALSF property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
TinicumT-17	
Location (address, lat/long)	FAA PHL ALSF
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Discuss with the owners the geology at the Sunoco Partners M & T, L.P. - Fort Mifflin Terminal property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
TinicumT-18	
Location (address, lat/long)	Sunoco Partners M & T, L.P. - Fort Mifflin Terminal
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Discuss with the owners the geology at the UNITED AIRLINES-PHL property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
TinicumT-19	
Location (address, lat/long)	UNITED AIRLINES-PHL
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Assess the property of the Tinicum Township Fire Company to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
TinicumT-20	
Location (address, lat/long)	Tinicum Township Fire Co. #48
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Tinicum Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
TinicumT-21	
Location (address, lat/long)	Essington Fire Company, Esstech, Inc., FAA PHL ALSF, FAA PHL ATCT, Lester Fire Company, LOCAL 1776 I A M A W UNION HALL - 45004000-1, MESSINA ELECTRIC - 45002000-1, PECO ROUTE 291 SUB STATION, Philadelphia Air Hub, Philadelphia Fuel Facility Inc., Philadelphia International Airport, PHL-CDF, SKC Hangar (Tenants Assoc.), Sunoco Partners M & T, L.P. - Fort Mifflin Terminal, TINICUM MUNICIPAL BLDG - 45003000-1, Tinicum Police Department, TINICUM PUBLIC LIBRARY, Tinicum School, TINICUM TOWNSHIP FIRE CO. #48 - 45001000-1, Tinicum Township Historical Society, TINICUM TWP SEWAGE TREATMENT PLANT, TINICUM TWP WATER STORAGE FACILITY, UNITED AIRLINES-PHL, Western Fumigation (B-2)
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Relocate Borough Hall outside of the Marcus Hook Creek floodplain.
Action Number:	
TrainerB-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA BRIC, HMGP; PA DCED; DVRPC funding; Municipal Bond *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Mayor
Support Agency(ies)/ Department(s)	Public Works; Floodplain Administrator; Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Work with the owners to protect the Monroe Energy, LLC property to at least the 0.2 percent annual chance flood level
Action Number:	
TrainerB-2	
Location (address, lat/long)	Monroe Energy, LLC
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Work with the owners to protect the PECO - Trainer Substation property to at least the 0.2 percent annual chance flood level
Action Number:	
TrainerB-3	
Location (address, lat/long)	PECO - Trainer Substation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Protect the Trainer Police Department property to at least the 0.2 percent annual chance flood level
Action Number:	
TrainerB-4	
Location (address, lat/long)	Trainer Police Department
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Police Department
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Protect the Trainer Oil Refinery Sub Station property to at least the 0.2 percent annual chance flood level
Action Number:	
TrainerB-5	
Location (address, lat/long)	Trainer Oil Refinery Sub Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget *Project is currently not eligible for FEMA mitigation funding. The municipality did not participate in the planning process.*
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Assess the Trainer Oil Refinery Sub Station property their risk and vulnerability to levee failure and possible protective measures.
Action Number:	
TrainerB-6	
Location (address, lat/long)	Trainer Oil Refinery Sub Station
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam, Levee Failure
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Delaware County ES
Support Agency(ies)/ Department(s)	DPS, LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Discuss with the owners of the PECO - Trainer Substation property their risk and vulnerability to levee failure and possible protective measures.
Action Number:	
TrainerB-7	
Location (address, lat/long)	Trainer Oil Refinery Sub Station
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam, Levee Failure
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Assess the property of the Trainer Fire Company to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
TrainerB-8	
Location (address, lat/long)	Trainer Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Assess the property of the Conoco Phillips Fire and Rescue to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
TrainerB-9	
Location (address, lat/long)	Conoco Phillips Fire and Rescue
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Trainer Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
TrainerB-10	
Location (address, lat/long)	Congoleum Acquisitions, LLC., Congoleum Fire Brigade, Conoco Phillips Fire and Rescue, DELCORA - Western Regional Treatment Plant, Lennox Park Fire Company # 1, Monroe Energy, LLC., PECO - Trainer Substation, Trainer Community Center, Trainer Fire Company, Trainer Oil Refinery Sub Station, Trainer Police Department
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Protect the Caleb Pusey House to at least the 0.2 percent annual chance flood level
Action Number:	
UplandB-1	
Location (address, lat/long)	Caleb Pusey House
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Protect the Landingford Plantation to at least the 0.2 percent annual chance flood level
Action Number:	
UplandB-2	
Location (address, lat/long)	Landingford Plantation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Discuss and assess with the property owner the topography around the Upland Fire Company property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
UplandB-3	
Location (address, lat/long)	Upland Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
UplandB-4	
Location (address, lat/long)	Caleb Pusey House & Landingford Plantation, Cheshire House, Chester Community Charter School Upland, Crozer-Chester Medical Center, Main Street Elementary School, Upland Fire Company, Upland Baptist Church, Upland Borough Hall, Upland Police Department,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Upgrade the Kerlin Street Bridge in Upland Borough to allow more water to flow under it.
Action Number:	
UplandB-5	
Location (address, lat/long)	Kerlin Street Bridge in Upland Borough
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, FMA, BRIC; PennDOT; DVRPC; Operating Budget; Municipal Bond
Timeline	Long
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Evaluate and repair undermining of Upland Avenue near the Kerlin Street Bridge in Upland Borough.
Action Number:	
UplandB-6	
Location (address, lat/long)	Upland Avenue near the Kerlin Street Bridge in Upland Borough.
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC; Operating Budget
Timeline	Long
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Public Works
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upland Borough	Evaluate and upgrade the Maris Run culvert under 4th Street.
Action Number:	
UplandB-7	
Location (address, lat/long)	Maris Run at 4th Street
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Borough Public Safety Official
Support Agency(ies)/ Department(s)	Borough Public Works; Engineer
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Chichester Township	Work with PennDOT to mitigate flooding on I-95 at PA-452 (Exit 2)
Action Number:	
UpperChichesterT-1	
Location (address, lat/long)	I-95 at PA-452 (Exit 2)
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Chichester Township	Assess the need to repair or replace the culvert along Spring Run under Larkin Road that is experiencing flooding.
Action Number:	
UpperChichesterT-2	
Location (address, lat/long)	Along Spring Run under Larkin Road
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Chichester Township	Assess the need to repair or replace the culvert along East Branch of Naaman Creek under Larkin Road that is experience flooding.
Action Number:	
UpperChichesterT-3	
Location (address, lat/long)	Along East Branch of Naaman Creek under Larkin Road
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Chichester Township	Discuss with the owners of the Gehr Plastics Inc. property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level
Action Number:	
UpperChichesterT-4	
Location (address, lat/long)	Gehr Plastics Inc.
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Chichester Township	Discuss and assess with the property owner the topography around the Verizon CHESTER HEIGHTS CO property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
UpperChichesterT-5	
Location (address, lat/long)	Verizon CHESTER HEIGHTS CO
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Chichester Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
UpperChichesterT-6	
Location (address, lat/long)	Boothwyn Fire Co 1, Boothwyn Fire Company # 1, Chichester Historical Society, Chichester Kinderschool, Kiddie Kampus Learning Center, Kindercare Learning Center, Little Lambs Christian Kindergarten, Mt. Pleasant Nursery School, Ogden Fire Co., Ogden Fire Company, Reliance Hook & Ladder Company, Upper Chichester Community Service, Upper Chichester Municipal Bldg, Upper Chichester Police Department, W278AK
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Increase size of upstream impoundment areas for Cobbs Creek and Naylors Run.
Action Number:	
UpperDarbyT-1	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	PEMA; FEMA; PA DEP
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Conduct flood level monitoring along Naylor's Run Creek.
Action Number:	
UpperDarbyT-2	
Location (address, lat/long)	Multiple Locations
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam; Dam Failure
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; Planning; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Continue planning of dispersement locations as part of Disaster Relief Drug Distribution Program.
Action Number:	
UpperDarbyT-3	
Location (address, lat/long)	N/A
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Pandemic
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Township Manager
Support Agency(ies)/ Department(s)	Health; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss with the owners of the Idle Hour Tennis Club property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level
Action Number:	
UpperDarbyT-4	
Location (address, lat/long)	Idle Hour Tennis Club
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Assess the need to repair or replace the Naylors Run culvert
Action Number:	
UpperDarbyT-5	
Location (address, lat/long)	Naylors Run culvert
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss with the owners of the PECO Marshall Rd Sub Station property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level
Action Number:	
UpperDarbyT-6	
Location (address, lat/long)	PECO Marshall Rd Sub Station
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss with the owners of the PECO - Upper Darby Substation property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level
Action Number:	
UpperDarbyT-7	
Location (address, lat/long)	PECO - Upper Darby Substation
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss with the owners of the Speedway 6806 property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level
Action Number:	
UpperDarbyT-8	
Location (address, lat/long)	Speedway 6806
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss with the owners of the Swedish Cabin property their risk and vulnerability to flooding and possible protective measures to at least the 0.2 percent annual chance flood level
Action Number:	
UpperDarbyT-9	
Location (address, lat/long)	Swedish Cabin
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss and assess with the Upper Darby School District the topography around the Charles Kelly Elementary School property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
UpperDarbyT-10	
Location (address, lat/long)	Charles Kelly Elementary School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Upper Darby School District
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss and assess with the property owner the topography around the PECO MARSHALL RD SUB STATION property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
UpperDarbyT-11	
Location (address, lat/long)	PECO MARSHALL RD SUB STATION
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss and assess with the property owner the topography around the SEPTA VICTORY SHOP property to determine if mitigation measures are necessary, and how to implement those measures if they are.
Action Number:	
UpperDarbyT-12	
Location (address, lat/long)	SEPTA VICTORY SHOP
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Landslide
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Assess the property of the Upper Darby Historical Society to determine the risk from wildfires and vegetation to be cleared.
Action Number:	
UpperDarbyT-13	
Location (address, lat/long)	Upper Darby Historical Society
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Fire Department
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss and assess with property owners of the Speedway 6806 their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperDarbyT-14	
Location (address, lat/long)	Speedway 6806
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
UpperDarbyT-15	
Location (address, lat/long)	69th St Alliance Church - 16006004-1, Aardvark Child Care And Learning Center, Alverston Rd Water Storage Facility, Ancona Montessori School, Apple Pie Christian Academy, Aronomink Elementary School, Beverly Hills Middle School, Bywood Elementary School, Cardington Stonehurst Fire Company, Careview Community Church - 16007001-1, Charles Kelly Elementary School, Christ Lutheran Church - 16007003-1, Christ's Community Church - 16005008-1, COMCAST CABLE-Upper Darby OTN, Delaware Valley Steel, District Court 32-2-52 - 16002007-1, Drexel Hill Fire Company, Drexel Hill Middle School, Drexel Hill United Methodist Church - 16001005-1, DREXELBROOK BUILDING 10 - 16001006-1, DREXELBROOK COMMUNITY CENTER - 16001008-1, Face The Music Studio - 16003006-1, Fairy Tale Academy, Friends Of Sellers Hall, Garrettford Drexel Hill Fire Co - 16005006-1, Garrettford Elementary School, Highland Ave Water Storage Facility, Highland Park Elementary School, Highland Park Fire Company, Hillcrest Elementary School, Holy Child Academy, Isaac Garrett House, Little Friends Child Care And Kindergarten, Little Friends II Daycare & Learning Center, Llanerch Hills Chapel - 16003007-1, Masjid Al-Madinah Islamic Center - 16006002-1, Meenan Oil Co., Monsignor Bonner And Archbishop Prendergast High School, Mourning House At Arlington Cemetery, PECO - Llanerch Substation, PECO - Upper Darby Substation, PECO Garret Rd Sub Station, PECO Marshall Rd Sub Station, Pennock/Sellers Home At Sellers Memorial Library, Preschool Academy, Primos Elementary School, Primos/Secane Fire Company, Providence Rd Water Storage Facility, Saint Andrews School, Saint Bernadette School, Saint Dorothy School, Saint Eugene School, Saint Laurence, Sellers Library - Main Branch, Sellers Library Muni. Bldg., Sellers Library Primos Branch, Sellers Memorial Free Library - 16004002-1, SEPTA VICTORY SHOP, Sonshine Christian Academy, Speedway 6806, Stonehurst Elementary School, Swedish Cabin, The Discovery Tree, Tiny Miracles Learning Center, Treasure Island Academy - The Journey, Upper Darby Fire Company # 3, Upper Darby High School, Upper Darby Historical Commission, Upper Darby Historical Society, Upper Darby Kindergarten Center, Upper Darby Municipal Library - 16005003-1, Upper Darby Police Station, Upper Darby Township Welcome Center - 16007004-1, Upper Darby Twp Bldg Police Annex - 16006011-1, Upper Darby Twp Municipal Building - 16005010-1, Upper Darby Voter Services Center - Vc-3, Verizon KIRKLYN CO (PA24760), Verizon UPPER DARBY ACCTG BLDG (PA24150), Verizon Wireless - UPPER DARBY (ID:70010), Waste Management Delaware Vallley South, Watkins Senior Center Gym - 16006006-1, Westbrook Park Elementary School
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Darby Township	Conduct flood study along Nailors Run.
Action Number:	
UpperDarbyT-16	
Location (address, lat/long)	Nailors Run
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; Planning; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Explore projects to mitigate washout of Farnum Road from flooding.
Action Number:	
UpperProvidenceT-1	
Location (address, lat/long)	N/A
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA BRIC; Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	Engineer; Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss with PennDOT flooding concerns at Crum Creek Road off of State Road at the US-1-overpass and possible protective actions.
Action Number:	
UpperProvidenceT-2	
Location (address, lat/long)	Crum Creek Road off State Road at the US-1 overpass
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Public Works
Support Agency(ies)/ Department(s)	PennDOT; Floodplain Administrator
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss with the property owners of the Rose Tree Early Learning Center the geology of the property to determine if mitigation measures are necessary, and how to implement them if they are.
Action Number:	
UpperProvidenceT-3	
Location (address, lat/long)	Rose Tree Early Learning Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Subsidence and Sinkholes
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Engineer
Support Agency(ies)/ Department(s)	Facility Management
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss and assess with property owners of the Benchmark School their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-4	
Location (address, lat/long)	Benchmark School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Upper Providence Township	Assess property with District Court 32-2-46 and determine its risk from wildfires and vegetation to be cleared.
Action Number:	
UpperProvidenceT-5	
Location (address, lat/long)	District Court 32-2-46
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss and assess with property owners of the Reformation Lutheran Church their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-6	
Location (address, lat/long)	Reformation Lutheran Church
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Upper Providence Township	Discuss and assess with property owners of the RMH-HB/SNF nursing home their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-7	
Location (address, lat/long)	RMH-HB/SNF nursing home
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss and assess with property owners of the Rose Tree Early Learning Center their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-8	
Location (address, lat/long)	Rose Tree Early Learning Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss and assess with property owners of the Rose Tree Elementary School their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-9	
Location (address, lat/long)	Rose Tree Elementary School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Upper Providence Township	Discuss and assess with property owners of the Rose Tree Fire Company their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-10	
Location (address, lat/long)	Rose Tree Fire Company
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	**Action**
Upper Providence Township	Assess with Upper Providence Police Department property and determine its risk from wildfires and vegetation to be cleared.
Action Number:	
UpperProvidenceT-11	
Location (address, lat/long)	Upper Providence Police Department
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Police Department; Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss and assess with property owners of the Walden School their risk from wildfires and determine vegetation to be cleared.
Action Number:	
UpperProvidenceT-12	
Location (address, lat/long)	Walden School
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Fire Department
Support Agency(ies)/ Department(s)	Municipal EMC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Upper Providence Township	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
UpperProvidenceT-13	
Location (address, lat/long)	Aqua PA - Media WWTP, Benchmark School, District Court 32-2-46, Media Sewage Treatment Plant, PA Institute of Technology, PECO Middletown Rd Sub Station 2, Reformation Lutheran Church, Reformation Lutheran Church- Stay & Play Program, RMH-HB/SNF nursing home, Rose Tree Early Learning Center, Rose Tree Elementary School, Rose Tree Fire Company, Springton Lake Middle School, Upper Providence Police Department, Walden School
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Yeadon Borough	Discuss with the owners of the critical facilities vulnerable to a hazardous materials release the risk and possible protective measures.
Action Number:	
YeadonB-1	
Location (address, lat/long)	Bell Avenue Elementary School, Hydrol Chemical Company, Inc., Manorcare Health Services Mercy Fitzgerald, Penn Wood East Junior High School, Penn Wood High School Cypress Street Campus, William B. Evans Computer Magnet School, William B. Evans Elementary School, Yeadon Fire Company, Yeadon Police Department, Yeadon Public Library,
Mitigation Technique Category	Education and Awareness Programs (EAP)
Hazard(s) Addressed	Environmental Hazards - Hazardous Material Releases
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Operating Budget
Timeline	Short
Lead Agency/Department	Municipal EMC
Support Agency(ies)/ Department(s)	Emergency Services; LEPC
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Yeadon Borough	Conduct Flood Study along Cobbs Creek
Action Number:	
YeadonB-2	
Location (address, lat/long)	Cobbs Creek
Mitigation Technique Category	Local Plans and Regulations (LPR)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; USACE; Operating Budget
Timeline	Short
Lead Agency/Department	Floodplain Administrator
Support Agency(ies)/ Department(s)	Emergency Services; Planning; PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brandywine Conservancy and Museum of Art Special District	Protect the Brandywine Conservancy & Environmental Management Center to at least the 0.2 percent annual chance flood level.
Action Number:	
Brandywine-1	
Location (address, lat/long)	Brandywine Conservancy & Environmental Management Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMGP, BRIC, FMA; PA DCED FMP; Operating Budget
Timeline	Short
Lead Agency/Department	Facility Operator
Support Agency(ies)/ Department(s)	Township Floodplain Administrator; Municipal EMC; Emergency Services
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Municipality(ies):	Action
Brandywine Conservancy and Museum of Art Special District **Action Number:** Brandywine-2	Develop Brandywine Conservancy & Museum of Art flood study and determine all streams and tributaries with flow regimes that contribute to flood major flood events; evaluate the study areas soils, climate, population, land use, water quality, natural areas, and cultural resources; evaluate the historical and present flooding; and develop a hydrological model using the US Army Corps of Engineers HEC-RAS program. Using study area data, begin site selection and assessment for improvements to the study area to mitigation flooding.
Location (address, lat/long)	Brandywine Conservancy & Environmental Management Center
Mitigation Technique Category	Structure and Infrastructure Project (SIP)
Hazard(s) Addressed	Flood, Flash Flood, and Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	FEMA HMGP, BRIC; Operating Budget
Timeline	Short
Lead Agency/Department	Conservancy Management
Support Agency(ies)/ Department(s)	Township Floodplain Administrator
Project Point of Contact	
Name	Virginia Logan
Title	The Frolic Weymouth Executive Director and C.E.O
Agency/Department	Brandywine Conservancy & Museum of Art
Phone	(610) 388-8335
E-mail	executivedirector@brandywine.org

CRITICAL FACILITIES

Essential Facilities

Emergency Facilities

Table I-1. Emergency Facilities in Delaware County

Name	Address	Municipality	Bldg. Type
Community Hospital	2500 W. 9th St	Chester (C)	EMS
Mercy Fitzgerald Paramedics	1515 Lansdowne Ave	Darby (B)	EMS
Mercy-Fitzgerald Hospital	1500 Lansdowne Ave	Darby (B)	EMS
Haverford Township Paramedics	2325 Darby Rd	Haverford (Twp)	EMS
Marple Ambulance Corps	2590 Harding Ave	Marple (Twp)	EMS
Riddle Memorial Paramedics	1068 Baltimore Pike	Middletown (Twp)	EMS
Taylor Hospital paramedics	175 E. Chester Pike	Ridley Park (B)	EMS
Springfield EMS Corps	217 Saxer Ave	Springfield (Twp)	EMS
Springfield Hospital Paramedics	190 Sproul Rd	Springfield (Twp)	EMS
Crozer-Chester Paramedics	1 Medical Center Blvd	Upland (B)	EMS
Delaware County Hospital Paramedics	501 Lansdowne Ave	Upper Darby (Twp)	EMS
Concord Township EOC	43 Thornton Rd., Glen Mills, PA 19342	Concord (Twp)	EOC
Green Ridge Fire Company	Dutton Mill Rd	Aston (Twp)	Fire Station
Bethel Township Hose Company	3737 Foulk Rd	Bethel (Twp)	Fire Station
Brookhaven Fire Company	4218 Barlow Ave	Brookhaven (B)	Fire Station
Chester City Fire Company	E. 14th St	Chester (C)	Fire Station
Chester Fire Station 82 - 49002001-1	320 E 14th ST	Chester (C)	Fire Station
Felton Fire Company	429 Highland Ave	Chester (C)	Fire Station
Feltonville Fire Co - 07000002-1	2410 Concord Rd	Chester (Twp)	Fire Station
Chester Heights Fire Company	Llewellyn Rd	Chester Heights (B)	Fire Station
Clifton Heights Fire Company	20 West Baltimore Pike	Clifton Heights (B)	Fire Station
Collingdale Fire Department	510 Clifton Ave, Collingdale, PA 19023.	Collingdale (B)	Fire Station
Colwyn Fire Company # 1	3rd and Spruce St	Colwyn (B)	Fire Station
Concordville Fire Association	854 Concord Rd	Concord (Twp)	Fire Station
Darby Fire Company # 1	Quarry Street and Chester Pike	Darby (B)	Fire Station
Darby Fire Company # 2	Moore St & Chestnut St	Darby (B)	Fire Station
Briarcliffe Fire Company	767 Beech Ave	Darby (Twp)	Fire Station
Darby Township Fire Company	Greenhill Rd and Hook Rd	Darby (Twp)	Fire Station
Goodwill Fire Company	719 Cooke Ave	Darby (Twp)	Fire Station
East Lansdowne Fire Company # 1	155 Lexington Ave	East Lansdowne (B)	Fire Station
Eddystone Fire Company	1201 Saville Ave	Eddystone (B)	Fire Station
Excelon Fire and Rescue	1 Industrial Highway	Eddystone (B)	Fire Station
Edgemont Fire Company	1211 Gradyville Rd	Edgmont (Twp)	Fire Station
Folcroft Fire Company # 1	1674 Delmar Dr	Folcroft (B)	Fire Station
Glenolden Fire Company # 1	123 Chester Pike	Glenolden (B)	Fire Station
Bon Aire Fire Company	541 Royal Ave	Haverford (Twp)	Fire Station
Brookline Fire Company	1315 East Darby Rd	Haverford (Twp)	Fire Station
Llanerch Fire Company	107 West Chester Pike	Haverford (Twp)	Fire Station
Manoa Fire Company	115 South Eagle Rd	Haverford (Twp)	Fire Station

Name	Address	Municipality	Bldg. Type
Oakmont Fire Company # 1	21 West Benedict Ave	Haverford (Twp)	Fire Station
Lansdowne Fire Company	26 North Highland Ave	Lansdowne (B)	Fire Station
Linwood Fire Company	1540 Huddle Ave	Lower Chichester (Twp)	Fire Station
Marcus Hook Fire Company	801 Market Street	Marcus Hook (B)	Fire Station
Marcus Hook Fire Department - 24000004-1	617 10th St	Marcus Hook (B)	Fire Station
Sun Oil Fire Brigade	Sun Oil	Marcus Hook (B)	Fire Station
Viscose Fire Company	10th St and Penn Ave	Marcus Hook (B)	Fire Station
Broomall Fire Company	8 Malin Rd	Marple (Twp)	Fire Station
Media Fire Company	11 South Jackson St	Media (B)	Fire Station
Middletown Fire Company	425 south Middletown Rd	Middletown (Twp)	Fire Station
Rocky Run Fire Company	1174 West Baltimore Pike	Middletown (Twp)	Fire Station
Milbourne Fire Company	9 Park Ave	Millbourne (B)	Fire Station
Morton Fire Company	38 Alpha Ter	Morton (B)	Fire Station
Garden City Fire Co 1 - 34005001-1	412 Moore Rd	Nether Providence (Twp)	Fire Station
Garden City Fire Company	Moore Rd	Nether Providence (Twp)	Fire Station
South Media Fire Company	535 Washington Ave	Nether Providence (Twp)	Fire Station
Lyondel Chemical Fire Brigade	3801 West Chester Pike	Newtown (Twp)	Fire Station
Newtown Square Fire Company # 1	8 North Newtown Street Rd	Newtown (Twp)	Fire Station
Norwood Fire Company	26 Winona Ave	Norwood (B)	Fire Station
Parkside Fire Company # 1	107 West Roland Rd	Parkside (B)	Fire Station
Prospect Park Fire Company	East Lincoln Ave	Prospect Park (B)	Fire Station
Radnor Fire Company	121 South Wayne Ave	Radnor (Twp)	Fire Station
Boeing Fire Brigade	2 Industrial Highway	Ridley (Twp)	Fire Station
Folsom Fire Co 1 - 38008001-1	411 Sutton Ave	Ridley (Twp)	Fire Station
Folsom Fire Company	4th Ave and Sutton Ave	Ridley (Twp)	Fire Station
Holmes Fire Company	240 Holmes Ave	Ridley (Twp)	Fire Station
Leedom Fire Company	Darby Rd and Clymer Ave	Ridley (Twp)	Fire Station
Milmont Fire Company	714 Belmont Ave	Ridley (Twp)	Fire Station
S.M. Vauclain Fire Company	1137-1139 Haverford Ave	Ridley (Twp)	Fire Station
Woodlyn Fire Company	Fairview Rd and Grant Ave	Ridley (Twp)	Fire Station
Woodlyn Fire Company - 38007002-1	228 Fairview Road	Ridley (Twp)	Fire Station
Ridley Park Fire Company	Ward Street	Ridley Park (B)	Fire Station
Sharon Hill Fire Company	Sharon Ave	Sharon Hill (B)	Fire Station
Springfield Fire Company	225 Saxer Ave	Springfield (Twp)	Fire Station
Springfield Township Fire Co - 42004003-1	217 Saxer Ave	Springfield (Twp)	Fire Station
Swarthmore Fire Company	121 Park Ave	Swarthmore (B)	Fire Station
Tinicum Township Fire Company	99 Wanamaker Ave, Essington, PA 19029	Tinicum (Twp)	Fire Station
Congoleum Fire Brigade	Ridge Rd and Yates Ave	Trainer (B)	Fire Station
Conoco Phillips Fire and Rescue	4101 Post Rd	Trainer (B)	Fire Station
Lennox Park Fire Company # 1	1002 Chestnut St	Trainer (B)	Fire Station
Upland Fire Company	Upland Ave	Upland (B)	Fire Station
Upland Fire Company - 47000001-1	1 Auburn Drive	Upland (B)	Fire Station
Upper Chichester Fire Department	1405 Meetinghouse Rd, Boothwyn, PA 19061	Upper Chichester (Twp)	Fire Station
Cardington Stonehurst Fire Company	350 Harrison Ave	Upper Darby (Twp)	Fire Station
Drexel Hill Fire Company	323 Edmonds Ave	Upper Darby (Twp)	Fire Station
Garrettford Drexel Hill Fire Co - 16005009-1	Edmonds Ave & Randolph Rd	Upper Darby (Twp)	Fire Station

Name	Address	Municipality	Bldg. Type
Highland Park Fire Co - 16004010-1	20 Park Ave	Upper Darby (Twp)	Fire Station
Highland Park Fire Company	20 Park Ave	Upper Darby (Twp)	Fire Station
Primos Secane Fire Co - 16002006-1	Ashland & Secane Ave	Upper Darby (Twp)	Fire Station
Upper Darby Fire Company # 3	7241 West Chester Pike	Upper Darby (Twp)	Fire Station
Rose Tree Fire Company	Evergreen Ave	Upper Providence (Twp)	Fire Station
Yeadon Fire Company	600 Church Ln	Yeadon (B)	Fire Station
Aston Police Department	5021 Pennell Rd	Aston (Twp)	Police Station
Bethel Police Department	1082 Bethel Rd	Bethel (Twp)	Police Station
Brookhaven Police Department	2 Cambridge Rd	Brookhaven (B)	Police Station
Chester City Police Department	160 E. 7th St	Chester (C)	Police Station
Chester Township Police Department	1840 Harris St	Chester (Twp)	Police Station
Clifton Heights Police Department	30 S. Springfield Rd	Clifton Heights (B)	Police Station
Collingdale Police Department	800 MacDade Blvd	Collingdale (B)	Police Station
Colwyn Police Department	221 Spruce St	Colwyn (B)	Police Station
Darby Borough Police Department	821 Summit St	Darby (B)	Police Station
Darby Township Police Department	21 Bartram Ave	Darby (Twp)	Police Station
Darby Township Police Department	Hook Rd and Clifton Ave	Darby (Twp)	Police Station
East Lansdowne Police Department	155 Lexington Ave	East Lansdowne (B)	Police Station
Eddystone Police Department	1300 E. 12th St	Eddystone (B)	Police Station
Folcroft Police Department	1555 Elmwood Ave	Folcroft (B)	Police Station
Glenolden Police Department	38 Boon Ave	Glenolden (B)	Police Station
Haverford Police Department	1010 Darby Rd	Haverford (Twp)	Police Station
Lansdowne Police Department	12 E. Baltimore Ave	Lansdowne (B)	Police Station
Lower Chichester Police Department	1410 Market St	Lower Chichester (Twp)	Police Station
Marcus Hook	10th and Green St	Marcus Hook (B)	Police Station
Marple Police Department	225 S. Sproul Rd	Marple (Twp)	Police Station
Delaware County Sheriff's Department	210 West Front St, RM 101	Media (B)	Police Station
Media Police Department	301 Jackson St	Media (B)	Police Station
PA State Police	1342 W. Baltimore Pike	Middletown (Twp)	Police Station
Millbourne Police Department	9 Park Ave	Millbourne (B)	Police Station
Morton Police Department	500 Highland Ave	Morton (B)	Police Station
Nether Providence Police Department	214 Sykes Ln	Nether Providence (Twp)	Police Station
Netwon Township Police Department	209 Bishop Hollow Rd	Newtown (Twp)	Police Station
Norwood Police Department	10 W. Cleveland Ave	Norwood (B)	Police Station
Parkside Police Department	22 E. Elbon Rd	Parkside (B)	Police Station
Prospect Park Police Department	720 Maryland Ave	Prospect Park (B)	Police Station
Radnor Police Department	301 Iven Ave	Radnor (Twp)	Police Station
Ridley Township Police Department	100 E. MacDade Blvd	Ridley (Twp)	Police Station
Ridley Park Police Department	Ward St and Creswell St	Ridley Park (B)	Police Station
Sharon Hill Police Department	1116 Spring St	Sharon Hill (B)	Police Station
Springfield Police Department	50 Powell Rd	Springfield (Twp)	Police Station
Swarthmore Police Department	121 Park Ave	Swarthmore (B)	Police Station
Tinicum Police Department	629 N. governor Printz Blvd	Tinicum (Twp)	Police Station
Trainer Police Department	824 Main St	Trainer (B)	Police Station
Upland Police Department	224 Castle Ave	Upland (B)	Police Station
Upper Chichester Police Department	Furey Rd	Upper Chichester (Twp)	Police Station
Upper Darby Police Station	7236 West Chester Pike	Upper Darby (Twp)	Police Station
Upper Providence Police Department	935 Providence Rd	Upper Providence (Twp)	Police Station

Name	Address	Municipality	Bldg. Type
Yeadon Police Department	600 Church Ln	Yeadon (B)	Police Station

Source: Delaware County 2021
Notes:
EOC Emergency Operation Center
FD Fire department
PD Police department

Hospital and Medical Centers

Table I-2. Hospitals and Medical Centers in Delaware County

Name	Address	Municipality
Riddle Memorial Hospital	1068 Baltimore Pike	Middletown (Twp)
Taylor Hospital	1 Bartol Ave	Ridley Park (B)
Springfield Hospital at the Healthplex	190 Sproul Rd	Springfield (Twp)
Crozer-Chester Medical Center	1100 Upland Ave	Upland (B)
Delaware County Memorial Hospital	501 Lansdowne Ave	Upper Darby (Twp)

Source: Delaware County 2021

Schools

Table I-3. Schools in Delaware County

Name	Address	Municipality	Bldg. Type
Neumann College	1 Neumann Dr, Aston, PA 19014	Aston (Twp)	Higher Education
Widener University	1 University Pl, Chester, PA 19013	Chester (C)	Higher Education
Haverford College	370 Lancaster Ave, Haverford, PA 19041	Haverford (Twp)	Higher Education
Delaware County Community College	901 S. Media Line Rd, Media, PA 19063	Marple (Twp)	Higher Education
Pennsylvania State University Brandywine	25 Yearsley Mill Rd, Media, PA 19063	Middletown (Twp)	Higher Education
Cabrini College	610 King of Prussia Rd, Radnor, PA 19087	Radnor (Twp)	Higher Education
Eastern University	1300 Eagle Rd, St Davids, PA 19087	Radnor (Twp)	Higher Education
Valley Forge Military Academy	1001 Eagle Rd, Wayne, PA 19087	Radnor (Twp)	Higher Education
Villanova University	800 Lancaster Ave, Villanova, PA 19085	Radnor (Twp)	Higher Education
Delaware County Community College: Southeast Center	2000 Elmwood Avenue, Sharon Hill, PA 19*	Sharon Hill (B)	Higher Education
Swarthmore College	500 College Ave, Swarthmore, PA 19081	Swarthmore (B)	Higher Education
Cheyney University of PA	1837 University Cir, Cheyney, PA 19319	Thornbury (Twp)	Higher Education
Crozer Chester Medical School	1 Medical Center Blvd, Chester, PA 19013	Upland (B)	Higher Education
Delaware County Community College: Upper Darby Cen	1570 Garrett Road, Upper Darby, PA 19082	Upper Darby (Twp)	Higher Education
Pennsylvania Institute Of Technology	800 Manchester Ave, Media, PA 19063	Upper Providence (Twp)	Higher Education
Aldan Elementary School	1 N. Woodlawn Ave	Aldan (B)	School
Aldan Elementary School	1 North Woodlawn Avenue, Aldan, Pa 19018	Aldan (B)	School

Name	Address	Municipality	Bldg. Type
Aston DCIU Education Center	100 Crozerville Rd., Aston, PA 19014	Aston (Twp)	School
Aston Elementary School	900 Tyrens Rd	Aston (Twp)	School
Aston Elementary School	900 Tryens Rd, Aston, PA 19014	Aston (Twp)	School
Delaware County Technical School: Aston Campus	100 Crozerville Rd., Aston, PA 19014	Aston (Twp)	School
Holy Family Regional Catholic School	3265 Concord Rd, Aston, PA 19014	Aston (Twp)	School
Media Children's House	3301 Concord Rd, Aston, PA 19014	Aston (Twp)	School
Northerly Middle School	2850 Concord Rd	Aston (Twp)	School
Pennell Elementary School	3300 Richard Rd, Aston, PA 19014	Aston (Twp)	School
Sun Valley High School	2881 Pancoast Ave, Aston, PA 19014	Aston (Twp)	School
Bethel Springs Elementary School	3280 Foulk Rd, Garnet Valley, PA 19060	Bethel (Twp)	School
Christian Academy	4301 Chandler Dr, Brookhaven, PA 19015	Brookhaven (B)	School
Thomas Coeburn Elementary School	150 Coeburn Blvd	Brookhaven (B)	School
Saint Cornelius School	160 Ridge Road, Chadds Ford, PA 19317	Chadds Ford (Twp)	School
Chester Community Charter School East Campus	214 E 5th St, Chester, PA 19013	Chester (C)	School
Chester High School	200 W 9th St, Chester, PA 19013	Chester (C)	School
Drexel Neumann Academy	1901 Potter St, Chester, PA 19013	Chester (C)	School
Faith Temple Christian School	1007 W 7th St, Chester, PA 19013	Chester (C)	School
Frederick Douglass Christian School	700 Central Ave, Chester, PA 19013	Chester (C)	School
Institute Of Islamic Studies	1105 Concord Ave, Chester, PA 19013	Chester (C)	School
Shiloh Development Academy	703 Central Ave, Chester, PA 19013	Chester (C)	School
STEM Academy at Showalter	1100 W 10th St, Chester, PA 19013	Chester (C)	School
Stetser Elementary School	808 E 17th St, Chester, PA 19013	Chester (C)	School
The Chester Upland School of The Arts	501 W 9th St #1, Chester, PA 19013	Chester (C)	School
Chester Community Charter School Aston Campus	200 Commerce Drive, Aston, PA 19014	Chester (Twp)	School
Chester Community Charter School West Campus	2730 Bethel Rd, Chester, PA 19013	Chester (Twp)	School
Toby Farms Intermediate School	201 Bridgewater Rd, Brookhaven, PA 19015	Chester (Twp)	School
Saint Thomas The Apostle School	430 Valleybrook Rd, Glen Mills, PA 19342	Chester Heights (B)	School
LifeWorks School	4 Rockbourne Road, Clifton Heights, PA *	Clifton Heights (B)	School
Saint Mark's Christian School	436 N Oak Ave, Clifton Heights, PA 19018	Clifton Heights (B)	School
Christ Memorial Classical Academy	523 Clifton Ave. Collingdale, PA 19023	Collingdale (B)	School
Collingdale Nazarene Church	212 MacDade Blvd, Collingdale, PA 19023	Collingdale (B)	School

Name	Address	Municipality	Bldg. Type
Harris Elementary School	501 Sharon Ave	Collingdale (B)	School
Harris School	501 Sharon Avenue, Collingdale, PA 19023	Collingdale (B)	School
Southeast Academy		Collingdale (B)	School
Colwyn Elementary	211 Pine St, Darby, PA 19023	Colwyn (B)	School
Concord Elementary School	245 Bethel Rd	Concord (Twp)	School
Concord Elementary School	114 Station Rd, Glen Mills, PA 19342	Concord (Twp)	School
Garnet Valley Elementary School	599 Smithbridge Rd, Glen Mills, PA 19342	Concord (Twp)	School
Garnet Valley High School	552 Smithbridge Rd, Glen Mills, PA 19342	Concord (Twp)	School
Garnet Valley Middle School	599 Smithbridge Rd	Concord (Twp)	School
Garnet Valley Middle School	601 Smithbridge Rd, Glen Mills, PA 19342	Concord (Twp)	School
Pennington Center	245 BETHEL RD	Concord (Twp)	School
Blessed Virgin Mary School	1101 Main St, Darby, PA 19023	Darby (B)	School
Park Lane Elementary School	1300 Park Ln, Darby, PA 19023	Darby (B)	School
Penn Wood Middle School	121 Summit St, Darby, PA 19023	Darby (B)	School
Penn Wood West Junior High School	121 Summit St	Darby (B)	School
Walnut Street Elementary School	224 S 6th St, Darby, PA 19023	Darby (B)	School
Ashland Middle School	801 Ashland Ave	Darby (Twp)	School
Darby Township Elementary School	1 School Dr	Darby (Twp)	School
Darby Township School	801 W Ashland Ave, Glenolden, PA 19036	Darby (Twp)	School
Kindergarten Center	1 School Lane, Glenolden, PA 19036	Darby (Twp)	School
East Lansdowne Basic School	401 Emerson Ave	East Lansdowne (B)	School
East Lansdowne Elementary School	401 Emerson Ave, Lansdowne, PA 19050	East Lansdowne (B)	School
Vision Academy Charter School	716 Emerson Ave,, East Lansdowne, PA 19*	East Lansdowne (B)	School
Eddystone Elementary School	1410 9th St, Eddystone, PA 19022	Eddystone (B)	School
Delaware County Technical School: Folcroft Campus	701 Henderson Blvd., Folcroft, PA 19032	Folcroft (B)	School
Delcroft School	799 School Ln, Folcroft, PA 19032	Folcroft (B)	School
Glenolden School	150 N MacDade Blvd, Glenolden, PA 19036	Glenolden (B)	School
Walter M. Senkow Elementary	15 Lamont Ave #1430, Glenolden, PA 19036	Glenolden (B)	School
Cardinal Foley School	300 E Eagle Rd, Havertown, PA 19083	Haverford (Twp)	School
Chatham Park Elementary School	400 Allston Rd, Havertown, PA 19083	Haverford (Twp)	School
Chestnutwold Elementary School	630 Loraine St, Ardmore, PA 19003	Haverford (Twp)	School
Child Guidance Elementary Ed. Program	2000 Old West Chester Pike, Havertown, *	Haverford (Twp)	School
Coopertown Elementary School	800 Coopertown Rd, Bryn Mawr, PA 19010	Haverford (Twp)	School
Haverford Friends School	851 N Buck Ln, Haverford, PA 19041	Haverford (Twp)	School
Haverford High School	200 Mill Rd, Havertown, PA 19083	Haverford (Twp)	School

Name	Address	Municipality	Bldg. Type
Haverford Middle School	1701 Darby Rd, Havertown, PA 19083	Haverford (Twp)	School
Keep Kindergarten	153 N Eagle Rd, Havertown, PA 19083	Haverford (Twp)	School
Lynnewood Elementary School	1400 Lawrence Rd, Havertown, PA 19083	Haverford (Twp)	School
Manoa Elementary School	201 S Manoa Rd, Havertown, PA 19083	Haverford (Twp)	School
Oakmont Elementary School	50 E. Eagle Rd	Haverford (Twp)	School
Sacred Heart School	109 N. Manoa Rd., Havertown, PA 19083	Haverford (Twp)	School
Saint Faith Preschool And Kindergarten	1208 Allston Rd, Havertown, PA 19083	Haverford (Twp)	School
Ss. Colman-John Neumann School	372 Highland Ln, Bryn Mawr, PA 19010	Haverford (Twp)	School
Ardmore Avenue Elementary School	161 Ardmore Ave, Lansdowne, PA 19050	Lansdowne (B)	School
Lansdowne Friends School	110 N Lansdowne Ave, Lansdowne, PA 19050	Lansdowne (B)	School
Lansdowne Montessori School	109 S Lansdowne Ave, Lansdowne, PA 19050	Lansdowne (B)	School
Penn Wood High School - Green Ave Campus	100 Green Ave, Lansdowne, PA 19050	Lansdowne (B)	School
SS. Cyril & Philomena School	45 E. Baltimore Ave, Lansdowne, PA 19050	Lansdowne (B)	School
Linwood Elementary School	1403 Huddell Ave, Linwood, PA 19061	Lower Chichester (Twp)	School
Marcus Hook Elementary	711 Market St, Marcus Hook, PA 19061	Marcus Hook (B)	School
Cardinal O'Hara High School	1701 Sproul Rd, Springfield, PA 19064	Marple (Twp)	School
Charles H. Russell Elementary School	2201 Sproul Rd, Broomall, PA 19008	Marple (Twp)	School
Chi Institute	ROUTE 320 AND LAWRENCE RD	Marple (Twp)	School
Delaware County Technical High School: Marple Campus	85 N. Malin Road, Broomall, PA 19008	Marple (Twp)	School
Grayson School	35 N. Malin Road, Broomall, PA, 19008	Marple (Twp)	School
Loomis Elementary School	369 N Central Blvd, Broomall, PA 19008	Marple (Twp)	School
Paxon Hollow Middle School	815 Paxon Hollow Rd, Broomall, PA 19008	Marple (Twp)	School
Saint Pius X School	204 Lawrence Road, Broomall, PA 19008	Marple (Twp)	School
Worrall Elementary School	2979 Pennview Ave, Broomall, PA 19008	Marple (Twp)	School
Media Elementary School	120 E Front St, Media, PA 19063	Media (B)	School
Media Providence Friends School	125 W 3rd St, Media, PA 19063	Media (B)	School
Easterseals Southeastern Pennsylvania	468 N. Middletown Road, Media, PA 19063	Middletown (Twp)	School
Elwyn Davidson School	111 Elwyn Road, Media, PA 19063	Middletown (Twp)	School
Glenwood Elementary School	122 South Pennell Road, Media, PA 19063	Middletown (Twp)	School
Indian Lane Elementary School	309 S Old Middletown Rd, Media, PA 19063	Middletown (Twp)	School

Name	Address	Municipality	Bldg. Type
Middletown Montessori School	30 E Forge Rd, Media, PA 19063	Middletown (Twp)	School
Penncrest High School	134 Barren Rd, Media, PA 19063	Middletown (Twp)	School
Simon Youth Academy	134 Barren Road, Media, PA 19063	Middletown (Twp)	School
Delaware County Intermediate Unit	200 Yale Ave, Morton, PA 19070	Morton (B)	School
Mother of Providence Regional Catholic School	607 S Providence Rd, Wallingford, PA 19*	Nether Providence (Twp)	School
Nether Providence Elementary School	410 Moore Rd, Wallingford, PA 19086	Nether Providence (Twp)	School
Nether Providence Middle School	410 Moore Rd	Nether Providence (Twp)	School
Strath Haven High School	205 S Providence Rd, Wallingford, PA 19*	Nether Providence (Twp)	School
Strath Haven Middle School	200 S Providence Rd, Wallingford, PA 19*	Nether Providence (Twp)	School
Wallingford Elementary School	20 S Providence Rd, Wallingford, PA 190*	Nether Providence (Twp)	School
Culbertson Elementary School	3530 Goshen Rd, Newtown Square, PA 19073	Newtown (Twp)	School
Delaware County Christian School	462 Malin Rd, Newtown Square, PA 19073	Newtown (Twp)	School
Marple-Newtown High School	120 Media Line Rd, Newtown Square, PA	Newtown (Twp)	School
Marple-Newtown Junior High School	120 Media Line Rd	Newtown (Twp)	School
Marple-Newtown Senior High School	101 Media Line Rd	Newtown (Twp)	School
Melmark School	2600 Wayland Rd, Berwyn, PA 19312	Newtown (Twp)	School
Saint Anastasia School	3309 West Chester Pike, Newtown Square,*	Newtown (Twp)	School
Springton Lake Montessori School	4102 West Chester Pike, Newtown Square,*	Newtown (Twp)	School
Stratford Friends School	2 Bishop Hollow Rd, Newtown Square, PA *	Newtown (Twp)	School
The Episcopal Academy	1785 Bishop White Drive, Newtown Square*	Newtown (Twp)	School
William S. Culbertson Elementary School	3530 Goshen Rd	Newtown (Twp)	School
Norwood School	558 Seneca Ave, Norwood, PA 19074	Norwood (B)	School
Parkside Elementary School	3101 Edgmont Ave	Parkside (B)	School
Parkside Elementary School	2 E Forestview Rd, Brookhaven, PA 19015	Parkside (B)	School
Interboro High School	500 16th Ave, Prospect Park, PA 19076	Prospect Park (B)	School
Interboro Kindergarten Academy	900 Washington Ave, Prospect Park, PA 1*	Prospect Park (B)	School
Prospect Park School	901 Pennsylvania Ave, Prospect Park, PA*	Prospect Park (B)	School
Academy Of Notre Dame De Namur	560 Sproul Rd, Villanova, PA 19085	Radnor (Twp)	School
Agnes Irwin School	275 S Ithan Ave, Bryn Mawr, PA 19010	Radnor (Twp)	School
Archbishop Carroll High School	211 Matsonford Rd, Radnor, PA 19087	Radnor (Twp)	School
Cheder Chabad	276 S Bryn Mawr Ave, Bryn Mawr, PA 19010	Radnor (Twp)	School

Name	Address	Municipality	Bldg. Type
District Office Operations - RTSD	135 S Wayne Ave. Wayne, PA 19087	Radnor (Twp)	School
Hilltop Preparatory School	737 S Ithan Ave, Bryn Mawr, PA 19010	Radnor (Twp)	School
Ithan Elementary School	695 Clyde Rd, Bryn Mawr, PA 19010	Radnor (Twp)	School
Jack M. Barrack Hebrew Academy	272 S Bryn Mawr Ave, Bryn Mawr, PA 19010	Radnor (Twp)	School
Lane Montessori School	210 South Wayne Avenue, Wayne, PA 19087	Radnor (Twp)	School
Main Line Classical Academy	455 S Roberts Rd, Bryn Mawr, PA 19010	Radnor (Twp)	School
Main Line Montessori	459 Sproul Rd, Villanova, PA 19085	Radnor (Twp)	School
Radnor Elementary School	20 Matsonford Rd, Wayne, PA 19087	Radnor (Twp)	School
Radnor High School	130 King of Prussia Rd, Wayne, PA 19087	Radnor (Twp)	School
Radnor Middle School	131 S. Wayne Ave	Radnor (Twp)	School
Radnor Middle School	150 Louella Ave, Wayne, PA 19087	Radnor (Twp)	School
Radnor School Bus Depot	230 King of Prussia Rd. Radnor, PA 19087	Radnor (Twp)	School
Sacred Heart Academy	480 S Bryn Mawr Ave, Bryn Mawr, PA 19010	Radnor (Twp)	School
Saint Aloysius Academy	401 S Bryn Mawr Ave, Bryn Mawr, PA 19010	Radnor (Twp)	School
Saint David's Episcopal Day School	765 South Valley Forge Rd. Wayne, PA 19*	Radnor (Twp)	School
Saint Katharine Of Siena	116 S. Aberdeen Ave. Wayne, PA 19087	Radnor (Twp)	School
The Grayson School	211 Matsonford Rd. Radnor, PA 19087	Radnor (Twp)	School
Valley Forge Military Academy	1001 Eagle Rd, Wayne, PA 19087	Radnor (Twp)	School
Wayne Elementary School	651 W Wayne Ave, Wayne, PA 19087	Radnor (Twp)	School
Amosland Elementary School	549 Amosland Rd, Morton, PA 19070	Ridley (Twp)	School
Buxmont Academy/Woodlyn Center	1307 W. MacDade Blvd., Woodlyn, PA	Ridley (Twp)	School
Church Of Atonement Day School	FRANKLIN AVE AND AMOSLAND RD	Ridley (Twp)	School
Edgewood Elementary School	525 Edgewood Ave	Ridley (Twp)	School
Edgewood Elementary School	525 8th Ave, Folsom, PA 19033	Ridley (Twp)	School
Grace Park Elementary	1000 W. 7th St	Ridley (Twp)	School
Grace Park Elementary	1097 7th Ave, Swarthmore, PA 19081	Ridley (Twp)	School
Leedom Elementary School	620 E Chester Pike, Ridley Park, PA 190*	Ridley (Twp)	School
Notre Dame De Lourdes	990 Fairview Rd, Swarthmore PA 19081	Ridley (Twp)	School
Our Lady of Angels Regional School	2130 Franklin Ave, Morton, PA 19070	Ridley (Twp)	School
Ridley High School	901 Morton Ave, Folsom, PA 19033	Ridley (Twp)	School
Woodlyn Elementary School	1200 Colson Rd, Woodlyn, PA 19094	Ridley (Twp)	School

Name	Address	Municipality	Bldg. Type
Lakeview Elementary School	333 Constitution Terrace, Ridley Park, *	Ridley Park (B)	School
Ridley Middle School	400 Free Street, Ridley Park, PA 19078	Ridley Park (B)	School
Saint James Regional Catholic School	500 Tome St, Ridley Park, PA 19078	Ridley Park (B)	School
The School in Rose Valley	20 School Ln, Rose Valley, PA 19063	Rose Valley (B)	School
Academy Park High School	300 Calcon Hook Rd, Sharon Hill, PA 190*	Sharon Hill (B)	School
Sharon Hill Elementary School	701 Coates Ave	Sharon Hill (B)	School
E.T. Richardson Middle School	20 W Woodland Ave, Springfield, PA 19064	Springfield (Twp)	School
Harvey Sabold Elementary School	468 E Thomson Ave, Springfield, PA 19064	Springfield (Twp)	School
Holy Cross School	240 North Bishop Avenue, Springfield, P*	Springfield (Twp)	School
Life Discovery School Kindergarten	607 W Springfield Rd, Springfield, PA 1*	Springfield (Twp)	School
Saint Francis Of Assisi School	112 Saxer Ave, Springfield, PA 19064	Springfield (Twp)	School
Scenic Hills Elementary School	235 Hillview Dr, Springfield, PA 19064	Springfield (Twp)	School
Springfield High School	49 W Leamy Ave, Springfield, PA 19064	Springfield (Twp)	School
George Crothers Memorial School At Cades	401 Rutgers Ave, Swarthmore, PA 19081	Swarthmore (B)	School
Swarthmore-Rutledge School	100 College Ave, Swarthmore, PA 19081	Swarthmore (B)	School
Glen Mills School	185 Glen Mills Rd, Glen Mills, PA 19342	Thornbury (Twp)	School
Tinicum School Grades 1-8	91 Seneca St, Essington, PA 19029	Tinicum (Twp)	School
Chester Community Charter School Upland	11th & Main Street, Upland, PA 19015	Upland (B)	School
Main Street Elementary School	704 Main St, Upland, PA 19015	Upland (B)	School
Boothwyn Elementary	2128 Blueball Ave., Boothwyn, PA 19061	Upper Chichester (Twp)	School
Chichester High School	3333 Chichester Ave, Boothwyn, PA 19061	Upper Chichester (Twp)	School
Chichester Middle School	925 Meetinghouse Rd, Boothwyn, PA 19061	Upper Chichester (Twp)	School
Hilltop Elementary School	401 Cherry Tree Rd, Upper Chichester, P*	Upper Chichester (Twp)	School
Little Lambs Christian Kindergarten	700 Meetinghouse Rd, Boothwyn, PA 19061	Upper Chichester (Twp)	School
Mt. Pleasant Nursery School	101 WASHINGTON AVE	Upper Chichester (Twp)	School
Aronomink Elementary School	4611 Bond Ave, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Beverly Hills Middle School	1400 Garrett Road, Upper Darby, PA 19082	Upper Darby (Twp)	School
Bywood Elementary School	330 Avon Rd, Upper Darby, PA 19082	Upper Darby (Twp)	School
Charles Kelly Elementary School	3400 Dennison Ave, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Drexel Hill Middle School	3001 State Rd, Drexel Hill, PA 19026	Upper Darby (Twp)	School

Name	Address	Municipality	Bldg. Type
Garrettford Elementary School	3830 Garrett Rd, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Highland Park Elementary School	8301 West Chester Pike, Upper Darby, PA*	Upper Darby (Twp)	School
Hillcrest Elementary School	2601 Bond Ave, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Holy Child Academy	475 Shadeland Ave, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Monsignor Bonner and Archbishop Prendergast High School	403 N. Lansdowne Ave, Drexel Hill, PA 1*	Upper Darby (Twp)	School
Primos Elementary School	861 Bunting Ln, Primos, PA 19018	Upper Darby (Twp)	School
Saint Andrews School	535 Mason Ave, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Saint Bernadette School	1001 Turner Avenue, Drexel Hill, PA 190*	Upper Darby (Twp)	School
Saint Dorothy School	1225 Burmont Rd, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Saint Eugene School	110 S Oak Ave, Primos, PA 19018	Upper Darby (Twp)	School
Saint Laurence	8245 West Chester Pike, Upper Darby, PA*	Upper Darby (Twp)	School
Stonehurst Elementary School	7051 Ruskin Ln	Upper Darby (Twp)	School
Stonehurst Hills Elementary School	7051 Ruskin Ln, Upper Darby, PA 19082	Upper Darby (Twp)	School
Upper Darby High School	601 N Lansdowne Ave, Drexel Hill, PA 19*	Upper Darby (Twp)	School
Upper Darby Kindergarten Center	3200 State Rd, Drexel Hill, PA 19026	Upper Darby (Twp)	School
Westbrook Park Elementary School	199 Westbrook Dr, Clifton Heights, PA 1*	Upper Darby (Twp)	School
Benchmark School	2107 N Providence Rd, Media, PA 19063	Upper Providence (Twp)	School
Rose Tree Elementary School	1101 First Ave, Media, PA 19063	Upper Providence (Twp)	School
Saint Mary Magdalen	2430 North Providence Road | Media, PA *	Upper Providence (Twp)	School
Springton Lake Middle School	1900 N Providence Rd, Media, PA 19063	Upper Providence (Twp)	School
Walden School	901 N Providence Rd, Media, PA 19063	Upper Providence (Twp)	School
Bell Avenue Elementary School	1000 Bell Ave, Yeadon, PA 19050	Yeadon (B)	School
Penn Wood East Junior High School	600 Cypress Rd	Yeadon (B)	School
Penn Wood High School – Cypress Street Campus	600 Cypress St, Yeadon, PA 19050	Yeadon (B)	School
William B. Evans Elementary School	900 Baily Rd, Yeadon, PA 19050	Yeadon (B)	School

Source: Delaware County

Child Care Facilities

Table I-4 Child Care Facilities in Delaware County

Name	Address	Municipality
KinderCare Learning Center	5016 Pennell Rd, Aston PA 19014	Aston (Twp)
KinderCare Learning Center	201 Radio Park Ln, Brookhaven PA 19015	Brookhaven (B)
Goddard School	2 Hillman Drive, Chadds Ford, PA 19317	Chadds Ford (Twp)
Apple Pie Christian Academy	18 E 8th St, Chester, PA, 19013	Chester (C)

Name	Address	Municipality
Center for Self Development	1605 W 3rd St, Chester, PA 19013	Chester (C)
Haven Kindergarten Academy	800 Welsh St, Chester, PA 19013	Chester (C)
Widener Child Development Center	1800 Walnut St, Chester, PA 19013	Chester (C)
Nicholas School	31 N Diamond St, Clifton Heights, PA 19*	Clifton Heights (B)
Today's Child Learning Center	301 E Berkley Ave, Clifton Heights, PA *	Clifton Heights (B)
Ted Direnzo Montessori School	709 Bartram Ave, Collingdale, PA 19023	Collingdale (B)
The Children's Garden	600 Macdade Blvd, Darby, PA, 19023	Collingdale (B)
Today's Child Learning Center	328 Main Street, Colwyn, PA 19023	Colwyn (B)
Aardvark Child Care and Learning Center	335 Cheyney Rd, Glen Mills, PA, 19342	Concord (Twp)
KinderCare Learning Center	261 Brinton Lake Rd, Glen Mills PA 19342	Concord (Twp)
Love 'N' Learn Christian Preschool	256 Bethel Rd, Glen Mills, PA 19342	Concord (Twp)
Creative Minds Christian Academy	121 Ridge Ave, Darby, PA, 19023	Darby (B)
Tender Years Preschool	521 Walnut St, Darby, PA 19023	Darby (B)
The Children's Garden	301 N 3rd St, Darby, PA 19023	Darby (B)
Bumble Bee Preschool And Kindergarten	1015 Laurel Rd, Sharon Hill, PA 19079	Darby (Twp)
KinderCare Learning Center	6 School Ln, Folcroft PA 19032	Folcroft (B)
Friendly Faces Day Care	135 Myrtle Ave, Havertown, PA 19083	Haverford (Twp)
Little Eagle Daycare	1301 Maryland Avenue, Havertown, PA 190*	Haverford (Twp)
Play And Learn	560 Mill Rd, Havertown, PA 19083	Haverford (Twp)
Today's Child Learning Center	19 W Baltimore Ave, Lansdowne, Pa 19050	Lansdowne (B)
Sonrise Christian Day School	1627 Chichester Ave, Linwood, PA 19061	Lower Chichester (Twp)
Chesterbrook Academy	906 Media Line Rd, Newtown Square, PA 1*	Marple (Twp)
Children in the Son Learning Center	2220 Sproul Rd, Broomall, PA 19008	Marple (Twp)
Etta Natalie Rosenblatt Preschool	55 Church Lane, Broomall, PA 19008	Marple (Twp)
Hillview Nursery School	219 Parkview Drive, Broomall, PA 19008	Marple (Twp)
Miss Annette's Creative Nursery	801 Paxon Hollow Rd, Broomall, PA 19008	Marple (Twp)
Christ Episcopal Church Child Care Program	311 S. Orange St., Media, PA 19063	Media (B)
Crew Kids Choice Day Care & Learning Center	306 Manchester Ave., Media, PA 19063	Media (B)
Ethel Mason Child Development Center	111 Youth Way, Media, PA 19063	Media (B)
Today's Child Learning Center	317 Gayley Street, Media, PA 19063	Media (B)
Children's Academy	25 Middletown Rd, Media, PA 19063	Middletown (Twp)
The Development Center at Elwyn	111 Elwyn Rd., Elwyn, PA 19063	Middletown (Twp)
Step by Step Learning Center and Child Care	39 South Morton Avenue, Morton	Morton (B)
Chesterbrook Academy	3841 West Chester Pike, Newtown Square,*	Newtown (Twp)
Garretts Way Day Care And Learning Center	395 Bishop Hollow Rd, Newtown Square, P*	Newtown (Twp)
Malvern School Of Newtown Square	4731 West Chester Pike, Newtown Square,*	Newtown (Twp)
Newtown Square Presbyterian Nursery School	3600 Goshen Rd, Newtown Square, PA 19073	Newtown (Twp)
ABC & Me Learning Center	232 Chester Pike, Norwood, PA 19074	Norwood (B)
Central Nursery School	111 W Wayne Ave, Wayne, PA, 19087	Radnor (Twp)
Kids' Clubhouse of the Main Line	150 N Radnor Chester Rd. Ste. F130 Wayn*	Radnor (Twp)
Wayne Presbyterian Nursery School	125 E Lancaster Ave, Wayne, PA 19087	Radnor (Twp)
Art of Growing Nursery School	375 Holmes Rd, Holmes, PA 19043	Ridley (Twp)
The Discovery Tree	1312 MacDade Boulevard, Woodlyn, PA 190*	Ridley (Twp)
YMCA Ridley Area Children's Corner Kindergarten	900 South Ave, Secane, PA 19018	Ridley (Twp)
Today's Child Learning Center	235 Sharon Avenue, Sharon Hill, PA 19079	Sharon Hill (B)
Littler Friends Child Care	433 E Woodland Ave, Springfield, PA 190*	Springfield (Twp)
The Kids Place	104 College Ave	Swarthmore (B)
Trinity Cooperative Day Nursery	301 N. Chester Rd., Swarthmore, PA 19081	Swarthmore (B)
Malvern School Of Glen Mills	20 Creek Rd, Glen Mills, PA 19342	Thornbury (Twp)
Chichester Kinderschool	3913 Chichester Ave, Upper Chichester T*	Upper Chichester (Twp)
Kiddie Kampus Learning Center	4150 Market St, Aston, PA 19014	Upper Chichester (Twp)
KinderCare Learning Center	6 Creek Pkwy, Upper Chichester PA 19061	Upper Chichester (Twp)
Aardvark Child Care and Learning Center	739 Secane Avenue, Primos, PA 19018	Upper Darby (Twp)
Ancona Montessori School	5290 Townshipline Road, 19026	Upper Darby (Twp)

Name	Address	Municipality
Apple Pie Christian Academy	67 Long Lane, Upper Darby, PA 19082	Upper Darby (Twp)
Apple Pie Christian Academy	3 S State Road, Upper Darby, PA 19082	Upper Darby (Twp)
Fairy Tale Academy	8002 West Chester Pike, Upper Darby, PA*	Upper Darby (Twp)
Little Friends Child Care and Kindergarten	9107 West Chester Pike, Upper Darby, PA*	Upper Darby (Twp)
Little Friends II Daycare & Learning Center	4400 State Rd, Drexel Hill, PA 19026	Upper Darby (Twp)
Preschool Academy	150 Hampden Rd, Upper Darby, PA 19082	Upper Darby (Twp)
Sonshine Christian Academy	3601 Garrett Rd, Drexel Hill, PA 19026	Upper Darby (Twp)
The Discovery Tree	4814 Drexelbrook Drive, Drexel Hill, PA*	Upper Darby (Twp)
Tiny Miracles Learning Center	101 S Oak Ave, Primos, PA 19018	Upper Darby (Twp)
Treasure Island Academy - The Journey	6908 Market St, Upper Darby, PA 19082	Upper Darby (Twp)
Reformation Lutheran Church- Stay & Play Program	102 W. Rose Tree Rd., Media, PA 19063	Upper Providence (Twp)
Rose Tree Early Learning Center	145 W. Rose Tree Road, Media, PA 19063	Upper Providence (Twp)

Source: Delaware County 2021

Senior Care and Senior Living Facilities

Table I-5 Senior Facilities in Delaware County

Name	Address	Municipality
Naamans Creek Country Manor	1194 Naamans Creek Road	Bethel (Twp)
Belvedere Center Genesis Healthcare	2507 Chestnut Street	Chester (C)
Brinton Manor	549 Baltimore Pike	Concord (Twp)
Continuing Care At Maris Grove	500 Maris Grove Way	Concord (Twp)
Little Flower Manor	1201 Springfield Road	Darby (B)
St Francis Country House	1412 Lansdowne Avenue	Darby (B)
Health Care Ctr at White Horse Village	535 Gradyville Road	Edgmont (Twp)
Bryn Mawr Extended Care Center	956 Railroad Avenue	Haverford (Twp)
Bryn Mawr Terrace	773 E. Haverford Road	Haverford (Twp)
Crestwood	1401 Virginia Avenue	Haverford (Twp)
Quadrangle	3300 Darby Road	Haverford (Twp)
Westgate Hills Rehab & Nursing Center	2050 Old West Chester Pike	Haverford (Twp)
Broomall Manor	43 Church Lane	Marple (Twp)
Broomall Presbyterian Village	146 Marple Road	Marple (Twp)
Broomall Rehabilitation & Nursing Center	50 North Malin Road	Marple (Twp)
Meadows At Martins Run	11 Martins Run	Marple (Twp)
Wesley Enhanced Living Main Line Rehab And Skd Nursing	100 Halcyon Drive	Marple (Twp)
Sterling Health Care & Rehab Center	318 South Orange Street	Media (B)
Fair Acres Geriatric Center	340 N Middletown Road Po Box 488	Middletown (Twp)
Monticello House	1048 West Baltimore Pike	Middletown (Twp)
Oakbridge Terrace At Granite Farms Estates	1343 W Baltimore Pike	Middletown (Twp)
Oakbridge Terrace At Lima Estates	411 N Middletown Road	Middletown (Twp)
Riddle Memorial Hospital-Based SNF	1078 West Baltimore Pike	Middletown (Twp)
Willowbrooke Court At Granite Farms ESTS	1343 West Baltimore Pike	Middletown (Twp)
Willowbrooke Court At Lima Estates	411 North Middletown Road	Middletown (Twp)
Wallingford Nursing & Rehabilitation Ctr	115 South Providence Road	Nether Providence (Twp)
William Hood Dunwoody Care Center	3500 West Chester Pike	Newtown (Twp)
Prospect Park Health & Rehab Residence	815 Chester Pike	Prospect Park (B)
Wayne Center	30 West Avenue	Radnor (Twp)
Conner-Williams Nursing Home	105 Morton Avenue	Ridley Park (B)
Harlee Manor Nursing & Rehab Center	463 West Sproul Road	Springfield (Twp)
RMH-Hb/SNF	US Route 1	Upper Providence (Twp)
Manorcare Health Services Mercy Fitzgerald	600 South Wycombe Avenue	Yeadon (B)
Manorcare Health Services Yeadon	14 Lincoln Avenue	Yeadon (B)

Source: Delaware County

Lifeline Utility Systems

Communications Facilities

Table I-6. Radio Towers in Delaware County

Facility Name	Address	Municipality
WDNR		Chester (C)
WHHS		Haverford (Twp)
WRNB		Newtown (Twp)
W235AP		Radnor (Twp)
WXVU		Radnor (Twp)
WYBF		Radnor (Twp)
WRSD		Ridley (Twp)
WSRN-FM		Swarthmore (B)
WZZE		Thornbury (Twp)
W278AK		Upper Chichester (Twp)

Source: Delaware County

Potable Water Supply

Table I-7. Potable Water Supply in Delaware County

Facility Name	Address	Municipality
CWA Storage Facility		Aston (Twp)
Dutton Mill Rd Water Storage Facility		Brookhaven (B)
Concord Beverage Water Tower		Concord (Twp)
Campbell Ave Water Storage Facility		Haverford (Twp)
Marple Twp Water Storage Facility		Marple (Twp)
Sproul Rd Water Storage Facility		Marple (Twp)
Youth Way Water Storage Facility		Media (B)
Hunter Street Water Storage Facility		Middletown (Twp)
Media Water Treatment Plant		Middletown (Twp)
Middletown Water Storage Facility		Middletown (Twp)
Newtown Twp. Water Storage Facility		Newtown (Twp)
Baltimore Pike Water Storage Facility		Springfield (Twp)
Crum Reservoir Water Treatment Plant		Springfield (Twp)
West Ave Water Storage Facility		Springfield (Twp)
Tinicum Twp Water Storage Facility		Tinicum (Twp)
Alverston Rd Water Storage Facility		Upper Darby (Twp)
Highland Ave Water Storage Facility		Upper Darby (Twp)
Providence Rd Water Storage Facility		Upper Darby (Twp)

Source: Delaware County

Wastewater Facilities

Table I-8. Wastewater Facilities in Delaware County

Facility Name	Address	Municipality
Baldwin Run Treatment Plant		Aston (Twp)
Brookhaven Treatment Plant		Brookhaven (B)
Knights Bridge Sewage Treatment Plant		Chadds Ford (Twp)
Ridings Sewage Treatment Plant		Chadds Ford (Twp)
Springhill Farms Sewage Treatment Plant		Chadds Ford (Twp)
Delaware County Sewage Treatment Plant		Chester (C)
Concord Township Sewer Facility	664 Concord Road, Concord Township	Concord (Twp)
Concord Township Sewer Facility #2	49 N Valentine Dr., Garnet Valley, PA 1*	Concord (Twp)
Fox Valley Sewage Treatment Plant		Concord (Twp)
Garnett Valley Sewage Treatment Plant		Concord (Twp)
Southco Sewage Treatment Plant		Concord (Twp)
Darby Twp Sewage Treatment Plant		Darby (Twp)
Runnymeade Farms Sewage Treatment Plant 1		Edgmont (Twp)
Runnymeade Farms Sewage Treatment Plant 2		Edgmont (Twp)
Runnymeade Farms Sewage Treatment Plant 2		Edgmont (Twp)
Runnymeade Farms Sewage Treatment Plant 4		Edgmont (Twp)
US Army Reserve Base Sewer Treatment Plant		Edgmont (Twp)
Whitehorse Village Sewage Treatment Plant		Edgmont (Twp)
Selighton Farms Sewage Treatment Plant		Middletown (Twp)
Sellers Ave Sewage Treatment Plant		Ridley (Twp)
Rose Valley Treatment Plant		Rose Valley (B)
Cheyney College Sewage Treatment Plant		Thornbury (Twp)
Delaware County Prison Sewage Treatment Plant		Thornbury (Twp)
Glen Mills School Sewage Treatment Plant		Thornbury (Twp)
Thornbury Twp Sewage Treatment Plant		Thornbury (Twp)
Tinicum Twp Sewage Treatment Plant		Tinicum (Twp)
Media Sewage Treatment Plant		Upper Providence (Twp)

Source: Delaware County

Solid Waste Facilities

Table I-9. Solid Waste Facilities in Delaware County

Facility Name	Address	Municipality
Delaware County Incinerator		Chester (Twp)
Delaware County Incinerator		Marple (Twp)

Energy Resources

Table I-10. Electric Facilities in Delaware County

Facility Name	Address	Municipality
PECO Concord Rd Sub Station		Aston (Twp)
PECO Dutton Mill Rd Sub Station		Brookhaven (B)
PECO 202 Sub Station		Chadds Ford (Twp)
Excelon Front St Sub Station		Chester (C)
PECO Booth St Sub Station		Chester (C)
PECO Engle St Sub Station		Chester (C)

Facility Name	Address	Municipality
PECO Flower St Sub Station		Chester (C)
PECO Front St Sub Station		Chester (C)
PECO MacDade Blvd Sub Station		Chester (C)
PECO Bethel Rd Sub Station		Chester (Twp)
PECO Maddison Ave Sub Station		Clifton Heights (B)
PECO Spring Valley Rd Sub Station		Concord (Twp)
PECO Wycombe Ave Sub Station		Darby (B)
Boeing Sub Station		Eddystone (B)
Excelon Power Plant		Eddystone (B)
Liberty Electrical Company Electrical Plant		Eddystone (B)
PECO 7Th St Sub Station		Eddystone (B)
PECO Gradyville Rd Sub Station		Edgmont (Twp)
PECO Knowles Ave Sub Station		Glenolden (B)
PECO Eagle Rd Sub Station		Haverford (Twp)
PECO Landover Rd Sub Station		Haverford (Twp)
PECO West Chester Pike Sub Station		Haverford (Twp)
PECO Union Ave Sub Station		Lansdowne (B)
PECO Laughead Ave Sub Station		Lower Chichester (Twp)
PECO Ormond St Sub Station		Lower Chichester (Twp)
Sun Oil Refinery Sub Station		Lower Chichester (Twp)
PECO Chester Pike Sub Station		Marple (Twp)
PECO New Ardmore Ave Sub Station		Marple (Twp)
PECO Reed Rd Sub Station		Marple (Twp)
PECO Baltimore Pike Sub Station		Middletown (Twp)
PECO Middletown Rd Sub Station 1		Middletown (Twp)
PECO Harvey Rd Sub Station		Nether Providence (Twp)
PECO Houston Rd Sub Station		Parkside (B)
PECO Aldwyn Ln Sub Station		Radnor (Twp)
PECO Chester City Sub Station		Ridley (Twp)
PECO Fairview Rd Sub Station		Ridley (Twp)
PECO Springfield Ave Sub Station		Ridley (Twp)
PECO Chester Pike Sub Station		Sharon Hill (B)
PECO Baltimore Pike Sub Station		Springfield (Twp)
PECO Church Rd Sub Station		Springfield (Twp)
PECO Springfield Rd Substation		Springfield (Twp)
PECO Sproul Rd Sub Station		Springfield (Twp)
PECO Thomson Ave Sub Station		Springfield (Twp)
PECO Route 291 Sub Station		Tinicum (Twp)
Trainer Oil Refinery Sub Station		Trainer (B)
PECO Garret Rd Sub Station		Upper Darby (Twp)
PECO Marshall Rd Sub Station		Upper Darby (Twp)
PECO Middletown Rd Sub Station 2		Upper Providence (Twp)

Source: Delaware County 2021

Dams

Table I-11. Dams in Delaware County

Dam Name	Municipality	Stream	Class	Permittee
High-Hazard Dams				
Hilloch	Chadds Ford Township	Tr Harvey Run	C-3	Hilloch Homeowners Association
Brinton Lake	Thornbury Township	West Branch Chester Creek	C-1	New Brinton Lake Club
Ridley Park Lake	Ridley Park Borough	Little Crum Creek	C-1	Borough of Ridley Park
Cherry Farm Basin #1	Thornbury Township	Tr West Br Chester Creek	C-3	Cherry Farm Home Owners Assoc
Mill Club	Radnor Township	Little Darby Creek	C-3	Mill Dam Club
Naylors Run	Upper Darby Township	Naylors Run	C-1	Commissioners of Upper Darby Township
Springton (Geist)	Upper Providence Township	Crum Creek	B-1	Aqua Pennsylvania, Inc.
Crum Creek	Springfield Township	Crum Creek	C-1	Aqua Pennsylvania, Inc.
Other Dams				
Broomall Lake	Media Borough	Tr Ridley Creek	C-4	Broomalls Lake Country Club
Swarthmore+A40:E92 College	Springfield Township	Crum Creek	C-4	Swarthmore College
Rockdale	Middletown Township	Chester Creek	C-4	Tom King
Ridley Creek Wtf	Middletown Township	Ridley Creek	C-4	Aqua Pennsylvania, Inc.
Llewellen Mill	Aston Township	West Branch Chester Creek	C-4	Iaobucci Associates
Millbourne	Upper Darby Township	Cobbs Creek	C-4	Fairmount Park Commission
Concord Mills	Concord Township	Tr West Branch Chester Creek	C-4	Nicholas Newlin Foundation
Hanson Lower	Thornbury Township	Chester Creek	C-4	Hanson Glenn Mills and HMA Plant
Hanson Upper	Thornbury Township	Chester Creek	C-4	Hanson Glenn Mills and HMA Plant
Earles Lake	Newtown Township	Tr Darby Creek	C-4	Kyle & Ashley Wilson
Earles Lake	Newtown Township	Tr Darby Creek	C-4	Greene Countrie Village Owners Association
Earles Lake	Newtown Township	Tr Darby Creek	C-4	Harvey & Nadine Hensley
Kent	Upper Darby Township	Darby Creek	C-4	Mr. and Mrs. Wilischek, Jr.
Victoria Mills	Springfield Township	Crum Creek	C-4	Barrow Partnership
Woodland	Yeadon Borough	Cobbs Creek	C-4	City of Philadelphia
Sycamore Mills	Prospect Park Borough	Ridley Creek	C-4	DCNR
Thirteenth Ave Lake	Prospect Park Borough	Stony Creek	C-4	Borough of Prospect Park
Folcroft	Folcroft Borough	Muckinipattis Creek	C-4	Pennsylvania Railroad Company
Fetter	Radnor Township	Tr Gulph Creek	C-4	Kenneth Fetter
Digirolomo	Aston Township	Marcus Hook Creek	C-4	Lewis Digirolomo
Sposato	Radnor Township	Tr Gulph Creek	C-4	Richard P. Sposato
Detention Basin	Radnor Township	Abrahams Run	C-4	Inverary Homeowners Association
Edgemont County Fair	Edgemont Township	Tr Crum Creek	C-4	Claude Debotton

Dam Name	Municipality	Stream	Class	Permittee
Runnymeade Farms	Edgemont Township	Tr Crum Creek	C-4	Holloway Development Corporation
Rose Tree Hunt Detention Basin #1	Upper Providence Township	Tr Crum Creek	C-4	Toll Brothers, Inc.
Rose Tree Hunt Basin No 2	Upper Providence Township	Tr Crum Creek	C-4	Toll Brothers, Inc.
Maple Lane Farm	Concord Township	Tr West Branch Chester Creek	C-4	Pulte Home Corporation of The Delaware Valley
Painters Crossing Condominium	Chadds Ford Township	Tr Harvey Run	C-4	Painters Crossing Condominium Association
Ravenscliff Duck Pond No. 1	Radnor Township	Julip Run	C-4	Radnor Township
Ravenscliff Duck Pond No. 2	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Ravenscliff Duck Pond No. 3	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Ravenscliff Duck Pond No. 4	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Ravenscliff Duck Pond No. 5	Radnor Township	Julip Run	C-4	Ravenscliff Homeowners Association
Cherry Farm Basin # 2	Thornbury Township	Tr West Br Chester Creek	C-4	Cherry Farm Home Owners Assoc
Fenimore Park	Radnor Township	Gulph Creek	C-4	Radnor Township
Crum Creek	Upper Providence Township	Crum Creek	C-4	Jack Fetsko
Drexel Lodge Park Pond 1	Newtown Township	Preston Run	C-4	Newtown Township
Drexel Lodge Park Pond 2	Newtown Township	Preston Run	C-4	Newtown Township
Greer Park Pond 3	Newtown Township	Foxes Run	C-4	Newtown Township
Hole No. 13 Pond	Radnor Township	Ithan Creek	C-4	Radnor Valley Country Club
Muetterties	Middletown Township	Spring Run	C-4	Kurt and Ellen Muetterties
Gurvins Pond	Upper Providence Township	Tr Ridley Creek	C-4	Phil Gurvin
Overbrook Golf Course	Radnor Township	Miles Run	C-4	Overbrook Golf Course
Delco Angler Water	Middletown Township	Tr Ridley Creek	C-4	Delco Anglers and Conservationists
Llanerch Irrigation Pond	Haverford Township	Trib To Naylors Run	C-4	Llanerch Golf Course

Source: PA DEP 2021

Other Facilities

Table I-12. Other Critical Facilities

Name	Address	Municipality	Bldg. Type
3M Aston		Aston (Twp)	Hazardous Materials Facility
Iceworks		Aston (Twp)	Hazardous Materials Facility
McGee Industries Inc		Aston (Twp)	Hazardous Materials Facility
Nalco Water Pretreatment Solutions - Aston		Aston (Twp)	Hazardous Materials Facility
NuCO 2 Supply LLC Aston Depot		Aston (Twp)	Hazardous Materials Facility
Pyramid Materials		Aston (Twp)	Hazardous Materials Facility
Boothwyn Terminal		Bethel (Twp)	Hazardous Materials Facility
Laurel Pipe Line Company, L.P. -Booth Station		Bethel (Twp)	Hazardous Materials Facility
PECO - Foulk Substation		Bethel (Twp)	Hazardous Materials Facility
Lowe's Of Brookhaven (#3277)		Brookhaven (B)	Hazardous Materials Facility
Nestle Health Science Philadelphia		Chadds Ford (Twp)	Hazardous Materials Facility
Amtrak/Lamokin Substation		Chester (C)	Hazardous Materials Facility
Anthem Propane		Chester (C)	Hazardous Materials Facility

Name	Address	Municipality	Bldg. Type
Delaware Valley Resource Recovery Facility		Chester (C)	Hazardous Materials Facility
Evonik Corporation		Chester (C)	Hazardous Materials Facility
Exelon Chester Generating Station		Chester (C)	Hazardous Materials Facility
Exelon Lamokin Electric Substation		Chester (C)	Hazardous Materials Facility
Kimberly Clark Pa LLC		Chester (C)	Hazardous Materials Facility
Norquay, LLC		Chester (C)	Hazardous Materials Facility
PECO - Paper Tap Substation		Chester (C)	Hazardous Materials Facility
PECO - Tilghman Street Gas Plant		Chester (C)	Hazardous Materials Facility
PQ Corporation Chester		Chester (C)	Hazardous Materials Facility
Verizon Chester A Central Office (PA24009)		Chester (C)	Hazardous Materials Facility
Verizon Chester B Central Office (PA24011)		Chester (C)	Hazardous Materials Facility
West Phila Bronze Co Inc		Chester (C)	Hazardous Materials Facility
Widener University - Kirkbride Hall		Chester (C)	Hazardous Materials Facility
Widener University - Maintenance Yard		Chester (C)	Hazardous Materials Facility
Widener University- Schwartz Center		Chester (C)	Hazardous Materials Facility
Alloy Surfaces Company Incorporated - Plant 1		Chester (Twp)	Hazardous Materials Facility
Aston Facility		Chester (Twp)	Hazardous Materials Facility
Cintas Corporation 100		Chester (Twp)	Hazardous Materials Facility
Comcast Cable-Wallingford Headend		Chester (Twp)	Hazardous Materials Facility
Hachik Distributors Inc		Chester (Twp)	Hazardous Materials Facility
Pyromet		Chester (Twp)	Hazardous Materials Facility
Sunoco Partners Marketing & Terminals L.P. - Marcus Hook Tank Farm		Chester (Twp)	Hazardous Materials Facility
Westrock Cp, LLC		Chester (Twp)	Hazardous Materials Facility
Airgas - Collingdale		Collingdale (B)	Hazardous Materials Facility
BR20 Collingdale		Collingdale (B)	Hazardous Materials Facility
Multi-Flex Plating Company		Collingdale (B)	Hazardous Materials Facility
AT&T-Concordville - USID53697		Concord (Twp)	Hazardous Materials Facility
Brandywine Specialty Care		Concord (Twp)	Hazardous Materials Facility
Carsense Glen Mills		Concord (Twp)	Hazardous Materials Facility
Costco Wholesale #1114		Concord (Twp)	Hazardous Materials Facility
Refresco Beverages Us Inc		Concord (Twp)	Hazardous Materials Facility
Target Store T-2172		Concord (Twp)	Hazardous Materials Facility
AT&T - 1009750: Darby - (USID3340)		Darby (B)	Hazardous Materials Facility
Sunoco Partners Marketing & Terminals L.P. - Darby Creek Tank Farm		Darby (Twp)	Hazardous Materials Facility
Sunoco Terminal		Darby (Twp)	Hazardous Materials Facility
Baker Petrolite		Eddystone (B)	Hazardous Materials Facility
Del Monte Fresh Produce Company		Eddystone (B)	Hazardous Materials Facility
Liberty Electric Power Llc		Eddystone (B)	Hazardous Materials Facility
PECO - Baldwin Service Building		Eddystone (B)	Hazardous Materials Facility
Penn Terminals, LLC		Eddystone (B)	Hazardous Materials Facility
Edgemont USARC		Edgmont (Twp)	Hazardous Materials Facility
Neumann University		Edgmont (Twp)	Hazardous Materials Facility
Bullen Companies		Folcroft (B)	Hazardous Materials Facility
Cork Industries, Inc		Folcroft (B)	Hazardous Materials Facility
East Penn Manufacturing Co.		Folcroft (B)	Hazardous Materials Facility
White Cap, Ltd. (WC186) - Delaware		Folcroft (B)	Hazardous Materials Facility
Amtrak/Glenolden Substation		Glenolden (B)	Hazardous Materials Facility
PECO - MacDade Substation		Glenolden (B)	Hazardous Materials Facility
Verizon Glenolden Co (PA24040)		Glenolden (B)	Hazardous Materials Facility
Haverford College - Koshland Science Center		Haverford (Twp)	Hazardous Materials Facility
Havertown PCP Site		Haverford (Twp)	Hazardous Materials Facility

Name	Address	Municipality	Bldg. Type
Kindred Hospital Philadelphia-Havertown		Haverford (Twp)	Hazardous Materials Facility
Lowe's Of Havertown (#3169)		Haverford (Twp)	Hazardous Materials Facility
Verizon Lansdowne Co (PA24650)		Lansdowne (B)	Hazardous Materials Facility
Esschem Inc		Lower Chichester (Twp)	Hazardous Materials Facility
Honeywell International Inc		Lower Chichester (Twp)	Hazardous Materials Facility
Nalco Water Pretreatment Solutions		Lower Chichester (Twp)	Hazardous Materials Facility
PECO - Linwood Substation		Lower Chichester (Twp)	Hazardous Materials Facility
Braskem / Marcus Hook		Marcus Hook (B)	Hazardous Materials Facility
Marcus Hook Energy Center		Marcus Hook (B)	Hazardous Materials Facility
Marcus Hook Oil Refinery		Marcus Hook (B)	Hazardous Materials Facility
PECO - Blueball Substation		Marcus Hook (B)	Hazardous Materials Facility
PECO - Marcus Hook Substation		Marcus Hook (B)	Hazardous Materials Facility
PECO - Post Substation		Marcus Hook (B)	Hazardous Materials Facility
Sun Oil Refinery		Marcus Hook (B)	Hazardous Materials Facility
Sunoco LLC - Race Fuels		Marcus Hook (B)	Hazardous Materials Facility
Sunoco Partners Marketing & Terminals L.P. Marcus Hook Industrial Complex		Marcus Hook (B)	Hazardous Materials Facility
AT&T - USID3312		Marple (Twp)	Hazardous Materials Facility
The Home Depot Store #4181		Marple (Twp)	Hazardous Materials Facility
AT&T - 10140606:Dt Media - USID110428		Media (B)	Hazardous Materials Facility
Verizon Media Co (PA24016)		Media (B)	Hazardous Materials Facility
Aqua Pa - Ridley Creek Water Treatment Plant		Middletown (Twp)	Hazardous Materials Facility
Hanson Aggregates Pa LLC		Middletown (Twp)	Hazardous Materials Facility
PennDOT 0630-01 Delaware County		Middletown (Twp)	Hazardous Materials Facility
Riddle Hospital		Middletown (Twp)	Hazardous Materials Facility
The Pennsylvania State University-Brandywine Campus		Middletown (Twp)	Hazardous Materials Facility
Wawa Beverage Company		Middletown (Twp)	Hazardous Materials Facility
Wilson Of Wallingford Inc		Nether Providence (Twp)	Hazardous Materials Facility
BPG Real Estate Investors Straw Party 1, L.P.		Newtown (Twp)	Hazardous Materials Facility
Sap America Inc		Newtown (Twp)	Hazardous Materials Facility
Verizon Larchmont Co (PA21780)		Newtown (Twp)	Hazardous Materials Facility
Equipment Trade Service Co Inc		Norwood (B)	Hazardous Materials Facility
Concord Township Sewer Department		Prospect Park (B)	Hazardous Materials Facility
AT&T Corp. - PA4220		Radnor (Twp)	Hazardous Materials Facility
Cabrini University		Radnor (Twp)	Hazardous Materials Facility
Verizon Wayne Co (PA21170)		Radnor (Twp)	Hazardous Materials Facility
Villanova University		Radnor (Twp)	Hazardous Materials Facility
Boeing - Philadelphia		Ridley (Twp)	Hazardous Materials Facility
Eddystone Generating Station		Ridley (Twp)	Hazardous Materials Facility
Eddystone Marine and Rail Terminal Company LLC		Ridley (Twp)	Hazardous Materials Facility
Fizzano Brothers Concrete Products, Inc.		Ridley (Twp)	Hazardous Materials Facility
Marine Corps Reserve Center Folsom		Ridley (Twp)	Hazardous Materials Facility
Maxim Crane Works L. P.		Ridley (Twp)	Hazardous Materials Facility
PECO - Woodlyn Substation		Ridley (Twp)	Hazardous Materials Facility

Name	Address	Municipality	Bldg. Type
Sure Power Philadelphia		Ridley (Twp)	Hazardous Materials Facility
The Home Depot Store #4142		Ridley (Twp)	Hazardous Materials Facility
Southco, Inc. - Concordville		Ridley Park (B)	Hazardous Materials Facility
Taylor Hospital		Ridley Park (B)	Hazardous Materials Facility
Verizon Ridley Park Co (PA24320)		Ridley Park (B)	Hazardous Materials Facility
Es Opco USA LLC - Ph		Sharon Hill (B)	Hazardous Materials Facility
PECO - Sharon-Hill Substation		Sharon Hill (B)	Hazardous Materials Facility
Aqua Pa - Crum Creek Water Treatment Plant		Springfield (Twp)	Hazardous Materials Facility
Aqua Pa - Springfield Transportation Garage		Springfield (Twp)	Hazardous Materials Facility
Bj'S Wholesale Club #056		Springfield (Twp)	Hazardous Materials Facility
PECO - Morton Substation		Springfield (Twp)	Hazardous Materials Facility
Springfield Hospital		Springfield (Twp)	Hazardous Materials Facility
Target Store T-1136		Springfield (Twp)	Hazardous Materials Facility
Target Store T-2312		Springfield (Twp)	Hazardous Materials Facility
The Home Depot Store #4114		Springfield (Twp)	Hazardous Materials Facility
Verizon Springfield Co (PA24690)		Springfield (Twp)	Hazardous Materials Facility
The Home Depot Store #4121		Thornbury (Twp)	Hazardous Materials Facility
Esstech, Inc.		Tinicum (Twp)	Hazardous Materials Facility
FAA PHL ALSF		Tinicum (Twp)	Hazardous Materials Facility
FAA PHL ATCT		Tinicum (Twp)	Hazardous Materials Facility
Philadelphia Air Hub		Tinicum (Twp)	Hazardous Materials Facility
Philadelphia Fuel Facility Inc		Tinicum (Twp)	Hazardous Materials Facility
Philadelphia International Airport		Tinicum (Twp)	Hazardous Materials Facility
PHL-CDF		Tinicum (Twp)	Hazardous Materials Facility
SKC Hangar (Tenants Assoc.)		Tinicum (Twp)	Hazardous Materials Facility
Sunoco Partners M & T, L.P. - Fort Mifflin Terminal		Tinicum (Twp)	Hazardous Materials Facility
United Airlines-PHL		Tinicum (Twp)	Hazardous Materials Facility
Western Fumigation (B-2)		Tinicum (Twp)	Hazardous Materials Facility
Congoleum Acquisitions, LLC		Trainer (B)	Hazardous Materials Facility
Delcora - Western Regional Treatment Plant		Trainer (B)	Hazardous Materials Facility
Monroe Energy, LLC		Trainer (B)	Hazardous Materials Facility
PECO - Trainer Substation		Trainer (B)	Hazardous Materials Facility
Trainer Oil Refinery		Trainer (B)	Hazardous Materials Facility
Crozer Chester Medical Center		Upland (B)	Hazardous Materials Facility
Allied Propane - Chester		Upper Chichester (Twp)	Hazardous Materials Facility
Arctic Glacier Ice		Upper Chichester (Twp)	Hazardous Materials Facility
Chelsea Terminal		Upper Chichester (Twp)	Hazardous Materials Facility
Engineered Arresting Systems Corporation Dba Safran Aerosystems Arresting		Upper Chichester (Twp)	Hazardous Materials Facility
Ferrellgas		Upper Chichester (Twp)	Hazardous Materials Facility
Gehr Plastics Inc.		Upper Chichester (Twp)	Hazardous Materials Facility
MIPC, L.L.C. - Chelsea Station		Upper Chichester (Twp)	Hazardous Materials Facility
Pennsylvania Machine Works, LLC		Upper Chichester (Twp)	Hazardous Materials Facility
Sunoco Partners M & T, L.P. - Twin Oaks Terminal		Upper Chichester (Twp)	Hazardous Materials Facility
TDSI/Twin Oaks		Upper Chichester (Twp)	Hazardous Materials Facility

Name	Address	Municipality	Bldg. Type
Twin Oaks Terminal		Upper Chichester (Twp)	Hazardous Materials Facility
Verizon Chester Heights Co (PA24013)		Upper Chichester (Twp)	Hazardous Materials Facility
Comcast Cable-Upper Darby OTN		Upper Darby (Twp)	Hazardous Materials Facility
Delaware County Memorial Hospital		Upper Darby (Twp)	Hazardous Materials Facility
Delaware Valley Steel		Upper Darby (Twp)	Hazardous Materials Facility
Meenan Oil Co.		Upper Darby (Twp)	Hazardous Materials Facility
PECO - Llanerch Substation		Upper Darby (Twp)	Hazardous Materials Facility
PECO - Upper Darby Substation		Upper Darby (Twp)	Hazardous Materials Facility
Septa Victory Shop		Upper Darby (Twp)	Hazardous Materials Facility
Speedway 6806		Upper Darby (Twp)	Hazardous Materials Facility
Verizon Kirklyn Co (PA24760)		Upper Darby (Twp)	Hazardous Materials Facility
Verizon Upper Darby Acctg Bldg (PA24150)		Upper Darby (Twp)	Hazardous Materials Facility
Verizon Wireless - Upper Darby (Id:70010)		Upper Darby (Twp)	Hazardous Materials Facility
Waste Management Delaware Valley South		Upper Darby (Twp)	Hazardous Materials Facility
Aqua Pa - Media WWTP		Upper Providence (Twp)	Hazardous Materials Facility
Hydrol Chemical Company, Inc.		Yeadon (B)	Hazardous Materials Facility
Aldan Historical Commission		Aldan (B)	Historic Site
Aston Historical Society		Aston (Twp)	Historic Site
Bethel Township Preservation Society		Bethel (Twp)	Historic Site
Brandywine Battlefield Park Association		Chadds Ford (Twp)	Historic Site
Brandywine Conservancy & Environmental Management Center		Chadds Ford (Twp)	Historic Site
Brinton 1704 House		Chadds Ford (Twp)	Historic Site
Chadds Ford HARB		Chadds Ford (Twp)	Historic Site
Chadds Ford Historical Society		Chadds Ford (Twp)	Historic Site
Christian C. Sanderson Museum		Chadds Ford (Twp)	Historic Site
1724 Chester Courthouse		Chester (C)	Historic Site
Chester Historical Preservation Society		Chester (C)	Historic Site
Sun Ship Historic Marker		Chester (C)	Historic Site
William Penn Landing Site		Chester (C)	Historic Site
Chester Heights Camp Meeting		Chester Heights (B)	Historic Site
Old St Thomas at Ivy Mills Historic District		Chester Heights (B)	Historic Site
Concord Township Historical Commission		Concord (Twp)	Historic Site
Concord Township Historical Society		Concord (Twp)	Historic Site
Nicholas Newlin Foundation		Concord (Twp)	Historic Site
Darby Borough Historical Commission		Darby (B)	Historic Site

Name	Address	Municipality	Bldg. Type
Darby Borough Historical Preservation Society		Darby (B)	Historic Site
Darby Township Historical Commission		Darby (Twp)	Historic Site
Colonial Pennsylvania Plantation		Edgmont (Twp)	Historic Site
Glenolden Historical Commission		Glenolden (B)	Historic Site
Haverford Township Historical Society		Haverford (Twp)	Historic Site
The Grange		Haverford (Twp)	Historic Site
Historic Lansdowne Theater Corporation		Lansdowne (B)	Historic Site
Lansdowne Borough HARB		Lansdowne (B)	Historic Site
Marcus Hook Historical Commission		Marcus Hook (B)	Historic Site
Plank House		Marcus Hook (B)	Historic Site
1696 Thomas Massey House		Marple (Twp)	Historic Site
Delaware County Historical Society		Marple (Twp)	Historic Site
Marple Historical Society		Marple (Twp)	Historic Site
Delaware County Institute of Technology		Media (B)	Historic Site
Heritage Commission of Delaware County		Media (B)	Historic Site
Media Borough HARB		Media (B)	Historic Site
Media Historic Archives Commission		Media (B)	Historic Site
PA Veterans Museum Media Amory		Media (B)	Historic Site
Lanchford Hall at Tyler Arboretum		Middletown (Twp)	Historic Site
Middletown Township Historical Society		Middletown (Twp)	Historic Site
Painter Library at Tyler Arboretum		Middletown (Twp)	Historic Site
Morton Train Station		Morton (B)	Historic Site
Nether Providence Historical Commission		Nether Providence (Twp)	Historic Site
Nether Providence Historical Society		Nether Providence (Twp)	Historic Site
Thomas Leiper House		Nether Providence (Twp)	Historic Site
Newtown Square Historical Preservation Society		Newtown (Twp)	Historic Site
Newtown Square Penn Railroad Museum		Newtown (Twp)	Historic Site
Octagonal School at Dunwoody Village		Newtown (Twp)	Historic Site
Square Tavern		Newtown (Twp)	Historic Site
Norwood Historical Society Inc		Norwood (B)	Historic Site
Morton Homestead		Prospect Park (B)	Historic Site
Prospect Park Historical Society		Prospect Park (B)	Historic Site
Radnor Historical Society		Radnor (Twp)	Historic Site
Radnor Township HARB		Radnor (Twp)	Historic Site
Ridley Park HARB		Ridley Park (B)	Historic Site
Ridley Park Historical Commission		Ridley Park (B)	Historic Site
Ridley Park Historical Society		Ridley Park (B)	Historic Site
Rose Valley Museum & Historical Society		Rose Valley (B)	Historic Site
Sharon Hill Historical Commission		Sharon Hill (B)	Historic Site
Sharon Hill Historical Society		Sharon Hill (B)	Historic Site
Springfield Historical Society		Springfield (Twp)	Historic Site
Friends Historical Library		Swarthmore (B)	Historic Site
Swarthmore Historical Society		Swarthmore (B)	Historic Site
Thornbury Historical Commission		Thornbury (Twp)	Historic Site
Thornbury Historical Society		Thornbury (Twp)	Historic Site
Tinicum Township Historical Society		Tinicum (Twp)	Historic Site
Caleb Pusey House & Landingford Plantation		Upland (B)	Historic Site
Cheshire House		Upland (B)	Historic Site

Name	Address	Municipality	Bldg. Type
Chichester Historical Society		Upper Chichester (Twp)	Historic Site
Friends of Sellers Hall		Upper Darby (Twp)	Historic Site
Isaac Garrett House		Upper Darby (Twp)	Historic Site
Mourning House at Arlington Cemetery		Upper Darby (Twp)	Historic Site
Pennock/Sellers Home at Sellers Memorial Library		Upper Darby (Twp)	Historic Site
Swedish Cabin		Upper Darby (Twp)	Historic Site
Upper Darby Historical Commission		Upper Darby (Twp)	Historic Site
Upper Darby Historical Society		Upper Darby (Twp)	Historic Site
Yeadon Historic Preservation Task Force		Yeadon (B)	Historic Site
Concord Township Public Works Office	675 Smithbridge Rd., Glen Mills, PA 193*	Concord (Twp)	Public Works
Aston Free Library	3270 Concord Road Aston, PA 19014	Aston (Twp)	Library
J. Lewis Crozer Library	620 Engle Street, Chester, PA 19013	Chester (C)	Library
Collingdale Public Library	823 MacDade Blvd., Collingdale, PA 19023	Collingdale (B)	Library
Rachel Kohl Community Library	687 Smithbridge Road, Glen Mills, PA 19*	Concord (Twp)	Library
Darby Free Library	1001 Main Street, Darby, PA 19023	Darby (B)	Library
Folcroft Public Library	1725 Delmar Drive, Folcroft, PA 19032	Folcroft (B)	Library
Glenolden Library	211 S. Llanwellyn Ave, Glenolden , PA 1*	Glenolden (B)	Library
Haverford Twp. Library	1601 Darby Road, Havertown, PA 19083	Haverford (Twp)	Library
Lansdowne Public Library	55 S. Lansdowne Ave., Lansdowne, PA 190*	Lansdowne (B)	Library
Mary M. Campbell Library	10th & Green Sts., Marcus Hook, PA 19061	Marcus Hook (B)	Library
Marple Public Library	2599 Sproul Road, Broomall, PA 19008	Marple (Twp)	Library
Media-Upper Providence Library	1 E. Front Street, Media, PA 19063	Media (B)	Library
Middletown Free Library	21 N. Pennell Road, Media, PA 19063	Middletown (Twp)	Library
Helen Kate Furness Library	100 N. Providence Road, Wallingford, PA*	Nether Providence (Twp)	Library
Newtown Public Library	201 Bishop Hollow Rd., Newtown, PA 19073	Newtown (Twp)	Library
Norwood Public Library	513 Welcome Ave., Norwood, PA 19074	Norwood (B)	Library
Prospect Park Library	720 Maryland Ave., Prospect Park , PA 1*	Prospect Park (B)	Library
Radnor Twp. Library	114 West Wayne Avenue., Wayne , PA 19087	Radnor (Twp)	Library
Ridley Twp. Public Library	100 East MacDade Blvd., Folsom, PA 19033	Ridley (Twp)	Library
Ridley Park Library	107 West Ward Street, Ridley Park, PA 1*	Ridley Park (B)	Library

Name	Address	Municipality	Bldg. Type
Sharon Hill Public Library	246 Sharon Ave., Sharon Hill, PA 19079	Sharon Hill (B)	Library
Springfield Twp. Library	70 Powell Road, Springfield, PA 19064	Springfield (Twp)	Library
Swarthmore Library	121 Park Avenue, Swarthmore, PA 19081	Swarthmore (B)	Library
Tinicum Public Library	620 Seneca Street, Essington, PA 19029	Tinicum (Twp)	Library
Sellers Library - Main Branch	76 South State Road, Upper Darby, PA 19*	Upper Darby (Twp)	Library
Sellers Library Muni. Bldg.	501 Bywood Ave., Upper Darby, PA 19082	Upper Darby (Twp)	Library
Sellers Library Primos Branch	409 Ashland Ave, Secane, PA 19018	Upper Darby (Twp)	Library
Yeadon Public Library	809 Longacre Blvd., Yeadon, PA 19050	Yeadon (B)	Library
Aston Free Library	3270 Concord Road Aston, PA 19014	Aston (Twp)	Library
J. Lewis Crozer Library	620 Engle Street, Chester, PA 19013	Chester (C)	Library
Collingdale Public Library	823 MacDade Blvd., Collingdale, PA 19023	Collingdale (B)	Library
Rachel Kohl Community Library	687 Smithbridge Road, Glen Mills, PA 19*	Concord (Twp)	Library
Darby Free Library	1001 Main Street, Darby, PA 19023	Darby (B)	Library
Folcroft Public Library	1725 Delmar Drive, Folcroft, PA 19032	Folcroft (B)	Library
Glenolden Library	211 S. Llanwellyn Ave, Glenolden , PA 1*	Glenolden (B)	Library
Haverford Twp. Library	1601 Darby Road, Havertown, PA 19083	Haverford (Twp)	Library
Lansdowne Public Library	55 S. Lansdowne Ave., Lansdowne, PA 190*	Lansdowne (B)	Library
Mary M. Campbell Library	10th & Green Sts., Marcus Hook, PA 19061	Marcus Hook (B)	Library
Marple Public Library	2599 Sproul Road, Broomall, PA 19008	Marple (Twp)	Library
Media-Upper Providence Library	1 E. Front Street, Media, PA 19063	Media (B)	Library
Middletown Free Library	21 N. Pennell Road, Media, PA 19063	Middletown (Twp)	Library
Helen Kate Furness Library	100 N. Providence Road, Wallingford, PA*	Nether Providence (Twp)	Library
Newtown Public Library	201 Bishop Hollow Rd., Newtown, PA 19073	Newtown (Twp)	Library
Norwood Public Library	513 Welcome Ave., Norwood, PA 19074	Norwood (B)	Library
Prospect Park Library	720 Maryland Ave., Prospect Park , PA 1*	Prospect Park (B)	Library
Radnor Twp. Library	114 West Wayne Avenue., Wayne , PA 19087	Radnor (Twp)	Library
Ridley Twp. Public Library	100 East MacDade Blvd., Folsom, PA 19033	Ridley (Twp)	Library
Ridley Park Library	107 West Ward Street, Ridley Park, PA 1*	Ridley Park (B)	Library
Sharon Hill Public Library	246 Sharon Ave., Sharon Hill, PA 19079	Sharon Hill (B)	Library

Name	Address	Municipality	Bldg. Type
Springfield Twp. Library	70 Powell Road, Springfield, PA 19064	Springfield (Twp)	Library
Swarthmore Library	121 Park Avenue, Swarthmore, PA 19081	Swarthmore (B)	Library
Tinicum Public Library	620 Seneca Street, Essington, PA 19029	Tinicum (Twp)	Library
Sellers Library - Main Branch	76 South State Road, Upper Darby, PA 19*	Upper Darby (Twp)	Library
Sellers Library Muni. Bldg.	501 Bywood Ave., Upper Darby, PA 19082	Upper Darby (Twp)	Library
Sellers Library Primos Branch	409 Ashland Ave, Secane, PA 19018	Upper Darby (Twp)	Library
Yeadon Public Library	809 Longacre Blvd., Yeadon, PA 19050	Yeadon (B)	Library

Source: Delaware County

LOCAL MITIGATION PLAN REVIEW TOOL 2019

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*.

Jurisdiction: **Delaware County, PA**	**Title of Plan:** **Delaware County HMP**	**Date of Plan:**
Local Point of Contact:	**Address:**	
Title:		
Agency:		
Phone Number:	**E-Mail:**	

State Reviewer: **Ernie Szabo**	**Title:** **State Planner**	**Date:**

FEMA Reviewer: **Matt McCullough**	**Title:** Community Planner	**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 page number)**	**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))	Section 3 Appendices C, D, E	X	
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))	Section 3 & Appendices C, D , E	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3 & Appendices E	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2.5	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 7.2.3	X	
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))	Section 7.2	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met

ELEMENT A: REQUIRED REVISIONS

A1.) Discussion:
Table 3.2- Not all communities contributed to the plan to the level needed to be counted as participants. Based on the plan materials these are the following categories:

Full Participation- (Attended Meeting(s) & Provided Completed Forms)
Bethel Twp, Chester City, Chester Heights Borough, Concord Twp, Marple Twp, Middletown Twp, Newtown Twp, Prospect Park Boro, Radnor Twp, Thornbury Twp

Changeovers to Full Participation:
Aston Township, Brookhaven Borough, Chadds Ford Township, Chester Township, Haverford Township, Marcus Hook, Media Borough, Upland Borough, Upper Chichester Borough, Upper Providence Township, Brandywine Conservancy & Museum Special District.

This changeover occurred because the Plan Developer provided additional participation documentation for those communities who initially had not met the minimum of attending 1 meeting and filling out 1 form. Other communities with an asterisk were previously designated as only partially participating because they had only performed half of the minimum requirement for meetings or form completion. However, some communities had either attended multiple meetings or provided multiple forms. They are now being designated as participating.

Partial Participation- (Either Attended a Meeting(s) or Provided Completed Forms)
Aldan Boro, Aston Boro*,Brookhaven Boro*, Chadds Ford Twp, Chester Twp, Clifton Heights Boro, Darby Boro, Darby Twp, Eddystone Boro, Haverford Twp*, Marcus Hook*, Media Boro*, Ridley Park Boro, Ridley Twp, Rutledge Boro, Springfield Twp, Swarthmore Boro, Tinicum Twp, Upland Boro*, Upper Chichester Boro*, Upper Darby Twp, Upper Providence Twp, Yeadon Boro, Brandywine Conservancy & Museum SD

*- Attended multiple meetings or Provided Multiple Completed Forms

Highlighted green indicate updated participation information from Plan Developer. Those who do not have an asterisk but have the green highlighting will be deemed as participating.

Information has been verified in Appendix C for those communities who have participated beyond just meeting attendance.

No Participation- (Neither Attended a Meeting no Provided Completed Forms)
Collingsdale Boro, Colwyn Boro, East Lansdowne Boro, Edgmont Twp, Folcroft Boro, Glenolden Boro, Lansdowne Boro, Lower Chichester Twp, Millbourne Boro, Morton Boro, Nether Providence Twp, Norwood Boro, Parkside Boro, Rose Valley Boro, Sharon Hill Boro, Trainer Boro

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))	Section 4	X	
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))	Section 4	X	
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))	Section 4	X	
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. 4.3.8-46	X	

ELEMENT B: REQUIRED REVISIONS

B3.) Kudos:
Impacts are addressed by different sectors: Life, Health and Safety/General Building Stock/Critical Facilities/Economy/Environment

B3.) Recommended Revision:
Pg. 4.3.8-42: Table 4.3.8-10 The number of structures at-risk, per jurisdiction, are noted in this table. Is there additional information that can be provided as to the functions or uses of these building types?

Table 4.3.8-14 What types of critical facilities/lifelines are within the 1% annual chance area? What functions or services do they provide for each community? Providing this context is crucial to develop an understanding of needs within the communities.

Table 4.3.8-16 The sharing of this debris data for recovery purposes could aid in the post-disaster recovery needs to debris management. Pairing this information with open space availabilities within the County could be performed prior to an event to quicken recovery operations.

B3.) Recommended Revision:
Appendix C- Pg 63- 96: Additional cascading effects of the hazard events on these facilities/assets/structures could be provided to better explain the impact to the community's ability to function. Providing the "so what" of the asset being affected by that hazard.

B3.) Kudos:
Additional Data & Next Steps- clear distinction of what the County needs and how they would like to improve the plan.

B4.) Required Revision:
The Rep Loss data needs to be provided per jurisdiction. Also, the data pull should be within the timeframe of the plan update. The data is noted as being from 2019.
FEMA will provide instructions for a direct data request to the PIVOT system.

Updated Rep Loss information has been provided.

ELEMENT C. MITIGATION STRATEGY

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))	Section 5	X	
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))	5-10 – 5-11 & Appendix D	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	6-14 to 6-15	X	
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))	Section 6	X	
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))	Table 6.4	X	
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))	Section 5.2.5	X	

ELEMENT C: REQUIRED REVISIONS

C1.) Recommended Revision:
Application of evaluation criteria to improve the understanding of current gaps and opportunities for improvement.

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))	Section 2.2- 2.4	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 6-4 to 6-13	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 6-1 to 6-3	X	

ELEMENT D: REQUIRED REVISIONS

Recommended Revision:
D1.) Please provide mapping future land use; possibly from the County Comprehensive Plan.

Kudos:
D1.) Future Growth & Development write-up: rarely are discussions had within the hazard section as to the effects on development in relation to individual hazard types. Well done!

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
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))			
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))			
ELEMENT E: REQUIRED REVISIONS			
OPTIONAL: HIGH HAZARD POTENTIAL DAM RISKS			
HHPD1. Did Element A4 (planning process) describe the incorporation of existing plans, studies, reports, and technical information for high hazard potential dams?			X
HHPD2. Did Element B3 (risk assessment) address HHPDs?			X
HHPD3. Did Element C3 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?			X
HHPD4. Did Element C4-C5 (mitigation actions) address HHPDs prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?			X
REQUIRED REVISIONS HHPDs not profiled. N/A.			
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 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.*

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 jurisdiction 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?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Aston Township											
2	Brookhaven Borough											
3	Bethel Twp											
4	Chadds Ford Township											
5	Chester City											
6	Chester Township											
7	Chester Heights Borough											
8	Concord Twp											

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
9	Haverford Township											
10	Marcus Hook Township											
11	Marple Twp											
12	Media Borough											
13	Middletown Twp											
14	Newtown Twp											
15	Prospect Park Boro											
16	Radnor Twp											
17	Thornbury Twp											
18	Upland Borough											
19	Upper Chichester Borough											
20	Upper Providence Township											

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
21	Brandywine Conservancy & Museum Special District											

Delaware County Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

< Municipality Name>, Delaware County, Pennsylvania

WHEREAS, the *<Municipality Name>*, Delaware County, Pennsylvania, is most vulnerable to natural and human-made hazards, which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the *<Municipality Name>* acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Delaware County Hazard Mitigation Plan has been developed by Delaware County Emergency Services in cooperation with other county departments, and officials and citizens of *<Municipality Name>*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Delaware County Hazard Mitigation Plan, and

WHEREAS, the Delaware County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments.

NOW THEREFORE BE IT RESOLVED by the governing body for the *<Municipality Name>*:

- The 2023 Delaware County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the *<Municipality Name>*, and
- The respective officials and agencies identified in the implementation strategy of the 2023 Delaware County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2022

ATTEST:

_____

***< MUNICIPALITY NAME>* REPRESENTATIVES**

By _____

By _____

By _____