Franklin County
Hazard Vulnerability Assessment (HVA)

March 2018

(updated Dec 2021)

Change Number	Date of Change	Summary of Change	Change Made By (Signature)
1	6 Dec 2019	• Updated HVA from 2019 Annual Threat Hazard Municipal Survey. • Added Frederick County, MD as a border county to County Profile Section. • Updated population figures using the 2018 estimates available through the US Census. • Added Inundation Zone Maps and pictures of all High Hazard Dams impacting Franklin County to the Dam Failure Hazard Profile. • Updated Appendix G. • Added Appendix H to document Municipal Hazard Vulnerability Assessments.	Bob Povlich Jacob Crider
2	30 Dec 2020	• Updated HVA from 2020 Annual Threat Hazard Municipal Survey. • Updated population figures using the 2019 estimates available through the US Census. • Updated common level ratio for dam inundation zone structural impacts. • Added information on COVID-19 pandemic. • Updated Appendices G and H.	Mary K. Seville Jacob Crider
3	10 Dec 2021	• Updated HVA from 2021 Annual Threat Hazard Municipal Survey. • Updated population figures using the 2020 US Census numbers. • Updated common level ratio for dam inundation zone structural impacts. • Updated Appendices G and H.	Mary K. Seville Jacob Crider

Promulgation:

This plan is promulgated as the Franklin County Hazard Vulnerability Assessment (HVA). This plan is designed to comply with all applicable State and County regulations and identifies risks, hazards, and potential level of impacts to life and property of the citizens of Franklin County.

This plan supersedes all previous Franklin County HVA plans.

Promulgated this 10th day of December, 2021.

Signature: Jacob M. Crider Date: 12/11/2021

Jacob M. Crider
Director, Department of Emergency Services
Franklin County, Pennsylvania

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1. Introduction

1.1. Purpose

Hazard Vulnerability Assessment (HVA) and risk analysis are systematic approaches to identifying hazards or risks that are most likely to have an impact on a persons and property that lie within the borders of Franklin County. This plan was developed in conjunction with the update of the Franklin County Hazard Mitigation plan and serves 4 distinct purposes.

- To develop a common awareness among emergency service agencies, public officials, emergency responders, and the public of the major hazards existing in Franklin County.
- To identify the locations, the number of persons, and the major facilities that may be vulnerable to each type of hazard.
- To encourage cooperative management of emergency situations based on a common understanding of hazards and their impacts.
- To enhance Franklin County's emergency and disaster preparedness, response, mitigation, and recovery capabilities for all hazards.

1.2. Methods of Analysis

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also be used to assist local community officials in ranking and prioritizing those hazards that pose the most significant threat to their area based on a variety of factors deemed important by the planning team and other stakeholders involved in the hazard mitigation planning process. The RF system relies mainly on historical data, local knowledge, general consensus opinions from the planning team and information collected through development of the hazard profiles included in **Section 3.1**. 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 were obtained by assigning varying degrees of risk to 5 categories for each of the 24 hazards profiled in the *2018 Franklin County Hazard Mitigation Plan*. Those categories include: *probability*, *impact*, *spatial extent*, *warning time* and *duration*. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor is shown in **Table 1.2.1** and mirrors the weights assigned to each category in the *Pennsylvania 2013 Standard State All-Hazard Mitigation Plan*. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all 5 categories equals the final RF value, as demonstrated in the example equation in **Figure 1.2.1** below:

Hazard Risk Factor	=	Probability Rating	30%	+	Impact Rating	30%	+	Spatial Rating	20%	+	Warning Rating	10%	+	Duration Rating	10%

Figure 1.2.1: Risk Factor (RF) Equation

Table 1.2.1 summarizes each of the five categories used for calculating an RF for each hazard. According to the weighting scheme applied, the highest possible value is a 4.0.

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 PROBABILITY		4	
IMPACT *What, in terms of injuries, damage, death, and economic impact, would you anticipate 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 AFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THA ONE WEEK.		3	
	CATASTROPHIC	HIGH NUMBER OOF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPOERTY 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% OF AREA AFFECTED		2	
	MODERATE	BETWEEN 10% & 50% OF AREA AFFECTED		3	
	LARGE	BETWEEN 50% AND 100% OF AREA AFFECTED		4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Are impacts localized or regional?*	MORE THAN 24 HRS	SELF DEFINED	*(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	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	*(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	1	10%
	LESS THAN 24 HRS	SELF DEFINED		2	
	LESS THAN 1 WEEK	SELF DEFINED		3	
	MORE THAN 1 WEEK	SELF DEFINED		4	

Table 1.2.1: Summary of Risk Factor Approach Used to Rank Hazards at the Municipal Level

Since our first and most important priority in emergency response is to protect the lives of Franklin County citizens, the Risk Factors for each municipality were weighed based on the 2020 Census population results. This means that population density is also a factor in determining the Franklin County Risk Factor roll-up.

Each municipality was sent a survey based on the methodology identified above. However, the municipalities were only asked to score 4 of the 5 threat categories. The "Duration" category was standardized at the county level to make sure that a hazard occurring in one part of the county was in line with the same type of hazard occurring in another part of the county. That is, we did not want the survey data skewed because the "Duration" of the events was wildly varied. For example, if we are assessing a Winter Storm hazard threat, we know that the storm is not going to last longer in Chambersburg than in Waynesboro, on average. The numbers we used for the "Duration" of hazards characteristic were taken verbatim from the *Pennsylvania 2013 Standard State All-Hazard Mitigation Plan* for each threat. A copy of this Survey is included in **Appendix B** of this HVA.

We also expanded our Risk Factor results grading scale to five levels (See **Table 1.2.2** below).

Risk Factor Scale	
Catastrophic	**3.0 – 4.0**
Major	**2.5 - 2.9**
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Table 1.2.2: Risk Factor Scale for Hazard Assessments

This more granular scale allows for a finer distinction at the municipal level to identify those hazards that require immediate attention and those that can be more methodically mitigated. The results of this analysis are shown in **Section 4.1**.

1.3. Selection of Hazards

The HVA describes each hazard's occurrence and the effects on the county. It also identifies the effects of natural or human-caused hazard events by estimating the exposure of people, buildings, and infrastructure to hazardous conditions.

This HVA was performed in conjunction with the *Franklin County Hazard Mitigation Plan (HMP) Update for 2018* and updated based upon the Annual HMP Update performed in December of 2020. Therefore, the efforts to complete this HVA were undertaken by the Hazard Mitigation Planning Team (HMPT). The HMPT started the assessment by reviewing the natural and man-made hazards identified in the *Pennsylvania 2013 Standard State All-Hazard Mitigation Plan*. This plan identified 26 hazards that are prevalent in the state. A cursory review of these hazards was made to see if they were applicable to Franklin County. The team was able to identify two hazards (Coastal Erosion and Levee Failure) from this state-level plan that are not a factor for our Community. The remaining hazards (24 in total) were deemed to have the significance to our county and were assessed for potential occurrence and impact. These hazards are listed in **Table 1.3.1** below.

Natural (N) and Man-made (M) Hazards	
Civil Disturbance (M)	Mass Food/Animal Feed Contamination (M)
Dam Failure (M)	Nuclear Incident (M)
Drought (N)	Pandemic/Infectious Disease (N)
Earthquake (N)	Radon Exposure (N)
Environmental Hazards (M)	Subsidence/Sinkholes (N)
Extreme Temperatures (N)	Terrorism (M)
Flood, Flash Flood, Ice Jam (N)	Tornado/Windstorm (N)
Hailstorm (N)	Transportation Accident (M)
Hurricane, tropical Storm, Nor'easter (N)	Urban Fire/Explosion (M)
Invasive Species (N)	Utility Interruption (M)
Landslide (N)	Wildfire (N)
Lightning Strike (N)	Winter Storm (N)

Table 1.3.1: Summary of Natural and Man-made Hazard Threats to Franklin County

The definitions of these hazards to be assessed were provided in the *Pennsylvania 2013 Standard State All-Hazard Mitigation Plan* and are included in with the Hazard Survey included in **Appendix B**.

2. County Profile

2.1. Geography and Environment

Franklin County is in the south-central region of the Commonwealth in the southern Pennsylvania portion of the Cumberland Valley and covers a land area of 772 square miles. A section of the Mason-Dixon Line makes up the southern boundary of Franklin County while its most northerly point stretches jaggedly one-fourth of the way across the Commonwealth to an even latitude with Harrisburg (see **Figure 2.1.1** below).

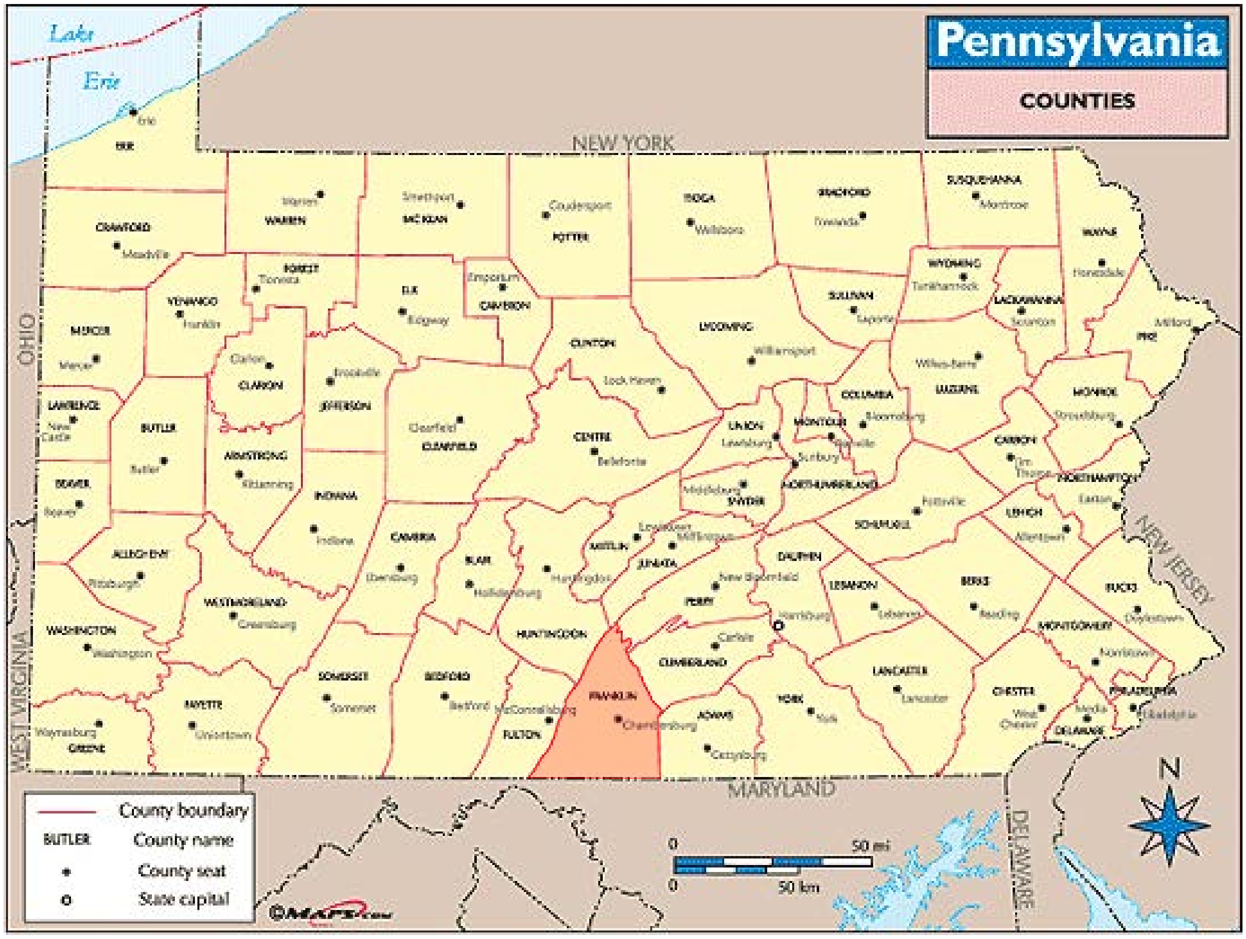

Figure 2.1.1: The Geography of Franklin County

Franklin County is bordered by Fulton, Huntingdon, Juniata, Perry, Cumberland, and Adams Counties in Pennsylvania. On our southern border, we are bounded by Washington and Frederick Counties in Maryland.

The county is supported by 4 watersheds: Conococheague-Opequon, Lower Juniata, Lower Susquehanna-Swatara, and the Monocacy. **Figure 2.1.2** below illustrates where these watersheds are located in the county.

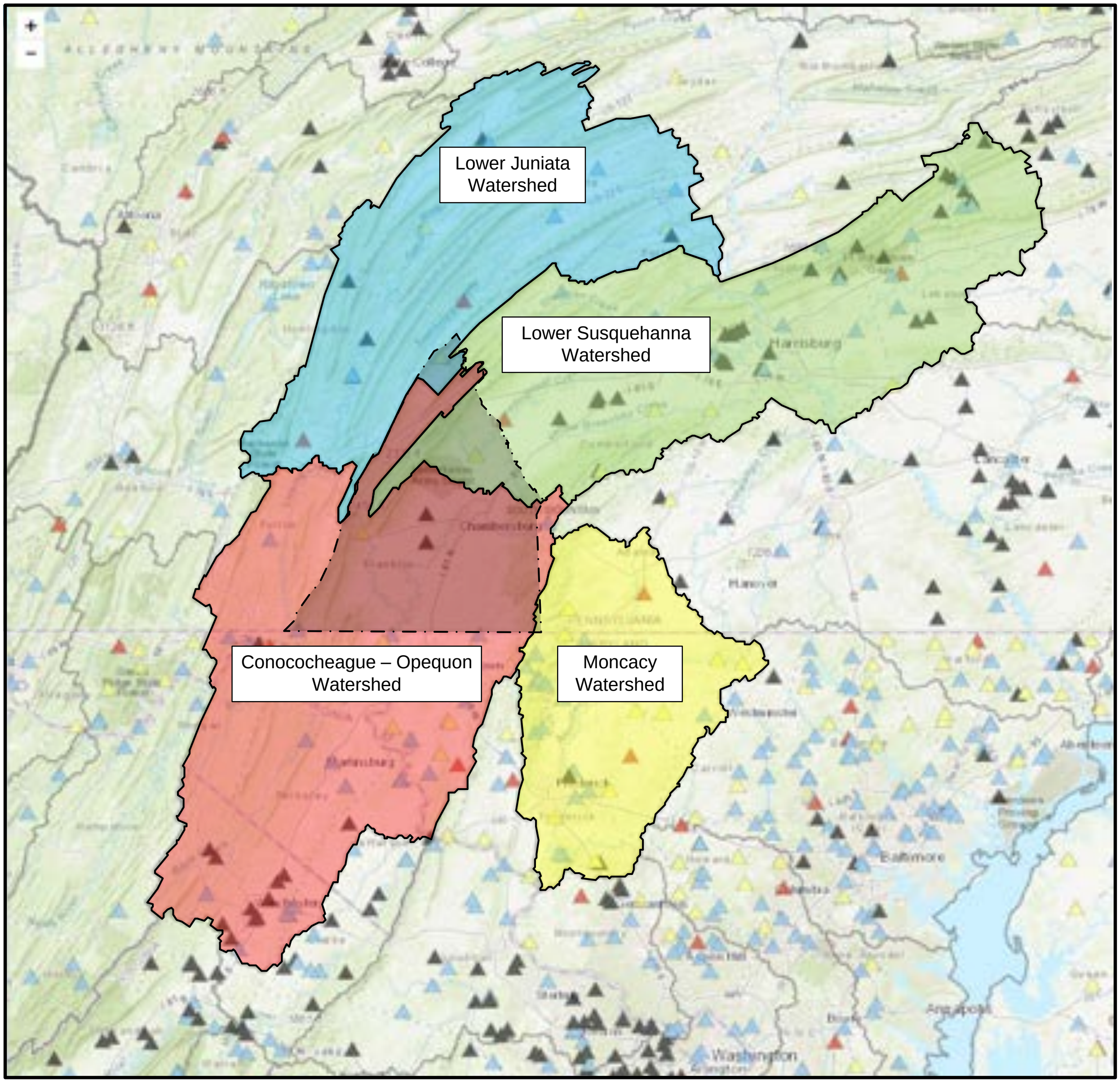

Figure 2.1.2: Franklin County Watersheds[15]

Theses watersheds support two larger watershed basins in the region, the Potomac and Susquehanna Basins. The Conococheague Creek (both branches), Little Cove Creek, Licking Creek, Tuscarora Creek, Back Creek, Antietam Creek, and their tributaries all drain to the Potomac River Watershed Basin. The Conodoguinet Creek, and its tributaries, drain to the Susquehanna River Watershed Basin. Both of these basins eventually drain to the Chesapeake Bay, a critical natural resource in the mid-Atlantic region.

Higher quality streams tend to be located along the eastern and western border regions, in more mountainous, less developed areas. The impaired streams and warm water streams are in the

[15] USGS

central, valley portion of the county, in areas with the highest level of development (See **Figure 2.1.3**).

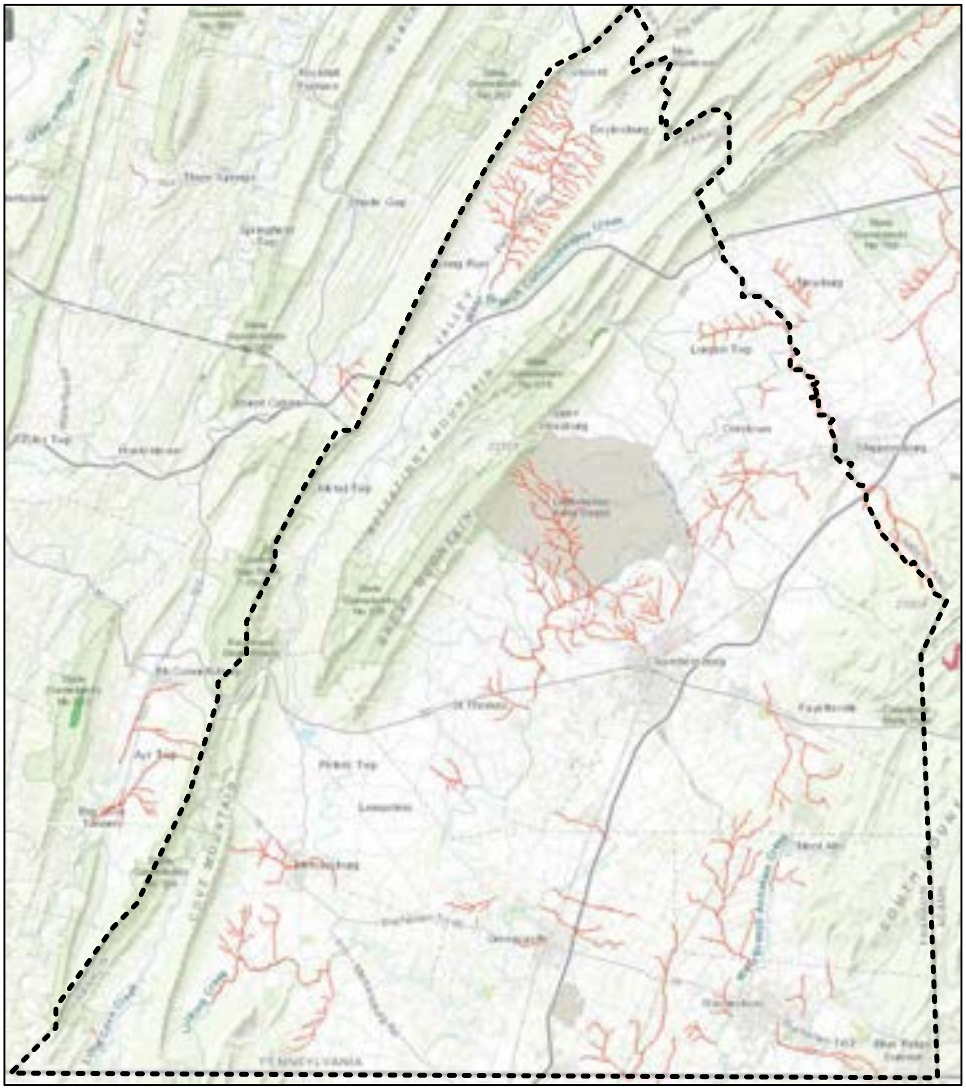

Figure 2.1.3: Impaired Stream Locations in Franklin County (red) (2018)[16]

There are a total of 1,696 miles of streams in Franklin County, with approximately 307 miles considered impaired. **Table 2.1.1** below lists the main causes of the stream impairment in the county. Siltation is the number one cause of stream impairment in the county, but there are several other factors that combine to negatively impact the natural environment.

[16] DEP, 2017

Impairment	Definition
Siltation / Suspended Solids / Turbidity	Water becomes dirty as a result of fine mineral particles in the water
Nutrients / Organic Enrichment-Low Dissolved Oxygen	Excessive nitrogen and phosphorous in the stream/creek
Water-Flow Variability / Flow Alterations / Other Habitat Alterations	Changes in hydraulic regime caused by water releases and increased surface runoff from impervious surfaces
Cause Unknown	Impairment cause has not been determined
Oil and Grease	Oil and/or Grease has polluted the stream/creek

Table 2.1.1: Causes of Impaired Streams in Franklin County[17]

Table 2.1.2 below lists the causes and number of miles of streams impacted by that causal factor or combination of causal factors in the county.

Impairment Cause(s)	Miles of Streams in Franklin County
Siltation / Suspended Solids / Turbidity	140.77
Siltation / Suspended Solids / Turbidity; Nutrients / Organic Enrichment-Low Dissolved Oxygen	104.40
Siltation / Suspended Solids / Turbidity; Water-Flow Variability / Flow Alterations / Other Habitat Alterations	30.68
Siltation / Suspended Solids / Turbidity; Nutrients / Organic Enrichment-Low Dissolved Oxygen; Water-Flow Variability / Flow Alterations / Other Habitat Alterations	12.94
Nutrients / Organic Enrichment-Low Dissolved Oxygen	4.15
Nutrients / Organic Enrichment-Low Dissolved Oxygen; Water-Flow Variability / Flow Alterations / Other Habitat Alterations	3.64
Siltation / Suspended Solids / Turbidity; Nutrients / Organic Enrichment-Low Dissolved Oxygen; Water-Flow Variability / Flow Alterations / Other Habitat Alterations; Cause Unknown	3.58
Water-Flow Variability / Flow Alterations / Other Habitat Alterations; Oil and Grease	2.36
Water-Flow Variability / Flow Alterations / Other Habitat Alterations	2.34
Siltation / Suspended Solids / Turbidity; Cause Unknown	1.79
Total	**306.65**

Table 2.1.2: Impaired Stream Miles in Franklin County[18]

[17] DEP, 2017
[18] DEP, 2017

Figure 2.1.4 below is a map of the streams and creeks that make up the water resources for Franklin County.

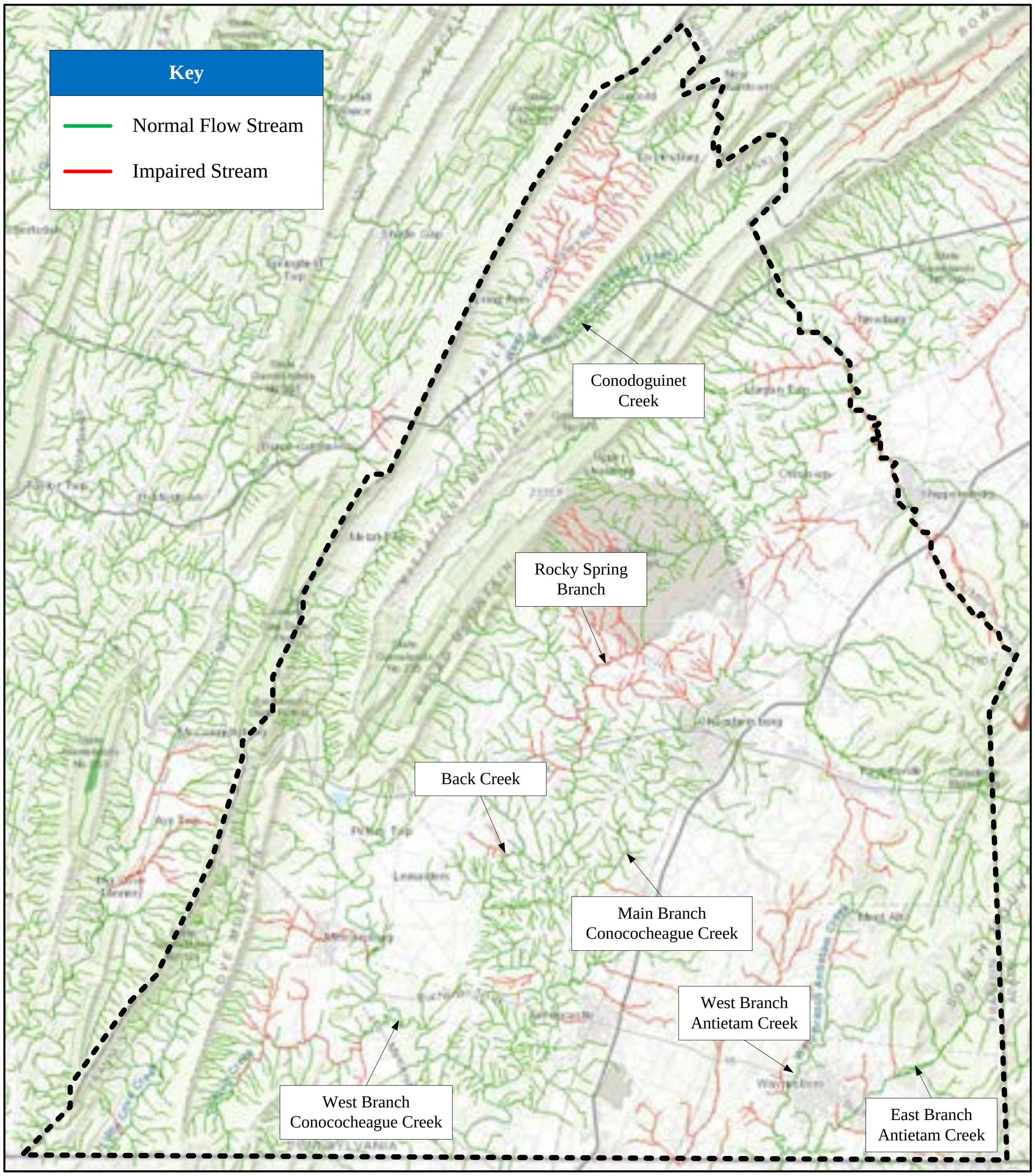

Figure 2.1.4: Franklin County Water Resources[19]

Interstate 81 and the Pennsylvania Turnpike (Interstate 76) transit through Franklin County's boundaries (see **Figure 2.1.5**). Two rail lines also cross through Franklin County, along with

[19] DEP, 2017

several sidings and spur lines (see **Figure 2.1.6**). In addition, several pipelines, which provide key hydrocarbons for the eastern seaboard, transit Franklin County (see **Figure 2.1.7**).

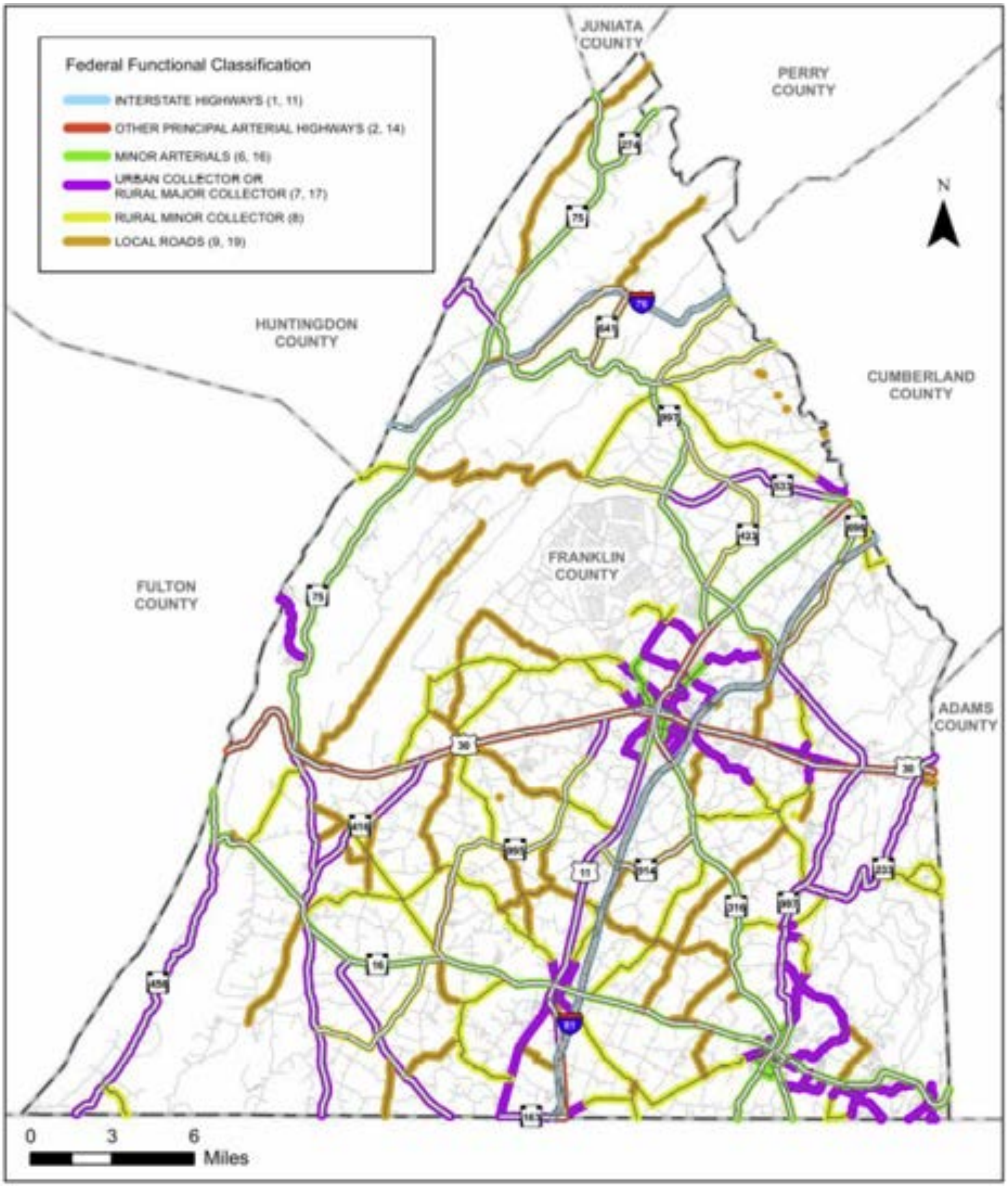

Figure 2.1.5: Highway Network in Franklin County

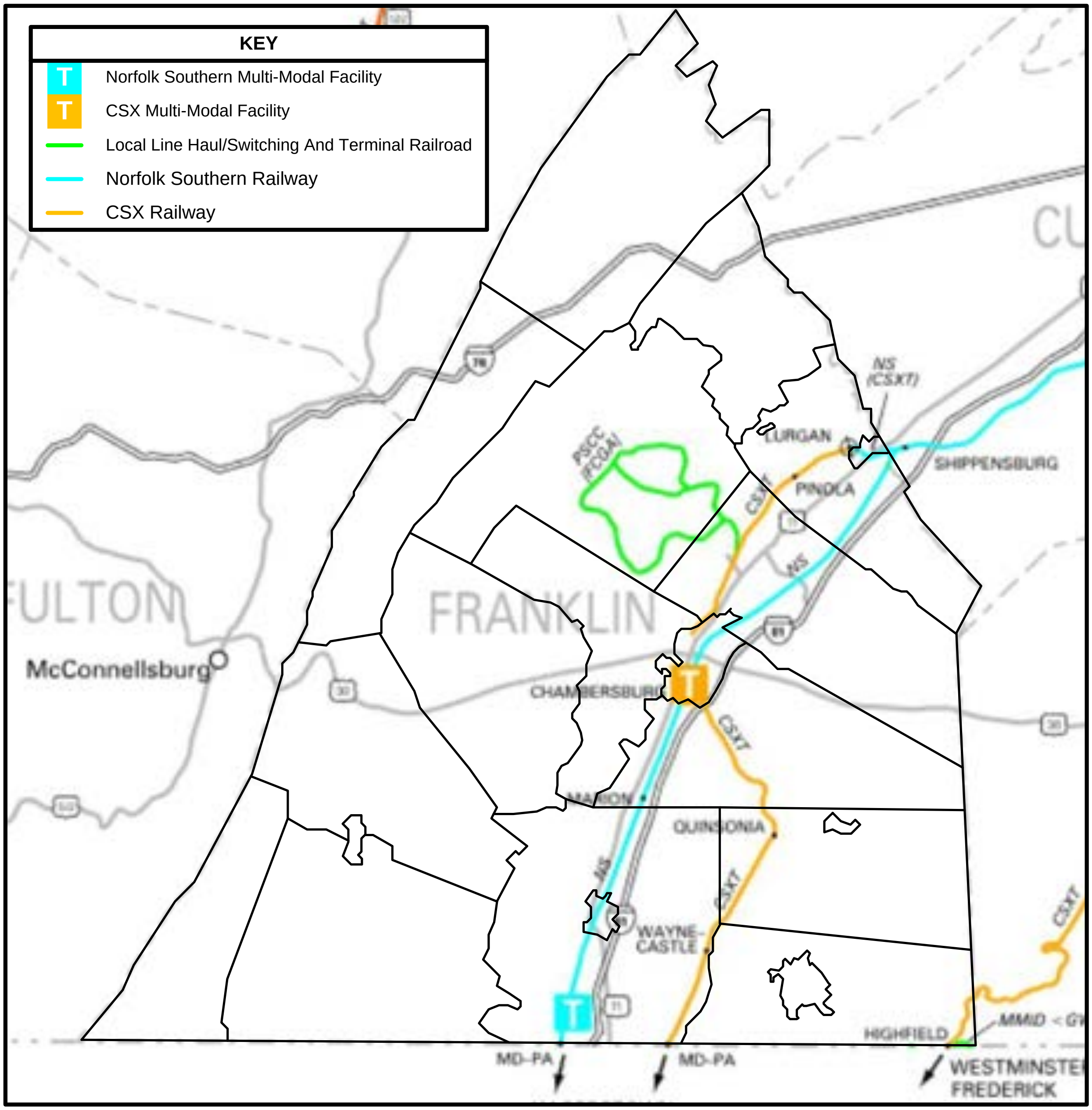

Figure 2.1.6: Railway Network in Franklin County

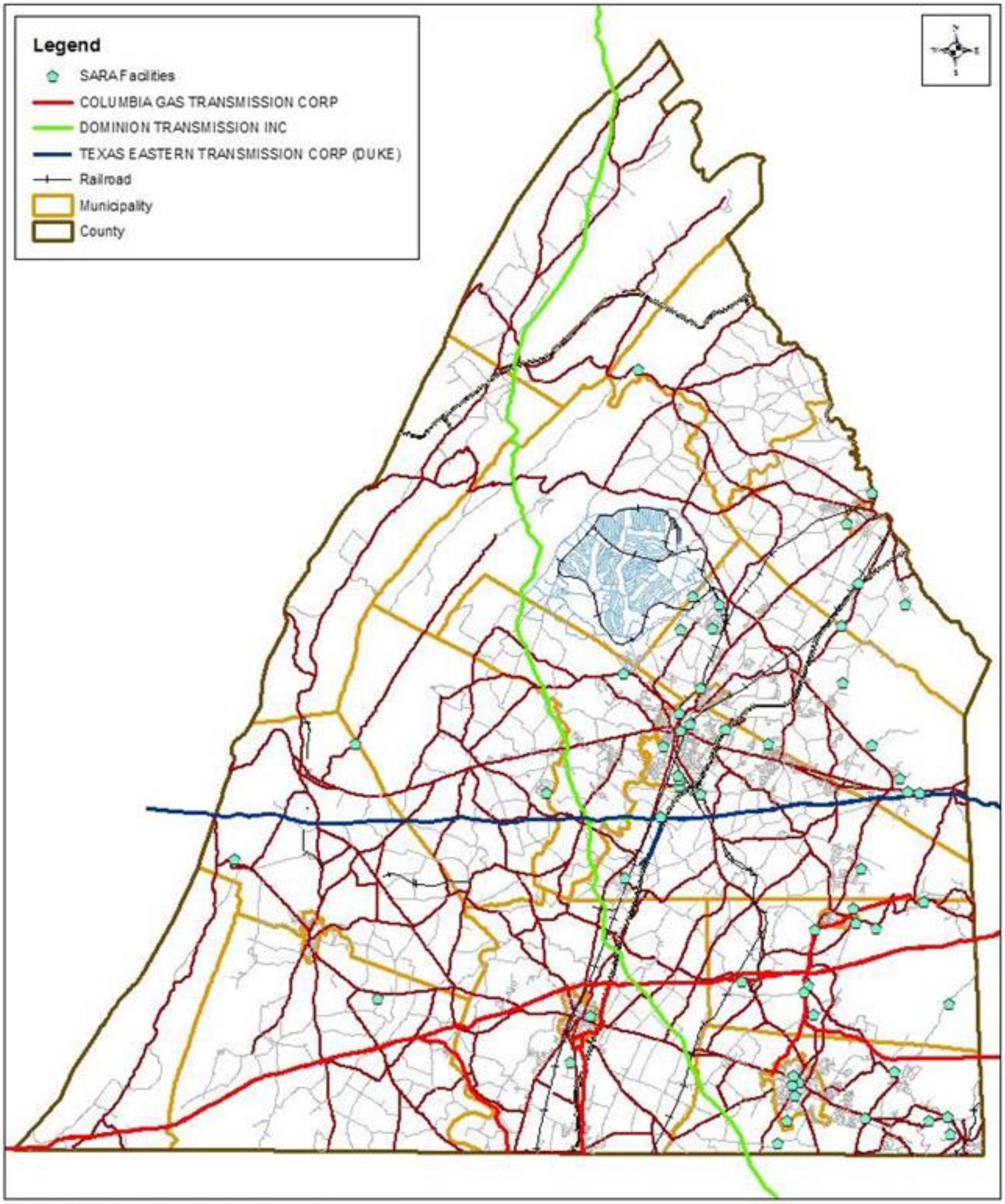

Figure 2.1.7: Pipeline Network in Franklin County

Franklin County supports a strong agricultural industry base; with agricultural receipts ranking 4th in the Commonwealth. The county has worked with the Commonwealth since 1990 to ensure permanent protection of agricultural land through the purchase of easements. Franklin County is ranked 13 in the number of individual farms under easement and 9 in the total number of acres protected in Pennsylvania. As of 2017, 16,882 acres at 130 farms were protected; in addition, approximately 104,276 acres are within Agricultural Security Areas[20] (see **Figure 2.1.8** below).

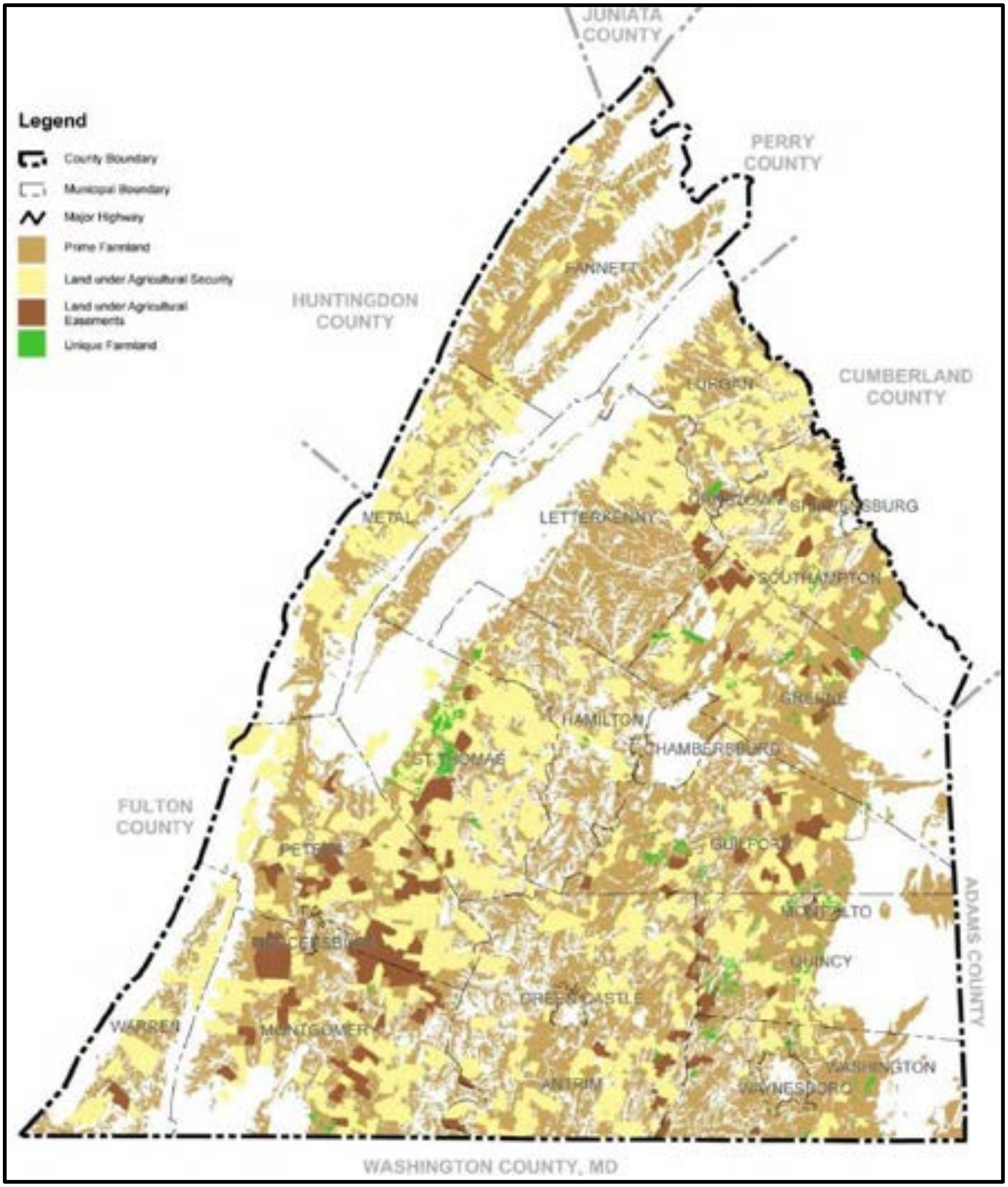

Figure 2.1.8: Franklin County Agricultural Resources[21]

[20] Pennsylvania Department of Agriculture, 2017
[21] Franklin County Comprehensive Plan, 2012

Franklin County has many recreational assets, including the Appalachian Trail, Tuscarora Trail, Cumberland Valley and Chambersburg Rail-Trails, Iron Horse Trail, three State parks, the Tuscarora, Buchanan, and Michaux State Forests (see **Figure 2.1.9** below), numerous State Game Lands, as well as several renowned trout fishing streams and dozens of local community parks; which together provide a variety of opportunities for biking, hiking, hunting, fishing, boating, wildlife viewing, and other pastimes.

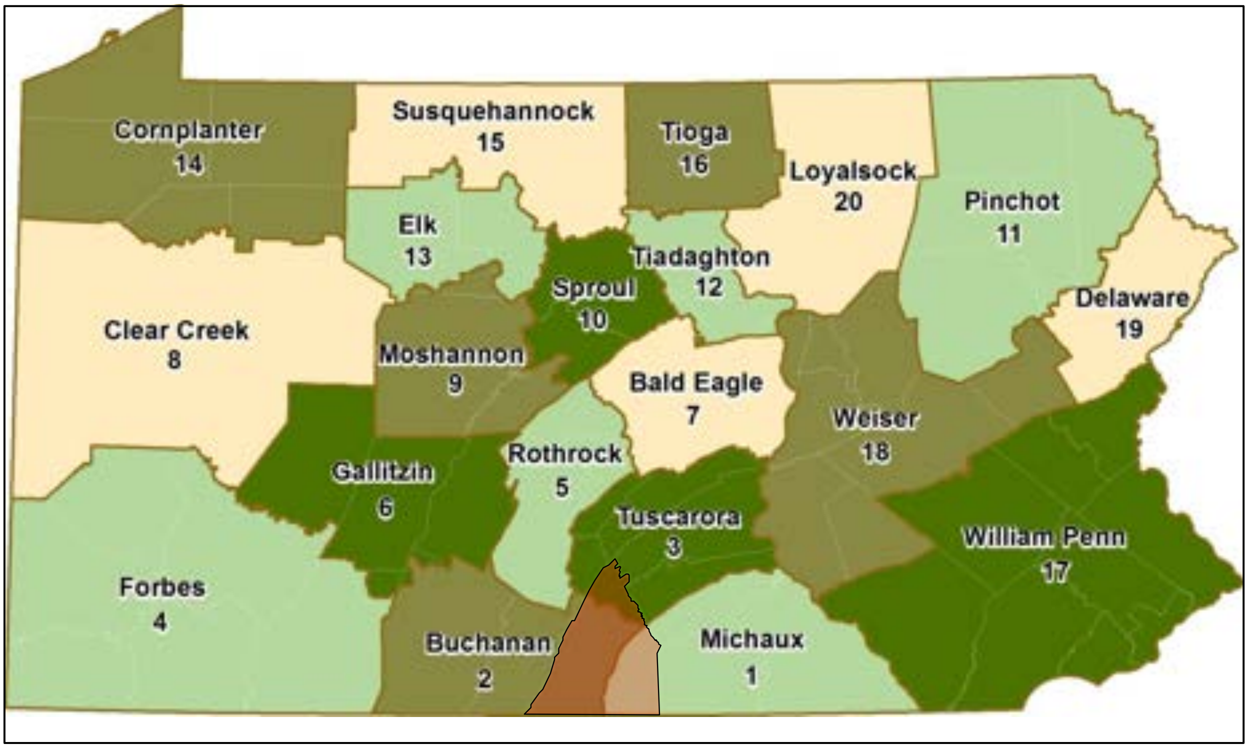

Figure 2.1.9: State Forests in Franklin County

Wilson College in Chambersburg, Penn State University-Mont Alto Campus, and Mercersburg Academy are the leading educational institutions, with Shippensburg University located along the northern border of Franklin County.

2.2. Community Facts

Originally part of Lancaster County (1729), then York County (1749), then Cumberland County (1750), Franklin County became an independent jurisdiction on September 9, 1784, relatively soon after the end of the American Revolutionary War. It is named in honor of Founding Father Benjamin Franklin.

The county has historically been an agricultural community with development concentrated in Chambersburg, Greencastle, Mercersburg, Shippensburg and Waynesboro. The county has maintained its agricultural economy and landscape as well as many of its historic structures.

There are 63 landmarks listed on the National Register of Historic Places for Franklin County including bridges, farms, homes and historic districts[22].

Chambersburg, the county seat, holds a distinction as the only northern town to be destroyed by the Confederate Army during the Civil War. On July 30, 1864, Brigadier General John McCausland and 2,800 Confederate cavalrymen entered Chambersburg and demanded $100,000 in gold or $500,000 in greenbacks in retaliation for Union Army actions in the Shenandoah Valley earlier in the war. The residents of Chambersburg failed to raise the ransom, and McCausland ordered his men to burn the town. Very few structures were left standing after the raid, two of note were the Masonic Temple and the Old Jail.

2.3. Population and Demographics

Franklin County is made up of 7 boroughs and 15 townships. **Figure 2.3.1** below shows the layout of the county and location of the municipalities.

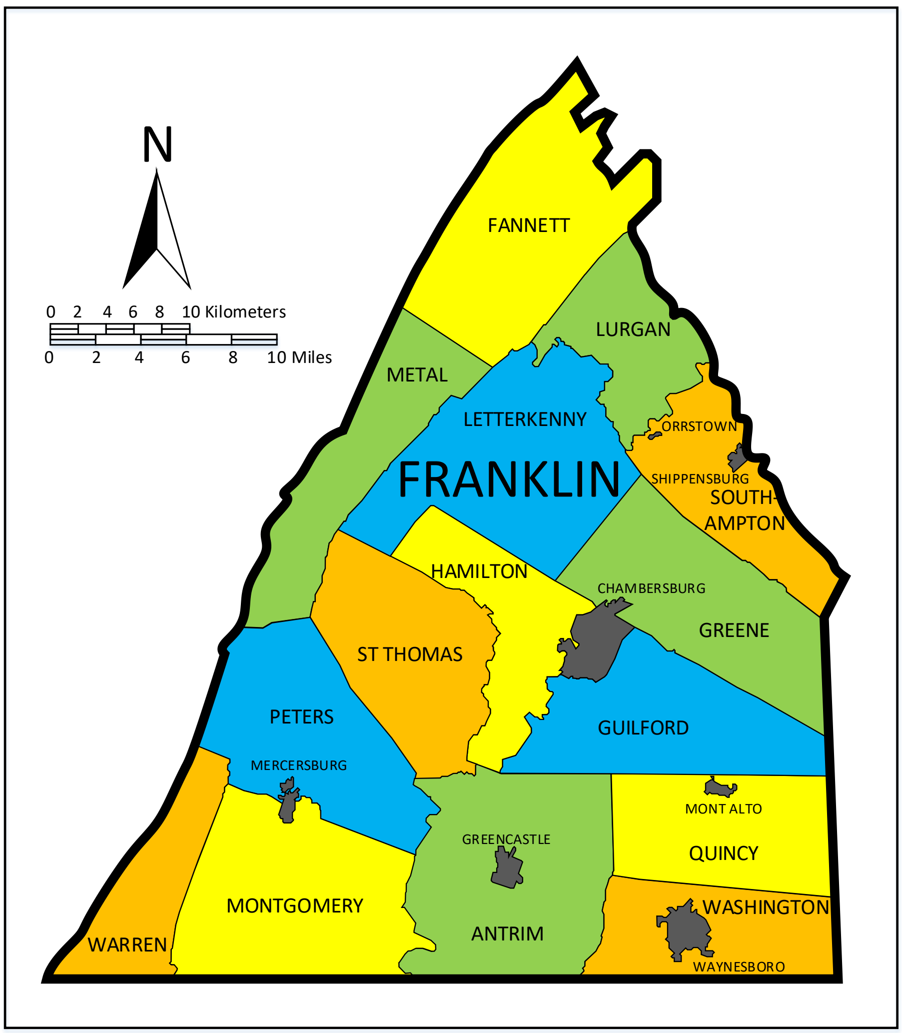

Figure 2.3.1: Franklin County Municipal Map

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[22] United States Department of Interior, 2017

Figure 2.3.2 represents the population of each of these municipalities as tallied by the 2020 US Census.

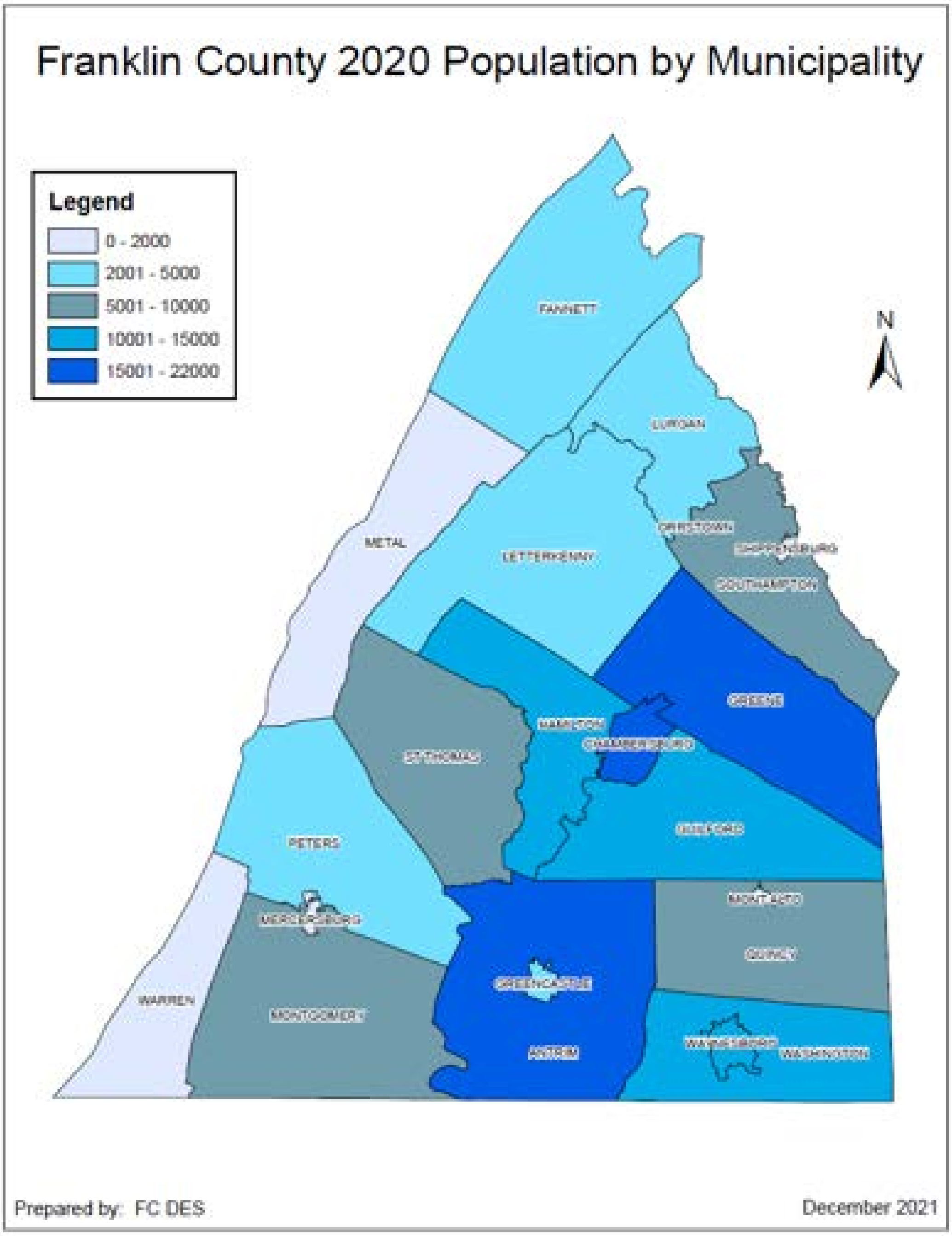

Figure 2.3.2: Franklin County Municipalities and 2020 Census Population

Population within the county grew 20.64% from 2000 to 2020 (see **Table 2.3.1** below).

Municipality	Population 1970	Population 1980	Population 1990	Population 2000	Population 2010	Population 2017 est	Population 2019 est	Population 2020
Antrim Township	7,378	9,326	10,107	12,504	14,893	15,596	15,768	15,778
Chambersburg Borough	17,315	16,174	16,647	17,862	20,268	20,872	21,143	21,903
Fannett Township	1,640	2,016	2,309	2,309	2,548	2,608	2,601	2,483
Greencastle Borough	3,293	3,679	3,600	3,722	3,996	4,017	3,986	4,251
Greene Township	9,504	11,470	11,930	12,284	16,700	17,659	17,898	18,436
Guilford Township	9,291	10,567	11,893	13,100	14,531	14,825	14,866	14,627
Hamilton Township	4,921	6,504	7,745	8,949	10,788	11,135	11,125	11,374
Letterkenny Township	1,419	1,960	2,251	2,074	2,318	2,383	2,377	2,462
Lurgan Township	1,649	1,986	2,026	2,014	2,151	2,177	2,170	2,207
Mercersburg Borough	1,727	1,617	1,640	1,540	1,561	1,543	1,532	1,507
Metal Township	1,205	1,576	1,612	1,721	1,866	1,870	1,853	1,768
Mont Alto Borough	1,532	1,592	1,395	1,357	1,705	1,740	1,729	1,580
Montgomery Township	3,221	4,252	4,558	4,949	6,116	6,239	6,230	5,740
Orrstown Borough	262	247	220	231	262	262	260	214
Peters Township	3,838	4,060	4,090	4,251	4,430	4,438	4,414	4,462
Quincy Township	5,264	5,792	5,704	5,846	5,541	5,482	5,451	5,318
St. Thomas Township	3,931	5,711	5,861	5,775	5,935	6,010	6,005	5,917
Shippensburg Borough	1,364	885	1,003	1,119	1,076	1,106	1,100	1,163
Southampton Township	3,292	4,604	5,484	6,138	7,987	8,540	8,495	8,566
Warren Township	262	269	310	334	369	371	368	328
Washington Township	8,514	9,616	11,119	11,559	14,009	14,624	14,770	14,897
Waynesboro Borough	10,011	9,726	9,578	9,617	10,568	10,879	10,886	10,951
County Totals	**100,833**	**113,629**	**121,082**	**129,255**	**149,618**	**154,376**	**155,027**	**155,932**

Table 2.3.1: Summary of Population Statistics for Franklin County and Incorporated Communities

Growth is expected to be between 8% and 16% through 2025, with the population of the county expected to be between 161,000 and 173,000. This reflects an increase of between 12,000 and 23,000 citizens from 2010 Census figures with the share of population expected to be within traditional working ages remaining relatively constant (see **Table 2.3.2**).

Age	% of Population in 2000	% of Population in 2010
<5	6.3%	7.4%
6 to 19	20.3%	18.7%
20 to 34	18.4%	17.7%
35 to 54	29.0%	26.5%
55 to 74	18.3%	21.3%
>74	7.7%	8.4%

Table 2.3.2: Franklin County Age Groups as a Percentage of Household Population (2000/2010/2016)[23]

Based on general county-wide build-out analysis, to fully develop the available land, the County would have approximately 300,000 households.

[23] US Census Bureau, 2017

2.4. Land Use and Development

Franklin County's fertile farmland not only produces major agricultural crops, but dairy and poultry farming are productive and well-financed industries. Industrially, Franklin County ranks high, having a variety of manufacturing and distribution facilities which complement the agricultural enterprises and the result is a stable and sound economy. **Tables 2.4.1** and **2.4.2** below capture the major industries and top employers in Franklin County respectively. In addition, significant truck and intermodal transportation facilities, including intermodal sites for both CSX and Norfolk Southern Rail Roads, are part of the infrastructure supporting the economy of Franklin County.

Industry	# Employees
Manufacturing	4,390
Logistics/Warehouse	3,920
Healthcare (WellSpan)	3,360
Federal (Letterkenny Army Depot)	3,150
Schools (Chambersburg area)	1,120
County Government	670
Total	16,610

Table 2.4.1: Major Industries in Franklin County (2017)[24]

Company/Organization	# Employees
WellSpan Health	3,360
Letterkenny Army Depot	3.150
Chambersburg Area School District	1,120
Manitowoc Crane Group/Grove Crane	950
Volvo Construction Equipment	850
Procter & Gamble Northeast Mixing Center	750
Franklin County Government	670
Target Distribution Center #589	590
Food Lion, Inc.	520
World Kitchen	510
Total	12,470

Table 2.4.2: Top Employers in Franklin County (2017)[25]

Because of its famous Blue Ridge Mountains, Franklin County lends itself easily to the entertainment of vacationers and persons seeking rest and relaxation. There is not a river in the county but many streams afford an ample supply of water for the fertile limestone soil.

[24] Franklin County Area Development Corporation, 2017
[25] Franklin County Area Development Corporation, 2017

Pasture and grasslands comprise approximately 30% of the land within Franklin County, with another 14% being cultivated by row crops. Over 30% of the land is classified as prime agricultural soil, which is composed of well-drained soil on slight slopes. Nearly 50% of the land within the county is forested, with the remaining 13% being utilized for residential, commercial and transportation uses (see **Table 2.4.3** and **Figure 2.4.1** below).

Land Use Category	% of County
Low Intensity Residential	2.33%
Medium Intensity Residential	3.08%
Low Intensity Non-Residential	2.18%
Medium Intensity Non Residential	1.52%
High Intensity Non Residential	0.38%
Active Strip Mining	0.16%
Transportation	1.83%
Row Crops	14.34%
Pasture/Grassland	29.32%
Golf Course	0.29%
Forest	43.37%
Barren Land	0.03%
Surface Water	0.33%
Wetlands	0.83%

Table 2.4.3: Land Use Coverage (2010)

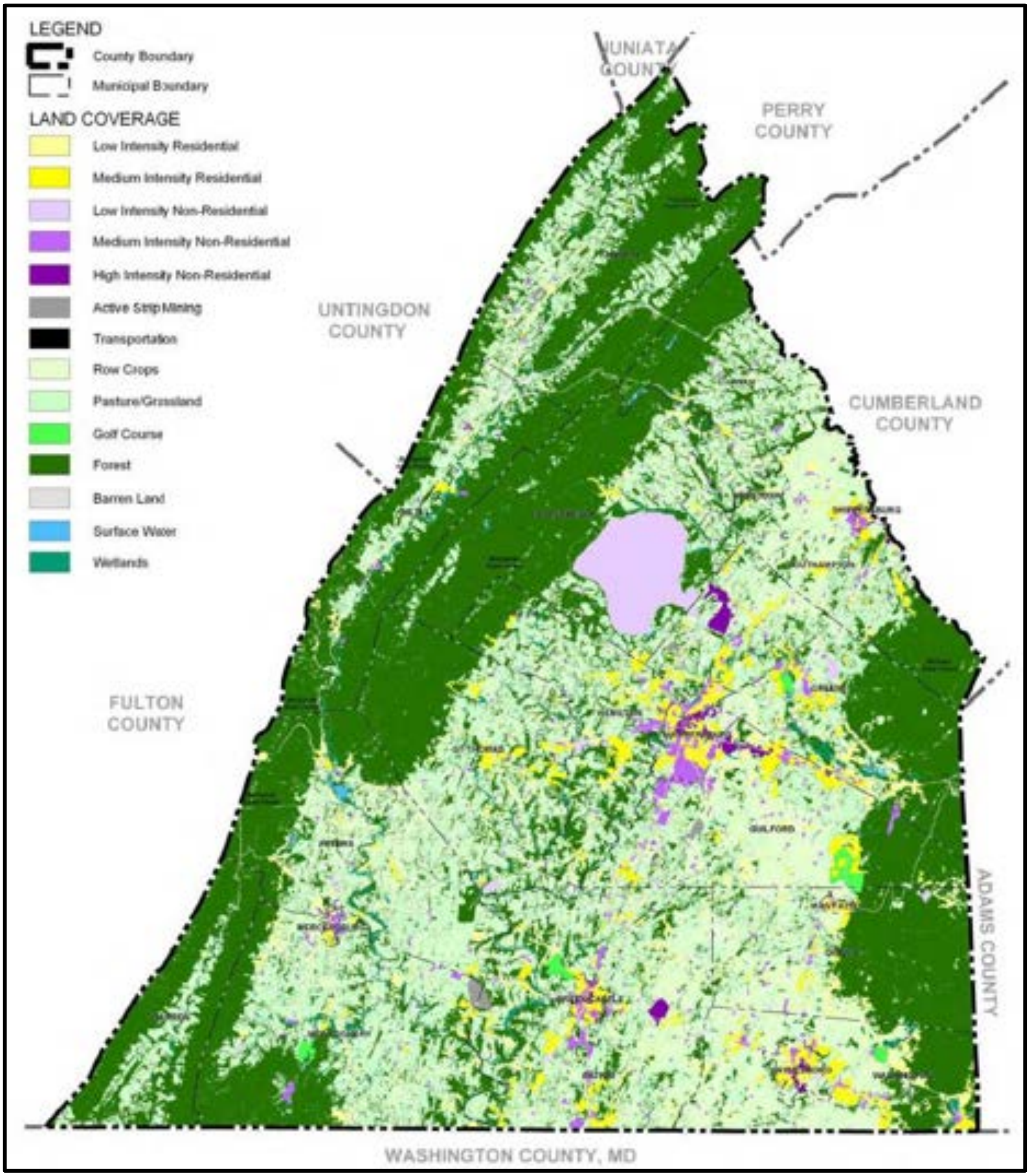

Figure 2.4.1: Franklin County Land Coverage (2010)[26]

The Land Use numbers cited from 2010, in **Table 2.4.3**, already take into account zoning change initiatives from the Franklin County Comprehensive Plan that was looking forward to 2025. These initiatives are only now starting to take effect and can be witnessed in the population transfer detailed in **Section 4.3** of this document.

[26] Franklin County Comprehensive Plan, 2012

An initiative that has been taken to try to limit the impacts of Land Use changes on our agrarian economy is the county's participation in easement and security area programs sponsored by the state. As highlighted in **Section 2.1**, Franklin County has 16,882 acres at 130 farms protected; in addition to approximately 104,276 acres that lie within Agricultural Security Areas. The number of acres (+971 acres) and farms (+11 farms) in easement areas represent a 6.1% growth since first published in the *2014 Franklin County HMP*, but the number of acres in security areas (-1,724 acres) has decreased. This results in a net loss of 753 acres (-0.7%) of protected agricultural area from 2014 to 2017 and may account for some of the growth seen in suburban developments highlighted in **Table 2.4.4** below.

With the continued economic and population growth, we have seen an increase in commercial building permits and subdivision zoning applications. **Table 2.4.4** shows this growth trend over the last 12 years.

Municipality	2005 Permits	2005 Lots	2007 Permits	2007 Lots	2010 Permits	2010 Lots	2016 Permits	2016 Lots
Antrim Township	0	12	2	8	0	10	2	4
Chambersburg Borough	2	25	23	20	5	9	3	23
Fannett Township	2	0	1	1	0	0	1	3
Greencastle Borough	0	1	3	0	0	2	0	0
Greene Township	5	4	4	0	1	0	2	3
Guilford Township	4	5	9	4	1	3	0	0
Hamilton Township	1	3	0	8	0	0	0	0
Letterkenny Township	0	0	0	1	0	0	0	1
Lurgan Township	0	0	0	3	0	1	0	0
Mercersburg Borough	2	1	1	0	0	1	0	0
Metal Township	1	0	3	0	0	0	0	0
Mont Alto Borough	0	2	1	0	0	0	0	0
Montgomery Township	4	2	1	0	1	1	2	2
Orrstown Borough	0	0	0	0	0	0	0	0
Peters Township	3	1	1	2	1	2	2	0
Quincy Township	1	1	4	0	0	1	3	0
St Thomas Township	1	0	1	0	0	0	0	0
Shippensburg Borough	2	1	0	1	0	0	0	1
Southampton Township	1	2	1	4	1	0	5	6
Warren Township	0	0	0	0	0	0	0	0
Washington Township	7	10	3	2	0	3	0	3
Waynesboro Borough	2	10	4	4	0	2	6	2
County Totals	**38**	**80**	**62**	**58**	**10**	**34**	**26**	**48**

Table 2.4.4: Franklin County New Construction Building Permits and Subdivision Lot Agreements

A factor that naturally limits adverse Land Use changes is the presence of State forests in and around our county that are protected from development. The Michaux State Forest on our Eastern flank, the Tuscarora State Forest on the Northern edge, and Pennsylvania State Game Lands #124 on the Western flank help protect the natural beauty of Franklin County.

However, it is inevitable that, to support population growth in our county, the current Land Use paradigm has to change. As the Franklin County Comprehensive Plan is updated in the next 2 years, the *Franklin County HMP* and this HVA will be updated to capture the changes in these Land Use demographics to further identify trends.

Franklin County has 53,410 land parcels, of which 50,419 are residential. The remaining 2,991 parcels are considered commercial properties. See **Table 2.4.5** below for the breakout of these parcels per municipality and their associated estimated values. These estimates only account for the value of the land and structures per parcel. It does not account for Loss of Contents, Function Loss, or Displacement Costs. Additionally, the costs associated with the facilities located on the Letterkenny Army Depot are not included in these numbers because the tax assessment database used to calculate the values does not include the federal properties of the Letterkenny Army Depot. However, they are included in the 1% flood loss numbers in **Section 3.1.7, Table 3.1.7.5.1** in the Letterkenny Township loss estimates.

Municipality	Total # of Resident Parcels	Assessed Value of Residential Parcels (1961 $)	Estimated Value of Residential Parcels (2017 $)	Total # of Commercial Parcels	Assessed Value of Commercial Parcels (1961 $)	Estimated Value of Commercial Parcels (2017 $)	Estimated Value of All Parcels (2017 $)
Antrim Township	5,123	$117,445,710.00	$896,110,767.30	157	$21,897,970.00	$167,081,511.10	$1,063,192,278.40
Chambersburg Borough	6,021	$102,551,060.00	$782,464,587.80	870	$88,126,100.00	$672,402,143.00	$1,454,866,730.80
Fannett Township	791	$10,713,090.00	$81,740,876.70	33	$724,340.00	$5,526,714.20	$87,267,590.90
Greencastle Borough	1,438	$30,497,140.00	$232,693,178.20	147	$8,426,130.00	$64,291,371.90	$296,984,550.10
Greene Township	6,180	$133,737,510.00	$1,020,417,201.30	260	$30,372,350.00	$231,741,030.50	$1,252,158,231.80
Guilford Township	5,499	$128,490,040.00	$980,379,005.20	308	$56,945,740.00	$434,495,996.20	$1,414,875,001.40
Hamilton Township	3,532	$78,639,040.00	$600,015,875.20	133	$7,790,290.00	$59,439,912.70	$659,455,787.90
Letterkenny Township	1,029	$15,742,350.00	$120,114,130.50	28	$704,720.00	$5,377,013.60	$125,491,144.10
Lurgan Township	639	$10,935,450.00	$83,437,483.50	21	$544,960.00	$4,158,044.80	$87,595,528.30
Mercersburg Borough	530	$7,952,760.00	$60,679,558.80	93	$4,084,150.00	$31,162,064.50	$91,841,623.30
Metal Township	801	$9,030,650.00	$68,903,859.50	34	$992,550.00	$7,573,156.50	$76,477,016.00
Mont Alto Borough	548	$8,103,410.00	$61,829,018.30	19	$1,035,040.00	$7,897,355.20	$69,726,373.50
Montgomery Township	1,950	$40,938,040.00	$312,357,245.20	27	$3,521,840.00	$26,871,639.20	$339,228,884.40
Orrstown Borough	72	$794,220.00	$6,059,898.60	3	$59,150.00	$451,314.50	$6,511,213.10
Peters Township	1,583	$24,937,150.00	$190,270,454.50	67	$1,904,040.00	$14,527,825.20	$204,798,279.70
Quincy Township	1,688	$26,880,840.00	$205,100,809.20	52	$5,338,390.00	$40,731,915.70	$245,832,724.90
Shippensburg Borough	459	$8,970,030.00	$68,441,328.90	32	$1,975,930.00	$15,076,345.90	$83,517,674.80
Southampton Township	2,394	$49,185,120.00	$375,282,465.60	85	$87,206,620.00	$665,386,510.60	$1,040,668,976.20
St Thomas Township	1,776	$32,665,700.00	$249,239,291.00	76	$2,956,770.00	$22,560,155.10	$271,799,446.10
Warren Township	85	$1,540,680.00	$11,755,388.40	1	$41,400.00	$315,882.00	$12,071,270.40
Washington Township	4,976	$113,023,070.00	$862,366,024.10	231	$17,883,910.00	$136,454,233.30	$998,820,257.40
Waynesboro Borough	3,305	$48,178,830.00	$367,604,472.90	314	$15,587,760.00	$118,934,608.80	$486,539,081.70
County Totals	**50,419**	**$1,000,951,890.00**	**$7,637,262,920.70**	**2,991**	**$358,120,150.00**	**$2,732,456,744.50**	**$10,369,719,665.20**

Table 2.4.5: Franklin County Parcel Breakdown and Value (2017)

Critical facilities and infrastructure as defined by Franklin County include: government buildings, schools, nursing homes, childcare facilities, jails, hospitals, medical/urgent care facilities, utility points/sub-stations, storage tanks, dams, water/waste water treatment facilities, radio towers, communications towers, airports/airstrips, fire/EMS/law enforcement facilities, and Superfund Amendments and Reauthorization Act (SARA) facilities. This definition was chosen to highlight the locations where mass evacuation may be needed and identify the emergency support infrastructure required to respond to impending disasters. This does not mean other locations in the county are not important, it is simply a fundamental prioritization required for initial response and recovery operations. **Table 2.4.6** shows the number of Critical Facilities located in each municipality in the county.

Municipality	Tier II (SARA)	Fire/EMS/LE	Government Bldg.	Education	Nursing Home	Child Care	Jail	Hospital	Medical/Urgent Care	Utility Points	Storage Tanks	Dams	Water Treatment	Waste Water Treatment	County Radio Tower	Cell/Other Tower	Airport/Airstrip	Municipal Totals
Antrim Township	10	1	1	4	1	23	0	0	0	27	2	0	0	2	0	3	1	**75**
Chambersburg Borough	11	6	7	12	5	22	0	1	17	6	3	0	0	1	1	5	0	**97**
Fannett Township	4	1	2	6	2	1	0	0	1	3	1	0	0	0	0	5	1	**27**
Greencastle Borough	3	1	3	5	0	5	0	0	1	2	2	0	1	0	0	1	0	**24**
Greene Township	5	4	5	9	3	24	1	0	2	18	14	5	1	0	1	4	4	**100**
Guilford Township	15	4	7	11	3	17	0	0	0	17	4	0	0	0	0	7	0	**85**
Hamilton Township	3	0	2	4	0	18	0	0	0	13	3	0	0	0	0	4	0	**47**
Letterkenny Township	1	1	2	0	0	1	0	0	0	0	1	4	0	0	1	9	0	**20**
Lurgan Township	0	0	1	7	0	1	0	0	0	3	0	3	0	0	1	4	1	**21**
Mercersburg Borough	0	2	2	2	0	2	0	0	1	1	0	0	0	0	0	0	0	**10**
Metal Township	1	1	1	3	0	1	0	0	0	3	0	1	0	1	0	3	0	**15**
Mont Alto Borough	0	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**6**
Montgomery Township	1	0	1	1	0	1	0	0	0	3	0	3	0	0	0	2	0	**12**
Orrstown Borough	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Peters Township	3	0	1	3	0	2	0	0	0	5	1	1	1	1	1	3	0	**22**
Quincy Township	3	0	4	9	3	3	0	0	1	8	9	3	2	0	0	3	0	**48**
Shippensburg Borough	0	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	**5**
Southampton Township	2	0	2	1	2	10	0	0	0	6	2	1	0	1	1	2	0	**30**
St Thomas Township	3	1	1	1	1	3	0	0	0	4	1	1	0	1	0	3	0	**20**
Warren Township	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**2**
Washington Township	5	2	2	1	0	11	0	0	1	9	2	5	0	1	0	7	0	**46**
Waynesboro Borough	4	5	1	8	3	9	0	1	4	3	2	0	0	1	0	4	0	**45**
County Totals	**74**	**33**	**48**	**91**	**23**	**156**	**1**	**2**	**28**	**131**	**47**	**27**	**5**	**9**	**7**	**69**	**7**	**758**

Table 2.4.6: Franklin County Critical Facilities (2017)

2.5. Data Sources and Limitations

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging hazard events was gathered. For a number of historic natural-hazard events, the National Climatic Data Center (NCDC) database was utilized. NCDC is a division of the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Information on hazard events is compiled by NCDC from data gathered by the National Weather Service (NWS), another division of NOAA. NCDC then presents it on their website in various formats. The data used for this plan came from the US Storm Events database, which "documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce"[27].

While NCDC data is comprised of natural hazards information, additional information focused more on human-made hazards was obtained through the Franklin County Computer Aided Dispatch (CAD) System database. When applicable, the CAD incident database spanning approximately the last 10 years (beginning on 4/27/2007), was used in the 2019 plan update.

Every attempt was made to provide consistency in reported data and in data sources. Data from the US Census Bureau 2010 Decennial Census was used throughout this plan, as well as Census estimates for 2018. In addition, the age of housing units reported in **Sections 3.1.21.5 & 3.1.24.5**, comes from the 2011-2015 American Community Survey because the Decennial Census no longer collects this information. As new Census data becomes available (2020), it will be incorporated into this HMP.

Additional information used to complete this vulnerability assessment was taken from various government agency and non-government agency sources. Those sources are cited where appropriate throughout the plan with full references listed in **Appendix A**. It should be noted that numerous Graphical Information Systems (GIS) datasets were obtained from the Pennsylvania Spatial Data Access (PASDA) website (http://www.pasda.psu.edu/). PASDA is the official public access geospatial information clearinghouse for the Commonwealth of Pennsylvania. PASDA was developed by the Pennsylvania State University as a service to the citizens, governments, and businesses of the Commonwealth. PASDA is a cooperative project of the Governor's Office of Administration, Office for Information Technology, Geospatial Technologies Office and the Penn State Institutes of Energy and the Environment of the Pennsylvania State University.

The Franklin County GIS Department provided the GIS dataset that was used as an inventory of structures throughout the county in this plan. This dataset included a generalized structure type which has been incorporated into this plan where appropriate.

The flood hazard area data used in this plan is the *Effective Countywide Digital Flood Insurance Rate Map (DFIRM)*, released January 18, 2012. This data provides flood frequency and elevation information used in the flood hazard risk assessment. Other GIS datasets including large and small streams, ponds, municipalities, roads, land use, and critical infrastructure were provided by the Franklin County GIS Department. Population data from the 2000 Census and 2018 estimated populations were obtained from the U.S. Census Bureau.

Due to the time and cost involved, the HMPT chose not to utilize HAZUS for the hazard analysis portion of the update. Instead, the Franklin County GIS Department used databases available to them to complete analysis on the various hazards throughout the plan as appropriate. The 100-year chance of flood was analyzed as follows:

> The Franklin County GIS Department conducted an analysis of the structures impacted by the 1% annual chance flood hazard (100-year flood hazard). Utilizing the following

[27] NOAA, 2006

geographic layers – 1% annual chance flood hazard areas (FEMA), parcels (Franklin), and building centroids (Franklin) – the Department identified those at risk structures impacted by the flood hazard. Using those at risk structures, were able to determine the associated structures' valuation data maintained by the county Tax Assessment Office.

Using the following formula, (building market value * 7.63), the structures valuation was converted from 1961 (base year) market value to 2017 market value.

The estimated loss for a 1% annual chance flood hazard was summarized by municipality and classified by structure land use[28].

This HVA evaluates the vulnerability of the county's critical facilities. For the purposes of this plan, critical facilities are those entities that are essential to the health and welfare of the community, including facilities that would be needed to serve as shelters in an emergency. The criteria for selection of these facilities is outlined in **Section 2.4, Table 2.4.6** of this plan. There are a total of 758 critical facilities in the county. **Table 2.4.6** above summarizes the critical facilities in Franklin County by type and by municipality.

3. Risk Assessment

3.1. Hazard Profiles

3.1.1. Civil Disturbance

Civil Disturbance is a broad term typically used by law enforcement to describe one or more forms of unrest that may include peaceful demonstrations or acts of violence. A civil disturbance can be an individual or collective action seriously interfering with peace, security, and/or functioning of a community. Demonstrations, civil unrest, public disorder, and riots happen for a number of reasons that include economic hardships, social injustices, ethnic differences, objections to world organizations, or certain governments, political grievances, and terrorist acts.

Civil disturbances can take the form of small gatherings or large groups blocking or impeding access to a building, or disrupting normal activities by generating noise and intimidating people. Demonstrations can range from a peaceful sit-in to a full-scale riot, during which a mob burns or otherwise destroys property and terrorizes individuals. Even in its more passive forms, group blockage of roadways, sidewalks, or buildings interferes with public order. Many protests intended to be peaceful demonstrations to the public and the government can escalate into general chaos.

Two types of large gatherings typically are associated with civil disturbances: a crowd and a mob. A crowd can be identified as causal, sighting, agitated, or mob-like:

[28] Franklin County GIS, 2018

- A causal crowd is identified as individuals or small groups with nothing in common to bind them together. If each has an agenda, it is his/her own. Casual crowds are made up of individuals or small groups occupying the same common place.

- Sighting crowds are similar to casual crowds; however, they gather for an event. People migrating as a crowd to sporting events, a group of people attracted to fires and accidents, and those attending music concerts are all types of sighting crowds. Individuals or small groups gather at these events for the same purpose. It is the event and/or individuals' curiosity that compels a crowd to come together.

- Agitated crowds add responses based on the elements (people, space, and event). Individuals with strong emotional feelings within a crowd can quickly spread and infect the rest of the crowd. As more people within the crowd become emotionally involved, a sense of unity may develop, causing changes in the overall demeanor of the crowd. Yelling, screaming, and name-calling all are associated with an agitated crowd.

- Mob-like crowds have all the elements of crowd types described above, in addition to aggressive, physical, and sometimes violent actions. Under these conditions, individuals within a crowd will often say or do things they usually would not do. Extreme acts of violence and property damage are often part of mob activities. These consist of, or involve elements of people and groups mixing together and becoming fluid[29].

A mob can be defined as a large disorderly crowd or throng. Mobs are usually emotional, loud, tumultuous, violent, and lawless. Similar to crowds, mobs have different levels of commitment, and can be classified into the following four categories[30]:

- Aggressive Mob: An aggressive mob attacks, riots, and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from an aggressive crowd only by lawless activity. Examples of aggressive mobs are inmate mobs in prisons and jails, mobs that act out their frustrations after political defeat, or violent mobs at political protests or rallies.

- Escape Mob: An escape mob is attempting to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs are generally difficult to control and can be characterized by unreasoning terror.

- Acquisitive Mob: An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits an authority's lack of control in safeguarding property.

- Expressive Mob: An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent up emotions in highly charged situations.

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[29] HQ, Department of the Army FM 3-19.15, 2005
[30] Alvarez and Bachman, 2007

3.1.1.1. Location and Extent

Although Franklin County is a rural setting, there are still areas in the county that could be subject to civil disturbances. Government facilities, landmarks, county jail, and university campuses are common sites where crowds and mobs may gather. Other types of institutions such as juvenile correctional facilities, treatment units, and youth development centers may be targets for civil unrest.

Civil unrest and disturbances affect the following factions of society:

- The public: The general population could serve as participants or targets in actions of civil unrest. Widespread unrest could cause fear among the populace and cause them to be absent from school or work activities. During an event, bystanders may be harmed because of activities of participants.

- Responders: Responses to civil unrest events are generally handled at the local level. Response to a large event of this type may exceed the resources of a local jurisdiction. In this instance, state resources would be activated to fill the need. During an event, responders may become targets, which could hamper their effectiveness.

- Continuity of operations, including delivery of services: An outbreak of widespread rioting or looting could impact the state/county's ability to provide services and conduct normal operations. Protesters could occupy government buildings and interrupt normal functions of government, or targeted attacks on government facilities could halt operations entirely.

- Property: Private property often serves as a target in instances of civil unrest. Businesses can be targeted for looting or vandalism. If an event is particularly large, damage could reach millions of dollars and recovery could take years.

- Facilities: Often in acts of civil unrest, government facilities become the focus of protests or targets for vandalism. Damage during an event or inability of workers to enter a facility may greatly reduce a facility's effective capacity or close it completely.

- Infrastructure: Similar to government facilities, public and private infrastructure can become targets of civil unrest. Damage to transportation, communication, or utility infrastructures could further exacerbate the situation.

- Environment: Normally, civil unrest would minimally impact the environment. However, if petroleum or other chemical facilities become targets for vandalism or large-scale fires occur, effects on the environment could be significant.

- Economic condition of the county: Civil unrest could prove economically crippling to Franklin County. Large-scale events are usually accompanied by wide-spread absenteeism and damage to private property.

- Public confidence in the county's governance: If an event becomes prolonged or is perceived to be mismanaged, it could greatly decrease public confidence in the governance of the county. If the response is seen to be inadequate, individuals may attempt to protect their properties by their own means and further exacerbate the situation.

Civil disorders can result in numerous secondary hazards. Depending on the size and scope of the incident, civil unrest may lead to widespread urban fire, utility failure, transportation interruption, and environmental hazards. The most significant impact of civil unrest is the secondary hazard of interrupted continuity of government, which can also lead to other secondary hazards cited in the previous paragraphs. The extent of secondary hazards will vary significantly based on the extent and nature of the civil unrest.

3.1.1.2. Range of Magnitude

The magnitude or severity of a civil unrest depends on the nature of the disturbance. This can take form as a small gathering or a large group blocking access to buildings or disrupting normal activities. Civil unrest events can range from peaceful sit-ins to a full-scale riot.

3.1.1.3. Past Occurrence

Civil Disturbances are rare in Franklin County. Most involve very small crowds or individuals protesting about perceived political/social injustices. In November and December of 2016, there were several protests held outside the Franklin County Courthouse after the 2016 Presidential elections. These gatherings were formed to express dissatisfaction with the election results. Some of these protests also centered on the proposed repeal and replacement of the Affordable Care Act (Obama Care) proposed by the newly elected president. These protests amounted to no more than a nuisance for the public that work in and around the county seat. However, there has been another type civil unrest that has been growing in the region and we have seen an example of this is Franklin County. This unrest is the emergence of the Sovereign Citizen movement.

The Sovereign Citizen movement is based on a decades-old conspiracy theory. At some point in history, sovereign citizens believe, the American government set up by the founding fathers, with a legal system the sovereign citizens refer to as “common law”, was secretly replaced by a new government system based on “admiralty law”, the law of the sea and international commerce. Under common law, or so they believe, the sovereign citizens would be free men. Under admiralty law, they are slaves, and secret government forces have a vested interest in keeping them that way. Some sovereign citizens believe this perfidious change occurred during the Civil War, while others blame the events of 1933, when the U.S. abandoned the gold standard. Either way, they stake their lives and livelihoods on the idea that judges around the country know all about this hidden government takeover, but are denying the sovereign citizens' motions and filings out of treasonous loyalty to hidden and malevolent government forces.

In May of 2017, a gentleman claiming to be a sovereign citizen espoused, in his criminal trial for assault, that laws did not apply to him as a sovereign citizen. He was subsequently convicted and jailed for simple assault, but not before proclaiming his sovereign citizen status above the jurisdiction of the Franklin County judicial system. This was a relatively benign case, but the movement has been growing in Pennsylvania and has spawned several frivolous Sovereign Citizen civil lawsuits that are tying up normal judicial processes and resources.

Another example of Civil Disturbance in Franklin County was the 1990 strike of T.B. Woods corporation in Chambersburg. The union at the company voted for a strike to grieve to company's refusal to arbitrate on a $0.50 per hour raise demanded by the worker's. The strike lasted 2.5 years and was quite intense at times. The Pennsylvania State Police were even called in to make sure things did not get out of hand. No damages or injuries were reported. The company eventually resumed business operations and the strike was broken when the union was voted out, saving over 230 jobs at the manufacturing plant. This disturbance disrupted the daily lives of over 300 local families for over 2 years and resulted in over $12M in losses for the company[31].

However, the starkest example of Civil Disturbance in Franklin County was the burning of Chambersburg during the Civil War. On July 30, 1864, Brigadier General John McCausland and 2,800 Confederate cavalrymen entered Chambersburg and demanded $100,000 in gold or $500,000 in greenbacks in response to the Union Army's actions in the Shenandoah Valley earlier in the War. The residents of Chambersburg failed to raise the ransom, and McCausland ordered his men to burn the town. It is understood that this instance is an extreme case due to the nature of the war that was being waged at the time, but it is still part of the history of Franklin County, and one that is remembered every year with a reenactment every July.

3.1.1.4. Future Occurrence

Many civil unrest incidents are spontaneous and can occur at any time, rendering prediction of probability of future occurrences difficult. When these incidents occur, they can become extremely disruptive and difficult to control. Assumedly, civil unrest incidents including marches, protests, demonstrations, and gatherings will continue to occur throughout Franklin County.

Due to the relative rarity of occurrences and the minimal disruptions they have caused in the county in the past (excluding the Civil War), the probability of a Civil Disturbance occurring again in Franklin County is considered ***possible*** as defined by the Risk Factor ranking probability criteria (See **Section 1.2**).

3.1.1.5. Vulnerability Assessment

Figure 3.1.1.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Civil Disturbance hazard. One can see that only 3 of 22 municipalities rated this threat as either a Major or Moderate event. This is a Minor threat ranked 22 overall for Franklin County.

[31] Hartford Courant, 2014

Civil Disturbance
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	1	30%	1	30%	2	20%	1	10%	2	10%	1.3	10.12%	0.1316
Chambersburg Borough	2	30%	1	30%	1	20%	4	10%	2	10%	1.7	14.05%	0.2389
Fannett Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.59%	0.0175
Greencastle Borough	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	2.73%	0.0382
Greene Township	2	30%	2	30%	1	20%	3	10%	2	10%	1.9	11.82%	0.2246
Guilford Township	1	30%	2	30%	1	20%	4	10%	2	10%	1.7	9.38%	0.1595
Hamilton Township	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	7.29%	0.1166
Letterkenny Township	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	1.58%	0.0221
Lurgan Township	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	1.42%	0.0199
Mercersburg Borough	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	0.97%	0.0155
Metal Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.13%	0.0124
Mont Alto Borough	1	30%	2	30%	2	20%	2	10%	2	10%	1.7	1.01%	0.0172
Montgomery Township	3	30%	3	30%	2	20%	3	10%	2	10%	2.7	3.68%	0.0994
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	0.14%	0.0018
Peters Township	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	2.86%	0.0400
Quincy Township	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	3.41%	0.0546
Shippensburg Borough	2	30%	1	30%	2	20%	4	10%	2	10%	1.9	0.75%	0.0143
Southampton Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	5.49%	0.1208
St Thomas Township	3	30%	2	30%	1	20%	4	10%	2	10%	2.3	3.79%	0.0872
Warren Township	1	30%	2	30%	2	20%	3	10%	2	10%	1.8	0.21%	0.0038
Washington Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	9.55%	0.1051
Waynesboro Borough	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	7.02%	0.0772
Municipal Weighted Average Risk Factor (RF)(*Updated 09/03/2021*)													1.618

Figure 3.1.1.5.1: Municipal Civil Disturbance Threat Vulnerability Self-Assessment

The entire county is considered vulnerable to this hazard. Potential losses from civil unrest incidents include human health, life, and property resources. In the transportation industry alone, it was assessed in 2011, that 1.2 billion tons of goods valued at $1.6 trillion traversed PA highways. A large portion of that transits the two major arteries traversing Franklin County (Interstate 81 and the Pennsylvania Turnpike). Any disruption to these major arteries or their feeder routes would have a negative impact not only to Franklin County, but might be felt all over the East Coast of the United States.[32]

Civil disorder incidents can lead to injury and/or death for both the involved persons and innocent bystanders. If a civil disturbance turns violent, it can lead to injury and/or death for personnel responding to the incident. The number of people exposed to a civil disturbance depends on population density at the place and time of the incident. Increases in population or hosting of major political, economic, or social events could increase the likelihood and severity of a civil unrest incident.

3.1.2. Dam Failure

A dam is an artificial barrier that has the ability to store water, wastewater, or liquid-borne materials for the storage or control of water.[33] Dams are built for a variety of reasons which include recreation, water supply, hydroelectric power generation, agriculture irrigation, and flood control. Dams are typically constructed of concrete, earthen materials, timber, and stone. [34]

Over 95% of the dams listed in the National Inventory of Dams are either privately owned, public utility owned, or locally owned and under the responsibility of the individual state for which they are located. The vast majority of the dams (over 88%) consist of an earthen embankment. Over 93% of the regulated dams have a dam height less than or equal to 50 feet and 50% of the regulated dams have a dam height less than or equal to 25 feet. The inventory of regulated dams is aging, with 70% of the dams older than 43 years. By 2029, over 85% of the dam inventory will be older than 50 years.[35]

Dam failures can result from one or more of the following reasons:

- Cracking caused by natural settling of a dam or movement caused by an earthquake.
- Structural failure due to faulty materials used in construction.
- Inadequate maintenance or upkeep of the dam due to failure to remove trees or repair seepage problems.
- Deliberate acts of sabotage.
- Overtopping caused by flooding due to excessive rain.
- Piping and internal erosion is caused by seepage.

[32] PennDOT, 2016
[33] The National Dam Safety Act of 2006
[34] FEMA P-946, 2013
[35] FEMA P-946, 2013

3.1.2.1. Location and Extent

Table 3.1.2.1.1 below lists the 33 dams in Franklin County (See **Figure 3.1.2.1.1** below for purpose/type definitions). We have B-1, C-3 and C-4 class dams (Refer to **Figure 3.1.2.1.2** below for description of these classifications). These classes of dams are found in the Pennsylvania Code (§ 105.91. classification of dams and reservoirs). They are used for hydroelectric, intake drinking water, irrigation, mill operations, private pond, public water source, recreation, and snow making water supply. The description of Franklin County dams are concrete, earth, gravity, masonry, run of river, and stone.

Table 3.1.2.1.1 also contains 6 dams that are located outside of Franklin County, but have the potential to impact our population. Three (3) dams are located in Adams County, 1 dam is located in Fulton County, and 2 dams are located in Washington County, Maryland which would inundate Franklin County if the dams failed. The inspection dates are listed for the dams, when available.

Dam #	Name	Municipality	Stream	Class	Purpose	Type	Last Inspection
28-001	Mercersburg Resevoir	Peters	Buck Run	C-4	S	RE	
28-004	Roxburg	Letterkenny	Conodoguinet	C-4	R	RE	
28-006	Rattlesnake	Quincy	Little Antietam	C-4	JS	CN	
28-011	Caledonia Furnace	Greene	Birch Run	C-4	R	RE	
28-014	US Papermill	Guilford	Conococheague	C-4			
28-037	W. H. Walker	Metal	Creek	C-4	R	RE	7/1/2014
28-043	Williamson	St Thomas	Back Creek	C-4	M	CN	
28-044	Montgomery Mills	Montgomery	WB Conococheague	C-4	HM	T	
28-045	C. A. Anderson	Montgomery	WB Conococheague	C-4	M	CN	
28-048	Mercersburg Resevoir	Peters	Buck Run	C-4			
28-073	Shockleys	Washington	EB Little Antietam	C-4	M	R	
28-075	Middour	Washington	EB Antietam	C-4	RP	S	
28-088	Shippensburg Borough	Lurgan	Trout Run	C-4	SJ	CN	
28-092	Red Run Lake	Washington	Red Run	C-4	R	S	
28-095	Wohelo Lake	Washington	Red Run	C-3	R	RE	6/26/2017
28-096	Roxbury	Letterkenny Township	Conodoquinet	B-1	S	G	10/26/2017
28-103	Comet Lake	Washington Township	Spring Run	C-3	R	RE	6/26/2017
28-108	Caledonia Water Co.	Greene Township	Stump Run	C-3	S	RE	7/26/2017
28-110	Lake Letterkenny Dam	Letterkenny Township	TR Rocky Spring Br	C-3	R	S	
28-111	Rocky Spring Dam	Letterkenny Township	Rocky Spring Br Back	C-3	R	RE	
28-112	Pond	Letterkenny Township	TR Keasy Run	C-4	I	RE	
28-114	Whitetail Land Co - A	Montgomery Township	TR Licking Creek	B-1	UIR	RE	12/29/2017
28-116	Scotland Pond #1	Greene Township	Conococheague	C-4	R	CN	
28-117	Scotland Pond #2	Greene Township	Conococheague	C-4	P	RR	
28-118	Scotland Pond #3	Greene Township	Conococheague	C-4	P	N	
28-119	Habig	Fannett Township	WB Conococheague	C-4	P	CN	
28-121	Amberson Valley Estates	Fannett Township	WB Conococheague	C-4	P	S	
28-122	Whitetail D	Montgomery Township	Conococheague	C-4	P	RE	
28-123	Whitetail C	Montgomery Township	TR Licking Crrek	C-3	P	RE	6/26/2017
28-124	Beacon of Greene	Guilford Township	TR Conococheague	C-4	P	RE	
28-125	Conocodell Golf Club	Greene Township	TR Conococheague	C-4	R	RE	
28-128	Timmons Farm Pond	Letterkenny Township	TR Conodoquinet	C-4			
28-129	Intake Pond	Quincy Township	EB Antietam	C-4			
01-073	Antietam	Hamiltonban Twp (Adams)	EB Antietam	B-1	S	RE	3/16/2018
01-077	Carbaugh Run	Franklin Twp (Adams)	Carbaugh Run	C-1	S	RE	11/15/2017
01-082	Long Pine Run	Franklin Twp (Adams)	Birch Run	A-1	S	RE	11/8/2017
29-032	Meadow Grounds	Ayr Twp (Fulton)	Roaring Run	B-1	R	RE	6/22/2017
MD00070	Lower Lake Royer	Washington Co., MD	TR Falls Creek	High	SR	RE	7/20/2017
MD00157	Upper Lake Royer	Washington Co., MD	TR Falls Creek		SR	RE	7/20/2017

Table 3.1.2.1.1: Dams with Potential to Impact Franklin County (June 2021)

Type Code	Description	Purpose Code	Description
CB	Butress	A	Ash Basin
CN	Concrete	B	Sediment Basin
ER	Rockfill	C	Flood Control
MS	Masonry	D	Debris Control
MV	Multi-arch	E	Slurry Impoundment
OT	Other	F	Stormwater Detention
PG	Gravity	G	Industrial/Mining Water Supply
QQ	Unpopulated	H	Hydroelectric
RC	RCC	I	Irrigation
RE	Earth	J	Intake Drinking Water
RR	Run of River	K	Intake Non-Drinking Water
SH	Sheetpile	L	Water Treatment Lagoon
ST	Stone	M	Mill Operation
TC	Timber Crib	N	Navigation
VA	Arch	O	Farm Pond
		P	Private Pond
		Q	Unpopulated
		R	Recreation
		S	Public Water Supply
		T	Tailings
		U	Snowmaking Water Supply
		V	Diversion
		W	Waste Impoundment (Untreated)
		X	Treated Waste Impoundment
		Y	Wetland Mitigation
		Z	Frac Water Lagoon

Figure 3.1.2.1.1: Definitions of Type and Purpose codes in Table 3.1.2.1.1

Hazard Classification	Impound Storage (acre ft)	Dam Height (ft)	Category Population at Risk	Economic Loss	Inspections
A1	A >= 50,000	H >= 100	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.	Once a year by owner's engineer
A2			Few (A small number of homes or small businesses).	Appreciable such as limited residential, commercial, or agricultural damage, or moderate public inconvenience.	Once a year by owner's engineer
A3			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.	Every 2 years by DEP
A4			None expected (no permanent structures for human habitation or employment)	Minimal damage to private or public property and no significant public inconvenience.	Every 5 years by DEP
B1	1000 < A < 50,000	40 < H < 100	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.	Once a year by owner's engineer
B2			Few (A small number of homes or small businesses).	Appreciable such as limited residential, commercial, or agricultural damage, or moderate public inconvenience.	Once a year by owner's engineer
B3			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.	Every 2 years by DEP
B4			None expected (no permanent structures for human habitation or employment)	Minimal damage to private or public property and no significant public inconvenience.	Every 5 years by DEP
C1	A <= 1000	H <= 40	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.	Once a year by owner's engineer
C2			Few (A small number of homes or small businesses).	Appreciable such as limited residential, commercial, or agricultural damage, or moderate public inconvenience.	Once a year by owner's engineer
C3			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.	Every 2 years by DEP
C4			None expected (no permanent structures for human habitation or employment)	Minimal damage to private or public property and no significant public inconvenience.	Every 5 years by DEP

A is Area of Dam	H is Height of Dam

Figure 3.1.2.1.2: Pennsylvania Dam Classifications

Hazard Potential Category 1 and 2 Dams (A-1, A-2, B-1, B-2, C-1 and C-2) are required to be inspected by the owner's engineer every year and the report submitted to FCDES by December 31st. The Pennsylvania Department of Environmental Protection (DEP) also inspects these dams on an annual basis[36].

Hazard Potential Category 3 and 4 Dams (A-3, A-4, B-3, B-4, C-3 and C-4) are not required to have an annual inspection report submitted. However, they should be inspected and observed every 3 months by the dam owner for any changes in condition. DEP inspects the Category 3 dams every other year and the Category 4 dams every 5 years.[37]

3.1.2.2. Range of Magnitude

Dam failures could cause significant or catastrophic damage to communities downstream of high hazard dams. The impact is determined by the amount of water which is released from the dam overflow or complete failure of the dam. DEP defines a high hazard dam as "any dam so located as to endanger populated areas downstream by its failure."

Dam failure evacuation time for people, pets, or livestock from the inundation area may vary due to circumstance. Dam failures can cause loss of life, hazardous materials releases, loss of critical infrastructure, agricultural damage, loss of livestock, loss of homes and businesses, and damage to natural resources. It can devastate a community and the economy. Seepage in earth dams could give a few hours for evacuation if detected early before failure. Overtopping due to heavy rain may give a few hours to evacuate or there may be a flash flood that gives little warning of dam failure. Dam failure could also be manmade due to terrorism or faulty operation of the dam.

The following high hazard dam failures would cause significant or catastrophic impact in Franklin County (See **Figure 3.1.2.2.1** below for overall map of Franklin County Dam Inundation Zones).

- Roxbury Dam would affect Lurgan, Letterkenny, and Southampton Townships.
- Whitetail Land Co. A. would affect Borough of Mercersburg and Montgomery Township.
- Gunter Valley Dam would affect Lurgan and Letterkenny Townships (at this time it has been breached and was removed from the list of dams in 2021).
- Adams County Dams that would affect Franklin County are; Antietam, Carbaugh Run and Long Pine Run.
- Meadow Grounds Dam in Fulton County which will affect Warren Township (visibly emptied, but dam wall still intact).
- Lower Lake Royer Dam in Washington County, MD which will affect Washington Township.

[36] DEP, 2013
[37] DEP, 2013

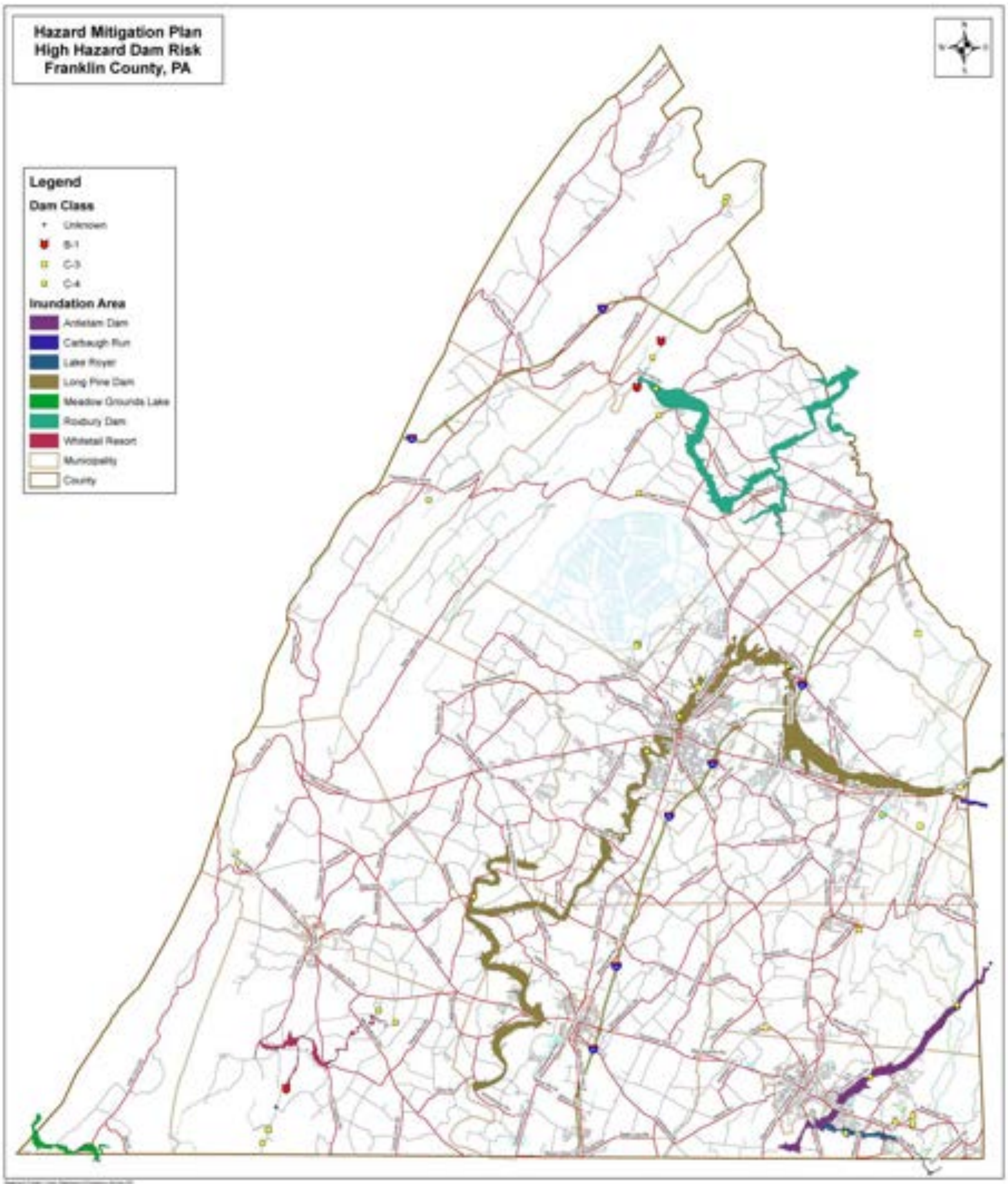


Figure 3.1.2.2.1: Franklin County Dam Inundation Zones (Dec 2017)

3.1.2.3. Past Occurrence

There have been 3 significant dam failures in Pennsylvania. The notorious Johnstown Flood is one of America's best-known disasters. The disaster occurred when an unusually large amount of rain fell over western Pennsylvania in May of 1889. Consequently, the earthen South Fork Dam breached on May 31, 1889 and released 20 million tons of water into the Conemaugh River

Valley, Cambria County. As the water rushed through the valley it swept away part of the community of South Fork and the communities of Mineral Point, Woodvale, Franklin, East Conemaugh, and finally, Johnstown. The dam had been known to be leaking and gave way when it was overtopped by the floodwaters. The narrow valley and the dense build-up along the Conemaugh floodplain downstream from the dam aggravated the flood catastrophe. When the flood was over, 16,000 people were homeless and 2,209 were dead.

On September 30, 1911, the Bayless Dam broke, claiming 78 lives in Austin, Potter County[38]. On July 19-20, 1977, a dam failure occurred on Laurel Run, Johnstown, PA. The filling of the lake and overtopping of the Laurel Run dam went unnoticed during a late-night storm. The dam break came as a complete surprise, even though it probably occurred over a time span of roughly one hour. The failure killed 84 people and caused between $3 - 6 million in damages.

3.1.2.4. Future Occurrence

Provided that adequate engineering and maintenance measures are in place, high hazard dam failures are unlikely in Franklin County. DEP inventories and generally regulates all dams that meet one of the following criteria[39]:

- The dam is located across a watercourse and the contributory drainage area to the dam exceeds 100 acres;
- The dam is located across a watercourse and the maximum depth of water, measured from the upstream toe of the dam to the top of the dam at maximum storage elevation, is greater than 15 feet;
- The dam is located across a watercourse and the impounding capacity (storage volume) at maximum storage elevation is greater than 50 acre-feet;
- The dam stores water, is not located on a watercourse, and has no contributory drainage, but the maximum depth exceeds 15 feet and the maximum storage volume exceeds 50 acre-feet;
- The dam is used for storage of fluids or semi-fluids other than water, the escape of which may result in air, water, or land pollution or in danger to persons or property

The construction, operation, maintenance, modification and abandonment of dams regulated by DEP is reviewed and monitored by the Department's Program of Dam Safety. Dams are evaluated based on categories such as slope stability, undermining seepage, and spillway adequacy. The presence of structural integrity and inspection programs significantly reduces the potential for major dam failure events to occur. Minor dam failures are more common since low hazard structures are minimally regulated, but the impact of these events is minimal.

[38] ASDSO, 2010
[39] DEP, 2013

Dam Emergency Action Plans drafted in accordance with the Federal Guidelines for Dam Safety identify the risk related information include the inundation area and the time lapse between failure and flooding reaching specific destinations downstream. Seven (7) of the 34 dams located in Franklin County are regulated by DEP and have approved Emergency Action Plans. These plans are also reviewed and approved by PEMA and a copy is kept at FCDES.

Dams regulated by federal agencies are subject to the dam safety offices of the regulating agency. The Federal Emergency Regulatory Commission (FERC) Office of Energy Projects' Dam Safety and Inspections Division conducts construction, operation, exemption, special, pre-license, and environmental and public use inspections of energy production dams to minimize risk associated with FERC dams. United States Army Corps of Engineers (USACE) dams are inspected and maintained by the district the dam is located.

3.1.2.5. Vulnerability Assessment

The Pennsylvania Code classifies dams based on impoundment storage, dam height, loss of life, and economic loss. Vulnerability is defined by identifying the location of dams having high hazard potential, as defined by The Pennsylvania Code (§ *105.91 Classification of Dams and Reservoirs*). Specifically, Category 1 dams were identified, indicating that the loss of life would be substantial or that economic loss would be excessive to residential, commercial, and agricultural areas and cause substantial public inconvenience. Notably, in 2011, the provisions for dam hazard potential classification changed; a fourth category of dam was added to capture instances where there might be damage to property but not loss of human life.[40]

The extent of downstream inundation areas vary based on dam characteristics. Inundation maps show the area that is projected to be impacted by flooding due to a dam failure. A county wide GIS layer of inundation maps would be effective in identifying risk more precisely than a dam location map. The inundation areas included on the maps in this document were digitized in GIS using the newest plans that have been provided to Franklin County. The accuracy of the areas is dependent on the quality and size of the maps in those plans. However inundation maps are not available in ArcGIS or AutoCAD for Franklin County due to the various levels of ownership and administration; the inundation information is hosted by a variety of different federal, state, local agencies and private owners.

Franklin County has 3 high hazard dams; Gunter Valley Dam (removed in 2021), Roxbury Dam, and the Whitetail Land Co – A Dam, but is impacted by an additional 5 external high hazard dams; Antietam Dam (Adams County), Carbaugh Run Dam (Adams County), Long Pine Run Dam (Adams County), Meadow Grounds Dam (Fulton County), and Lower Lake Royer Dam (Washington County, MD). The following section shows inundation maps and pictures of these dams.

[40] PEMA, 2013

Gunter Valley Dam

Gunter Valley Dam (28-102) is visibly breached, and was removed from the list of dams in 2021. **Figure 3.1.2.5.1** and **Figure 3.1.2.5.2** below show the lakebed and the tributary to the Gunter Valley Dam respectively.

Figure 3.1.2.5.1: Gunter Valley Dam Lakebed

Figure 3.1.2.5.2: Stream Leading into Gunter Valley Dam

Figure 3.1.2.5.3 below shows an aerial view of the Gunter Valley Dam. However, no inundation area is shown due to the dam being breeched. This document will be updated if the circumstances of the operation of this dam changes.

Figure 3.1.2.5.3: Aerial View of Gunter Valley Dam Without Inundation Zones

<u>Roxbury Dam</u>

The Roxbury Dam (28-096) is classified as a B-1 high hazard dam. **Figure 3.1.2.5.4, Figure 3.1.2.5.5,** and **Figure 3.1.2.5.6** below show south end of the dam wall, the north wing wall, and the entrapment area respectively.

Figure 3.1.2.5.4: South Wall of Roxbury Dam

Figure 3.1.2.5.5: North Wing Wall of Roxbury Dam

Figure 3.1.2.5.6: Entrapment Area of the Roxbury Dam

Figure 3.1.2.5.7 below shows the Roxbury Dam inundation area. It impacts Letterkenny, Lurgan, and Southampton Townships before flowing into Cumberland County.

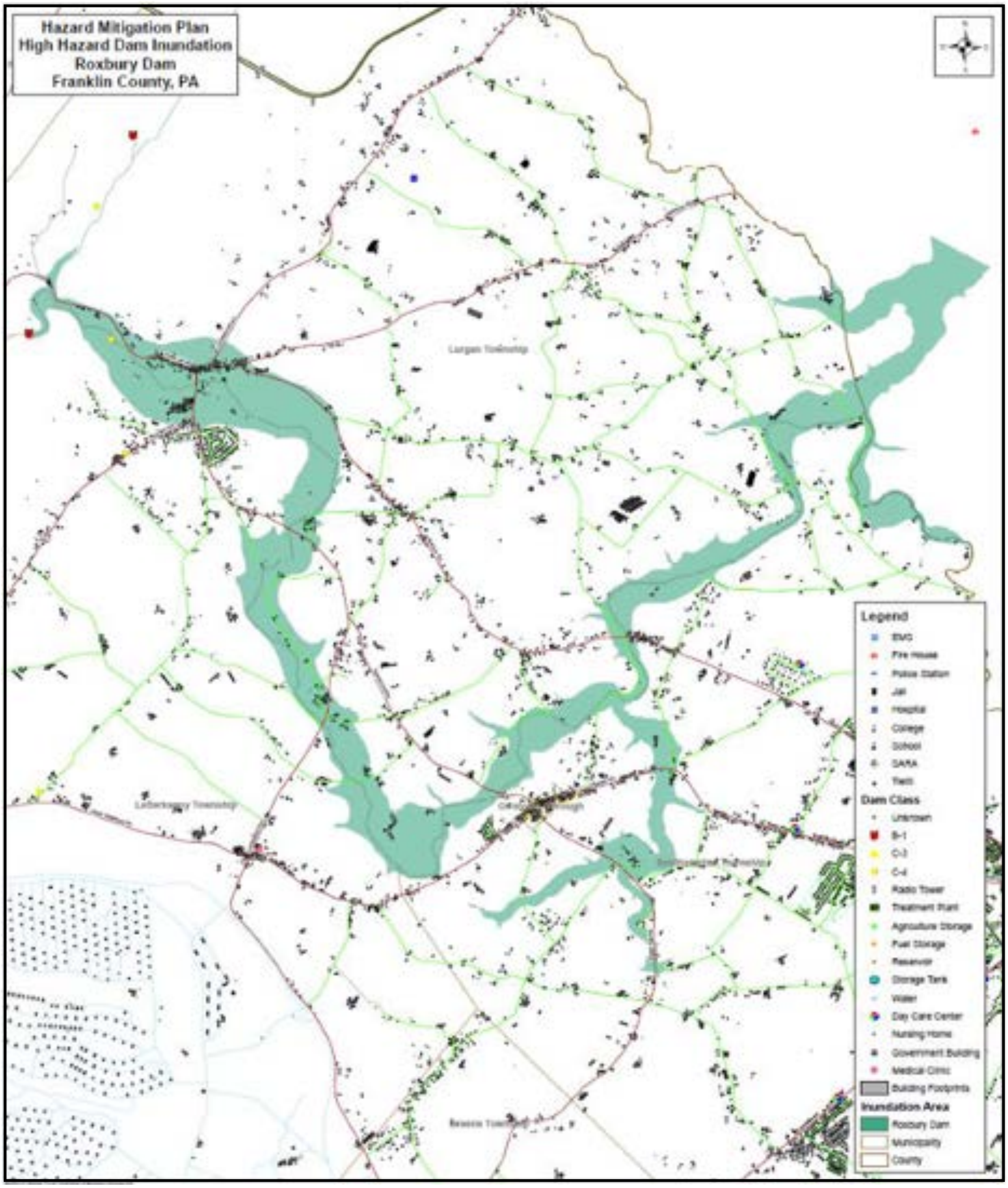


Figure 3.1.2.5.7: Roxbury Dam Inundation Zones (Dec 2017)

Table 3.1.2.5.1 below identifies the number of structures impacted by the Roxbury Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Roxbury Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Letterkenny Township	17	134	$561,570	$5,295,605
Lurgan Township	163	411	$1,902,080	$17,936,614
Southampton Township	35	86	$678,330	$6,396,652
Totals	215	631		$29,628,871

Table 3.1.2.5.1: Roxbury Dam Inundation Zone Structural Impacts (Oct 2021)

Whitetail Dam Land Co – A

The Whitetail Land Co – A Dam (28-114) is classified as a B-1 high hazard dam. **Figure 3.1.2.5.8, Figure 3.1.2.5.9,** and **Figure 3.1.2.5.10** below show the entrapment area, spillway, and dam wall respectively.

Figure 3.1.2.5.8: Whitetail – A Dam Entrapment Area

Figure 3.1.2.5.9: Whitetail – A Dam Spillway

Figure 3.1.2.5.10: Whitetail – A Dam Wall

Figure 3.1.5.2.11 below shows the Whitetail – A Dam inundation area. It impacts Montgomery Township.

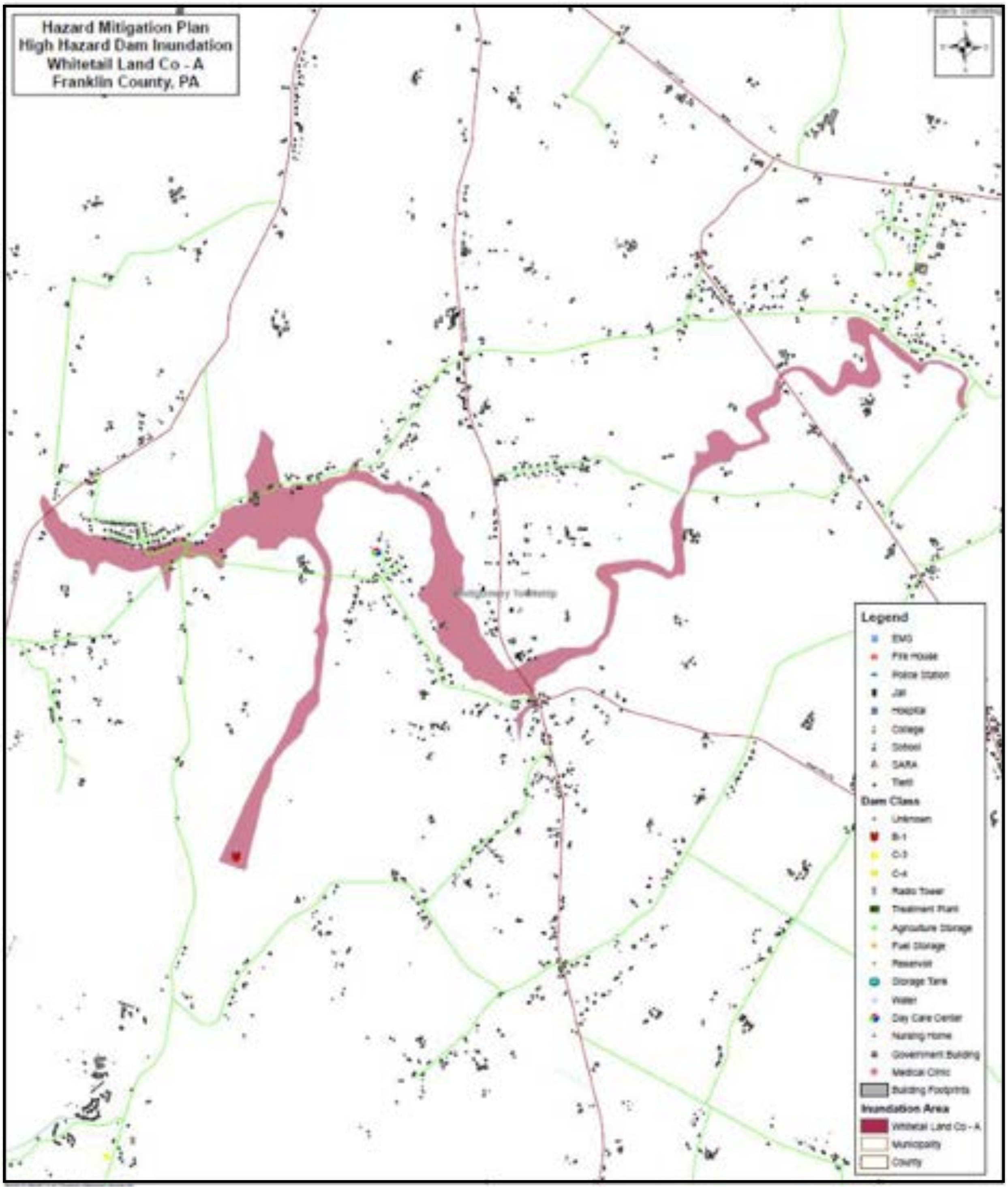


Figure 3.1.2.5.11: Whitetail – A Dam Inundation Zones (Dec 2017)

Table 3.3.1.5.2 below identifies the number of structures impacted by the Whitetail Land Co. – A Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Whitetail Land Co. - A Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Montgomery Township	18	35	$511,070	$4,819,390
Totals	18	35		$4,819,390

Table 3.1.2.5.2: Whitetail Land Co. – A Dam Inundation Zone Structural Impacts (Oct 2021)

Antietam Dam (Adams County)

The Antietam Dam (01-073) is classified as a B-1 high hazard dam. **Figure 3.1.2.5.12, Figure 3.1.2.5.13,** and **Figure 3.1.2.5.14** below show the entrapment area, spillway, and dam wall respectively.

Figure 3.1.2.5.12: Antietam Dam Entrapment Area

Figure 3.1.2.5.13: Antietam Dam Spillway

Figure 3.1.2.5.14: Antietam Dam Wall

Figure 3.1.5.2.15 below shows the Antietam Dam inundation area. It impacts Quincy Township, Washington Township, and Waynesboro Borough.

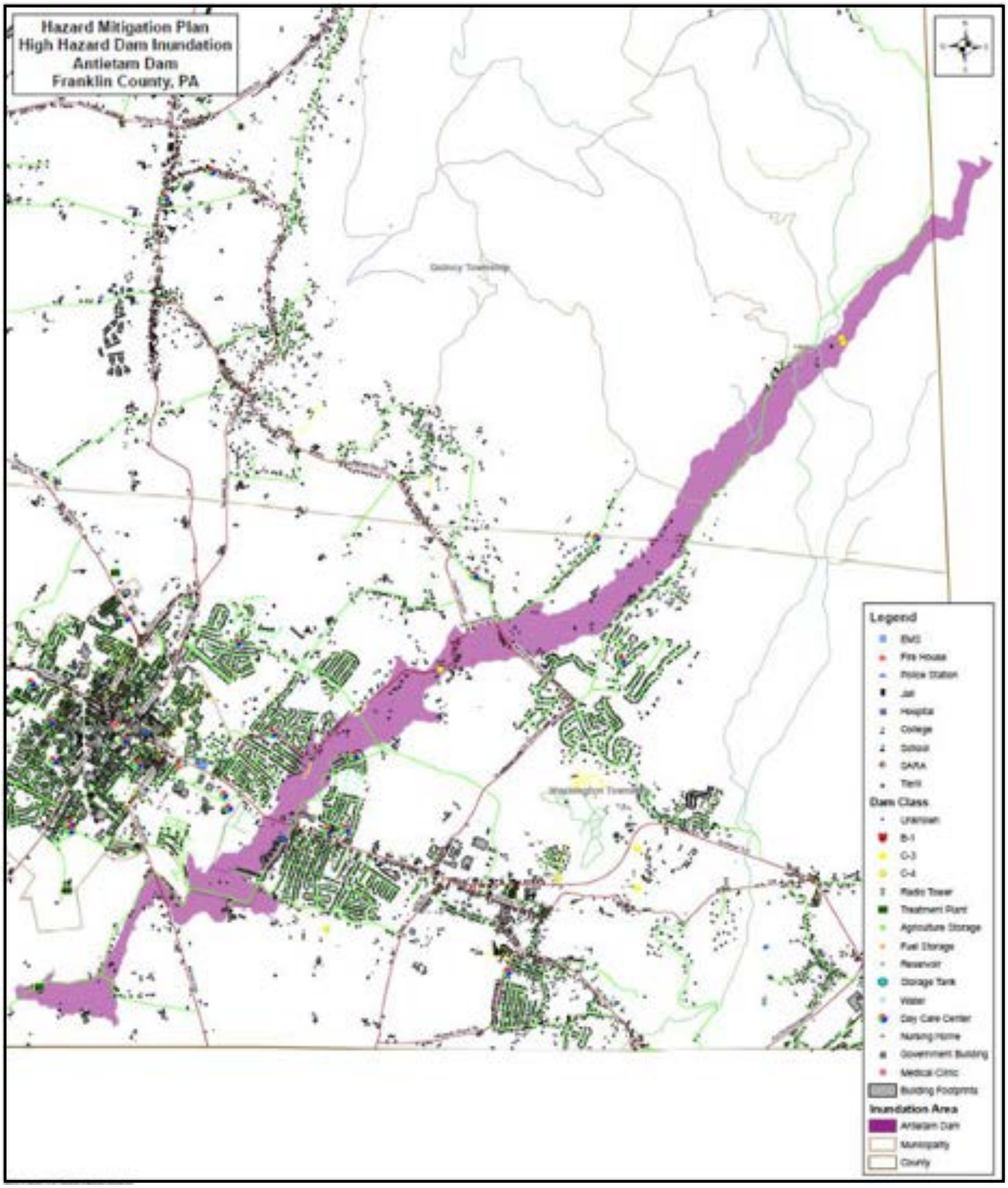


Figure 3.1.2.5.15: Antietam Dam Inundation Zone (Nov 2019)

Table 3.1.4.5.3 below identifies the number of structures impacted by the Antietam Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Antietam Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Quincy Township	8	20	$402,070	$3,791,520
Washington Township	165	407	$4,913,080	$46,330,344
Waynesboro Borough	2	6	$13,270	$125,136
Totals	175	433		$50,247,000

Table 3.1.2.5.3: Antietam Dam Inundation Zone Structural Impacts (Oct 2021)

<u>Carbaugh Run Dam (Adams County)</u>

The Carbaugh Run Dam (01-077) is classified as a C-1 high hazard dam. **Figure 3.1.2.5.16, Figure 3.1.2.5.17,** and **Figure 3.1.2.5.18** below show the entrapment area, spillway, and dam wall respectively.

Figure 3.1.2.5.16: Carbaugh Run Dam Entrapment Area

Figure 3.1.2.5.17: Carbaugh Run Dam Spillway

Figure 3.1.2.5.18: Carbaugh Run Dam Wall

Figure 3.1.2.5.19 below shows the Carbaugh Run Dam inundation area. It impacts Greene Township.

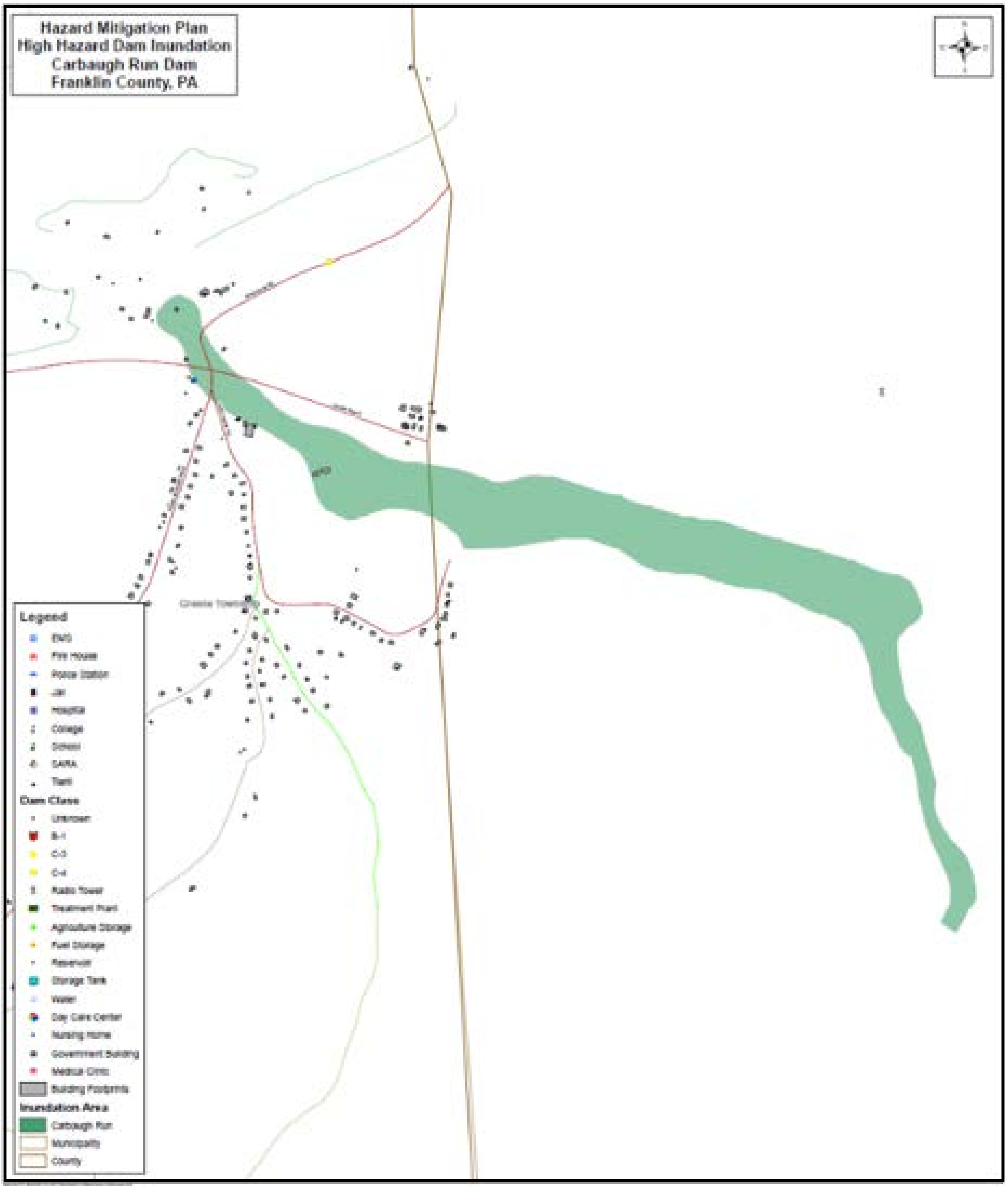


Figure 3.1.2.5.19: Carbaugh Run Dam Inundation Zone (Nov 2019)

Table 3.1.2.5.4 below identifies the number of structures impacted by the Carbaugh Run Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Carbaugh Run Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Greene Township	2	3	$63,020	$594,279
Totals	2	3		$594,279

Table 3.1.2.5.4: Carbaugh Run Dam Inundation Zone Structural Impacts (Oct 2021)

Long Pine Run Dam (Adams County)

The Long Pine Run Dam (01-082) is classified as an A-1 high hazard dam. **Figure 3.1.2.5.20, Figure 3.1.2.5.21,** and **Figure 3.1.2.5.22** below show the entrapment area, spillway, and dam wall respectively.

Figure 3.1.2.5.20: Long Pine Run Dam Entrapment Area

Figure 3.1.2.5.21: Long Pine Run Dam Spillway

Figure 3.1.2.5.22: Long Pine Run Dam Wall

Figure 3.1.2.5.23 below shows the Long Pine Run Dam inundation area. It impacts Antrim Township, Chambersburg Borough, Greene Township, Guilford Township, Hamilton Township, Peters Township, and St Thomas Township.

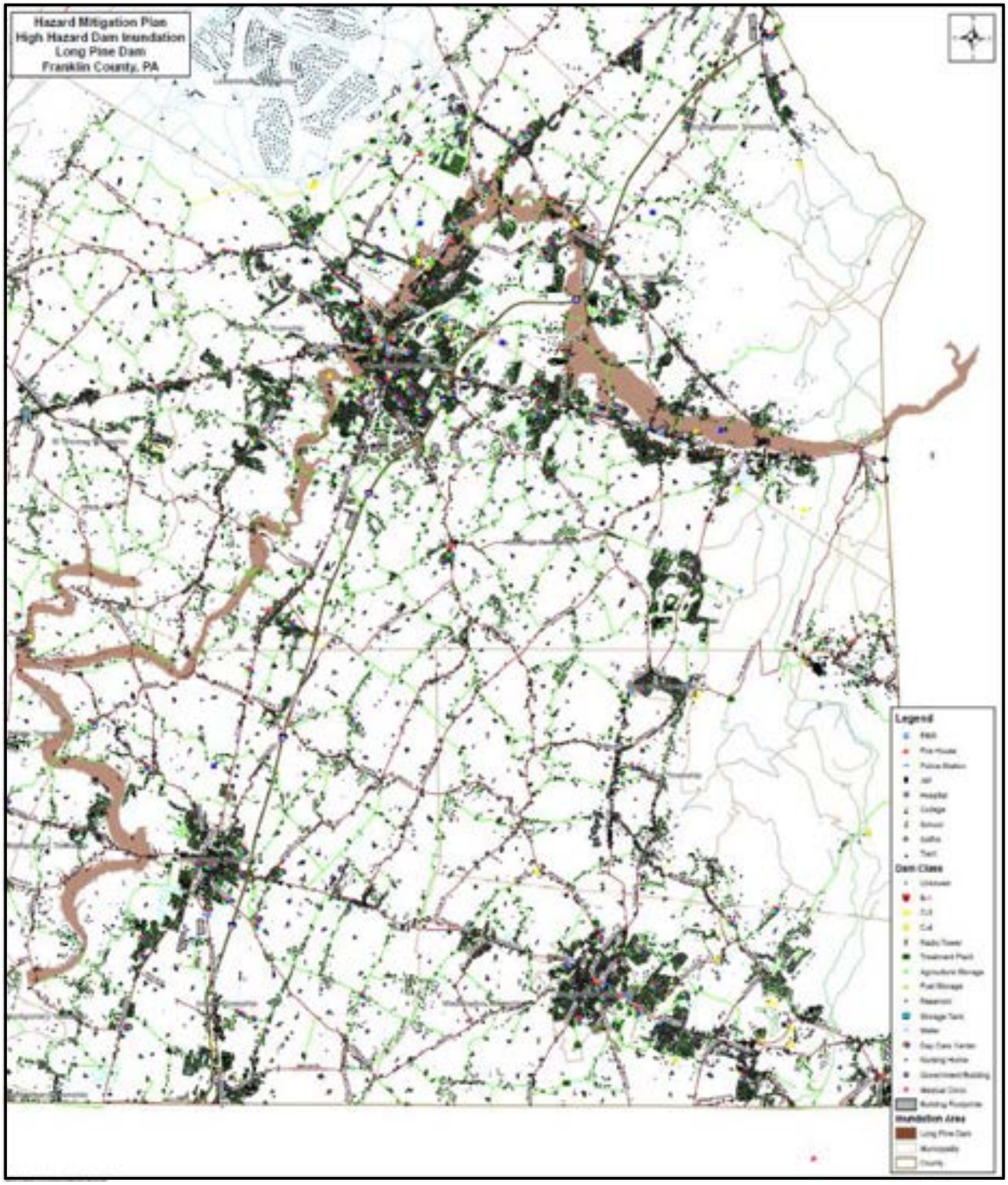


Figure 3.1.2.5.23: Long Pine Run Dam Inundation Zone (Nov 2019)

Table 3.1.2.5.5 below identifies the number of structures impacted by the Long Pine Run Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Long Pine Run Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Antrim Township	76	165	$1,548,700	$14,604,241
Chambersburg Borough	449	600	$25,700,150	$242,352,414
Greene Township	857	1676	$22,925,480	$216,187,276
Guilford Township	51	89	$594,290	$5,604,155
Hamilton Township	32	78	$545,660	$5,145,574
Peters Township	2	5	$40,020	$377,389
St Thomas Township	44	98	$557,200	$5,254,396
Totals	1511	2711		$489,525,445

Table 3.1.2.5.5: Long Pine Run Dam Inundation Zone Structural Impacts (Oct 2021)

<u>Meadow Grounds Dam (Fulton County)</u>

The Meadow Grounds Dam (29-032) has been emptied, but not physically breached at this point and is still classified as a B-1 high hazard dam. **Figure 3.1.2.5.24, Figure 3.1.2.5.25,** and **Figure 3.1.2.5.25** below show the entrapment area, spillway, and dam wall respectively.

Figure 3.1.2.5.24: Meadow Grounds Dam Entrapment Area

Figure 3.1.2.5.25: Meadow Grounds Dam Spillway

Figure 3.1.2.5.26: Meadow Grounds Dam Wall

Figure 3.1.2.5.27 below shows the Meadow Grounds Dam inundation area. It impacts Warren Township.

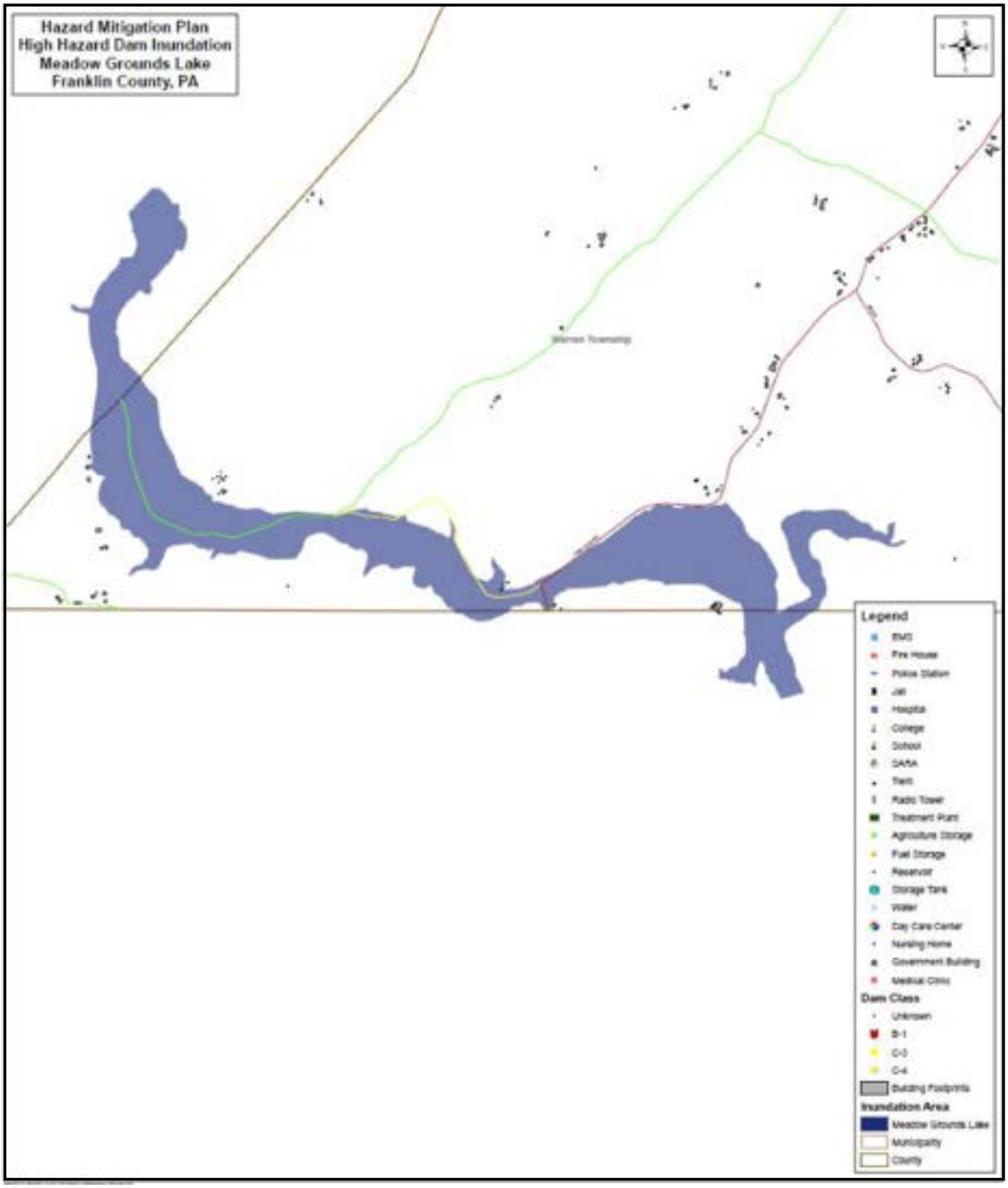


Figure 3.1.2.5.27: Meadow Grounds Dam Inundation Zone (Nov 2019)

Table 3.1.2.5.6 below identifies the number of structures impacted by the Meadow Grounds Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Meadow Grounds Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Warren Township	1	3	$2,450	$23,104
Totals	1	3		$23,104

Table 3.1.2.5.6: Meadow Grounds Dam Inundation Zone Structural Impacts (Oct 2021)

<u>Lower Lake Royer Dam (Washington County, MD)</u>

The Lower Lake Royer Dam (MD00070) is classified as a High hazard dam. **Figure 3.1.2.5.28, Figure 3.1.2.5.29,** and **Figure 3.1.2.5.30** below show the entrapment area, spillway, and dam wall respectively.

Figure 3.1.2.5.28: Lower Lake Royer Dam Entrapment Area

Figure 3.1.2.5.29: Lower Lake Royer Dam Spillway

Figure 3.1.2.5.30: Lower Lake Royer Dam Wall

Figure 3.1.2.5.31 below shows the Lower Lake Royer Dam inundation area. It impacts Washington Township and Waynesboro Borough.

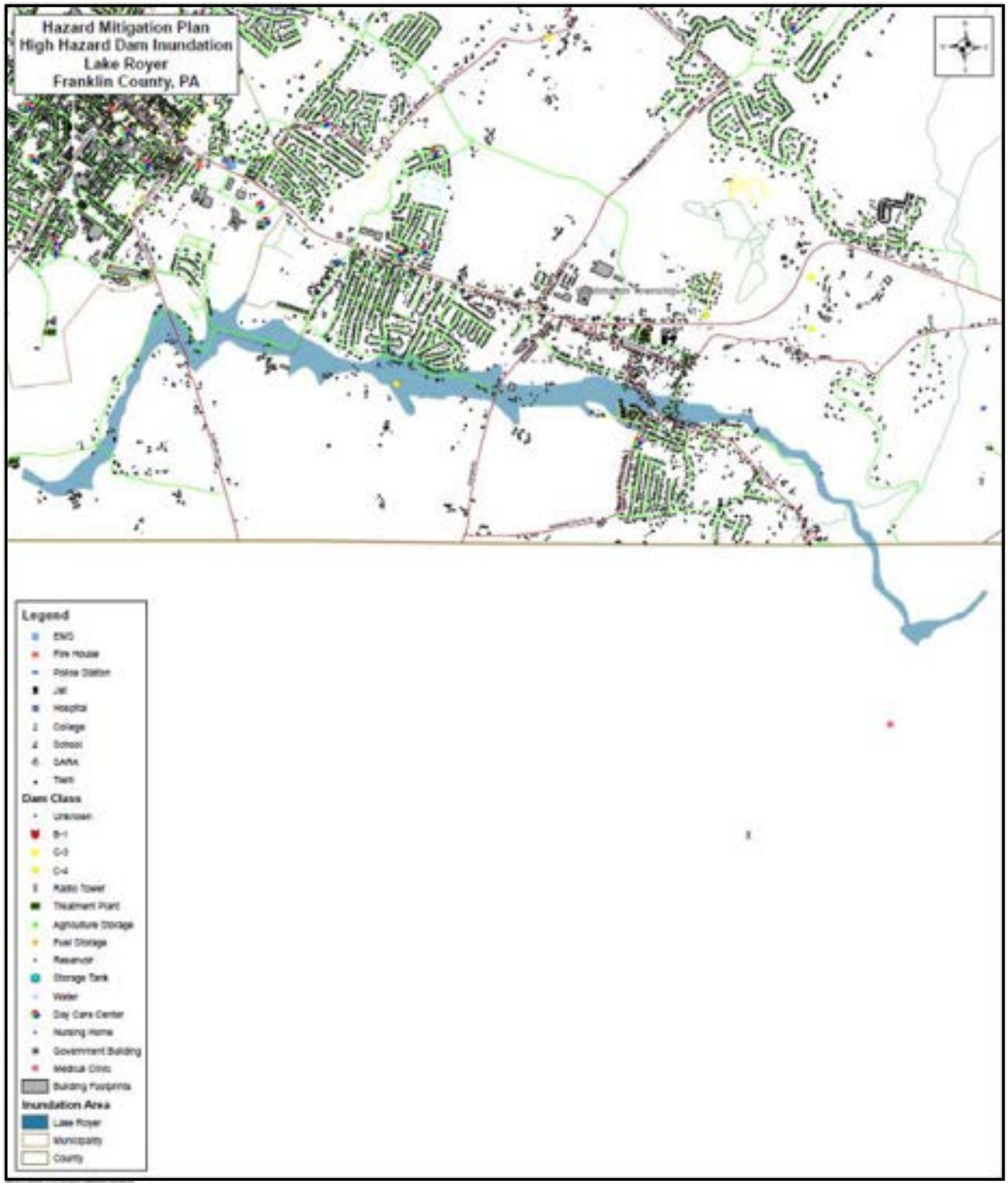


Figure 3.1.2.5.31: Lower Lake Royer Inundation Zone (Nov 2019)

Table 3.1.2.5.7 below identifies the number of structures impacted by the Lower Lake Royer Dam inundation zone and the estimated value of those structures. The assessed values of these structures were recorded in the Franklin County Tax Assessment database and reflect values as assessed in 1961. Therefore, to get approximate value of these structures in 2021 dollars they

were multiplied by a factor of 9.43. This factor is given to the county by the state and is based off of sales in the previous year.

Lower Lake Royer Dam Failure Impacts				
Municipality	Impacted Parcels	Impacted Structures	Assessed Value (1961)	Estimated Value (2021)
Washington Township	109	273	$1,516,160	$14,297,389
Waynesboro Borough	2	2	$59,630	$562,311
Totals	111	275		$14,859,700

Table 3.1.2.5.7: Lower Lake Royer Dam Inundation Zone Structural Impacts (Oct 2021)

Table 3.1.2.5.8 shows the critical facilities in the inundation zones the high hazard dams in each municipality of Franklin County.

Municipality	Total Number of Critical Facilities	Critical Facilities in Risk Areas
Antrim Township	75	1
Chambersburg Borough	97	13
Fannett Township	27	0
Greencastle Borough	24	0
Greene Township	100	21
Guilford Township	85	1
Hamilton Township	47	0
Letterkenny Township	20	1
Lurgan Township	21	3
Mercersburg Borough	10	0
Metal Township	15	0
Mont Alto Borough	6	0
Montgomery Township	12	0
Orrstown Borough	1	0
Peters Township	22	0
Quincy Township	48	3
Shippensburg Borough	5	0
Southampton Township	30	0
St Thomas Township	20	1
Warren Township	2	0
Washington Township	46	7
Waynesboro Borough	45	0
Totals	**758**	**51**

Table 3.1.2.5.8: Critical Facilities per Municipality Impacted by High Hazard Dams

Table 3.1.2.5.9 shows the number of critical facilities that fall in the inundations zone of the 7 high hazard dams that are in or can potentially impact the Franklin County population.

Dam	Total Number of Critical Facilities Impaacted
Antietam Dam	9
Carbaugh Run Dam	1
Lake Royer Dam	1
Long Pine Run Dam	36
Meadow Grounds Lake Dam	0
Roxbury Dam	4
Whitetail – A Dam	0
Total	**51**

Table 3.1.2.5.9: Critical Facilities Impacted per High Hazard Dam

Figure 3.1.2.5.32 represents the municipality hazard threat risk assessment for dam failures in Franklin County. This self-assessment by the municipalities ranks a Dam Failure as the number 9 highest threat in the county and is considered an overall moderate risk. However, based on the lack of history of this threat in the county, the future occurrence of a dam failure can be considered ***unlikely*** as defined by the Risk Factor Methodology criteria (See **Section 1.2**).

Dam Failure
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	1	30%	2	30%	2	20%	2	10%	4	10%	1.9	10.12%	0.1923
Chambersburg Borough	1	30%	4	30%	3	20%	1	10%	4	10%	2.6	14.05%	0.3653
Fannett Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.59%	0.0207
Greencastle Borough	2	30%	2	30%	4	20%	1	10%	4	10%	2.5	2.73%	0.0683
Greene Township	1	30%	2	30%	2	20%	2	10%	4	10%	1.9	11.82%	0.2246
Guilford Township	1	30%	1	30%	2	20%	4	10%	4	10%	1.8	9.38%	0.1688
Hamilton Township	1	30%	1	30%	3	20%	4	10%	4	10%	2.0	7.29%	0.1458
Letterkenny Township	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	1.58%	0.0253
Lurgan Township	2	30%	4	30%	4	20%	3	10%	4	10%	3.3	1.42%	0.0469
Mercersburg Borough	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	0.97%	0.0155
Metal Township	2	30%	3	30%	1	20%	1	10%	4	10%	2.2	1.13%	0.0249
Mont Alto Borough	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	1.01%	0.0162
Montgomery Township	1	30%	2	30%	2	20%	4	10%	4	10%	2.1	3.68%	0.0773
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	2.86%	0.0458
Quincy Township	2	30%	1	30%	3	20%	1	10%	4	10%	2.0	3.41%	0.0682
Shippensburg Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.75%	0.0113
Southampton Township	2	30%	2	30%	2	20%	4	10%	4	10%	2.4	5.49%	0.1318
St Thomas Township	2	30%	1	30%	2	20%	2	10%	4	10%	1.9	3.79%	0.0720
Warren Township	2	30%	2	30%	2	20%	3	10%	4	10%	2.3	0.21%	0.0048
Washington Township	2	30%	2	30%	3	20%	4	10%	4	10%	2.6	9.55%	0.2483
Waynesboro Borough	1	30%	4	30%	1	20%	4	10%	4	10%	2.5	7.02%	0.1755
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.152

Figure 3.1.2.5.12: Municipal Dam Failure Threat Vulnerability Self-Assessment

Even though Franklin County has not experienced a dam failure in recorded history, it is still a distinct possibility. The most troublesome aspect of the above information is the total number of critical facilities that could be impacted by a breach of the Long Pine Run Dam, which is in Adams County. This means that we could have very little impact to mitigate the actual failure of the Dam Failure itself and may have to develop some mitigation actions that address expected flow of water from such a breach.

3.1.3. Drought

National Geographic explains drought to be an extended period of unusually dry weather when there is not enough rain. The lack of precipitation can cause a variety of problems for local communities, including damage to crops and a shortage of drinking water. These effects can lead to devastating economic and social disasters, such as famine, forced migration away from drought-stricken areas, and conflict over remaining resources.

Because the full effects of a drought can develop slowly over time, impacts can be underestimated. However, drought can have drastic and long-term effects on vegetation, animals, and people. Since 1900, more than eleven 11 million people have died and more than 2 billion people have been affected by drought. Drought is also one of the costliest weather-related disasters. In the past 30 years, the U.S. has experienced 16 billion-dollar droughts, totaling $195 billion in losses[41].

The National Oceanic and Atmospheric Administration (NOAA) depicts drought to be an *absence* of water. The climatological community has defined four types of drought:

- Meteorological drought happens when dry weather patterns dominate an area. Meteorological drought can begin and end rapidly.
- Hydrological drought occurs when low water supply becomes evident, especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought. Hydrological drought takes much longer to develop and then to recover.
- Agricultural drought happens when crops become affected.
- Socioeconomic drought relates the supply and demand of various commodities to drought.

The U.S. Drought Monitor established a drought scale much like those that rate hurricanes and tornadoes. The "D-scale" speaks to the "unusualness" of a drought episode. Over the long run, D1 conditions are expected to occur about 10 to 20 percent of the time. D4 is much rarer, expected less than 2% of the time[42].

Figure 3.1.3.1 is the current drought conditions in Pennsylvania using the D-scale according to the USDA (as of November 2017):

[41] National Geographic Society
[42] NOAA

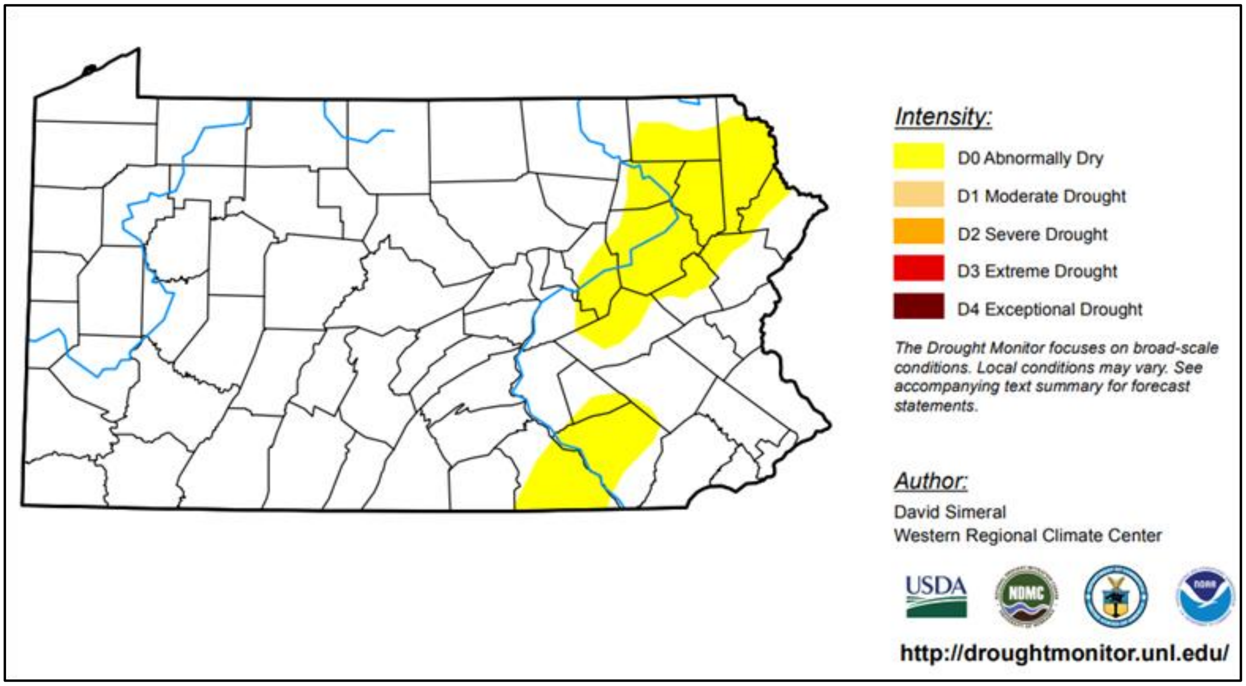


Figure 3.1.3.1: Pennsylvania Drought Conditions (Nov 2017)

3.1.3.1. Location and Extent

The current climate in Pennsylvania, when compared to many other states across the U.S., is generally water-rich. However, like all other states, Pennsylvania is subject to periodic droughts that impact the Commonwealth's ability to meet its water needs. While large geographic areas can be impacted by a given drought, areas with extensive agricultural land use can experience particularly significant impacts. Agriculture comprises more than 242,600 acres of land in Franklin County. Franklin County ranks 4 in the state in total agricultural cash receipts (market value of all agricultural products = $413,806,000), additionally, statewide Franklin County ranks 2 in the production of milk, cattle, melons, and corn for silage and 3 for fruit and berry production. Because of its high agriculture production, a drought incident could have a tremendous impact on the county.

Figure 2.1.8 in **Section 2,** County Profile shows Franklin County's Agricultural Resources and Land breakdown.

3.1.3.2. Range of Magnitude

Droughts can have varying effects, depending upon what month they occur, severity, duration, and location. Some droughts may have their greatest impact on agriculture and even short term droughts, when coupled with extreme temperatures, can be devastating. Others may impact water supply or other water use activities such as recreation. Most droughts cause direct impacts to aquatic resources. Drought events are defined by rainfall amounts, vegetation conditions, soil-moisture conditions, water levels in reservoirs, stream flow, agricultural productivity, or economic impacts.

Hydrologic drought events result in a reduction of stream flows, reduction of lake/reservoir storage, and reduced groundwater levels. These events have a significant adverse impact on public water supplies for human consumption, rural water supplies for livestock consumption/agricultural operations, water quality, natural soil water/irrigation water for agriculture, soil moisture, conditions conducive to wildfire events, and water for navigation/recreation.

The DEP, Office of Water Resources Planning, is responsible for drought management. Many drought management activities are coordinated at the county level, so the office's monitoring efforts are oriented primarily on a county basis as well. On a routine basis, the office reviews precipitation, stream flow, groundwater level, soil moisture, and reservoir storage information. Regular attention to these drought "indicators" is designed to provide timely identification of developing drought conditions.

- **Precipitation Deficits**

The earliest indicators of a potential drought are precipitation deficits, because it is precipitation that provides the basis for both our ground and surface water resources. The National Weather Service has long-term monthly averages of precipitation for each county (each county uses a varied number of rain gages to determine the county average). These averages are updated at the end of each decade, based upon the most recent 30 years, and are considered "normal" monthly precipitation. Each month, the total cumulative precipitation values in each county, for periods ranging from 3 to 12 months, are compared against the normal values for the same periods. Totals that are less than the normal values represent deficits, which are then converted to percentages of the normal values.

Table 3.1.3.2.1 below is provided by PADEP which indicates Precipitation Deficit Drought Indicators:

Duration of Deficit Accumulation (months)	Drought Watch (Deficit as Percentage 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

Table 3.1.3.2.1: Precipitation Deficiency Drought Indicators

- **Stream Flows**

After precipitation, stream flows provide the next earliest indication of a developing drought. Stream flows typically lag behind precipitation in signaling a drought. The U.S. Geological Survey (USGS) maintains a network of stream gages across the state. PADEP currently uses 61 of these gauges (58 in Pennsylvania, 2 in Maryland, and 1 in West Virginia), equipped with satellite communication transmitters, as its drought monitoring network. Similar to precipitation, long-term 30-day average stream flow values have been computed for each of the stream gauges, but rather than using only the past 30 years, the entire period of record for each gauge is used. Both the Commonwealth of Pennsylvania and the USGS use "percentiles" in regard to stream-flow statistics. Every day, USGS stream-gauge records are used to compute an average flow of the last 30 days preceding that day (called the "30-day moving average daily flow"), that serves as a stream-flow indicator. The stream-flow indicators are then compared with statistical flow values known as "percentiles" derived from historic stream-gauge records. A flow percentile is a value on a scale from 0 to 100 that indicates the percent of the time on that given date throughout the gauge period of record that flow has been equal to or below that value. An average flow over the last 30 days having a percentile range of:

- 10 to 25 is considered as the entry into Drought Watch
- 5 to 10 as entry into Drought Warning
- 0 to 5 as entry into Drought Emergency

Suitable stream gauges with adequate periods of record do not exist in each of the 67 counties; therefore, surrogate stream-flow gauges are used for some counties. The term "Exceedances" is sometimes used to describe drought statistics and may be considered the complement of percentiles; i.e., a 10% exceedance is equivalent to a 90th percentile value, a 75% exceedance is equivalent to a 25th percentile value, etc.

- **Groundwater Levels**

Groundwater is usually the third indicator of a developing drought. Groundwater typically lags behind precipitation, largely because of the storage effect. About 80 trillion gallons of groundwater is stored throughout Pennsylvania, enough to cover the entire state with more than 8 feet of water, according to Department of Conservation and Natural Resources (DCNR) publication *ES3, "The Geology of Pennsylvania's Groundwater*." Therefore, precipitation deficits can accumulate for several months before the resultant lack of groundwater recharge becomes clearly evident in groundwater levels. As with stream-flow, the term "percentiles" is used in regard to groundwater statistics. Groundwater levels are used to indicate drought status in a manner similar to stream flows. Every day, groundwater levels in USGS observation wells are used to compute an average level of the last 30 days preceding that day (called the '30-day moving average groundwater level"), that serves as a groundwater indicator. The groundwater indicators are then compared with statistical groundwater-level values known as "percentiles" derived from historic observation-well records. A percentile is a value on a scale from 0 to 100 that indicates the percent of the time on that given date throughout the observation well period of record that water levels have been equal to or below that value. Groundwater percentile ranges of 10 to 25, 5 to 10, and 0 to 5 are used to represent entry into watch, warning and emergency, respectively. Suitable observation wells with adequate periods of record do not exist in each of the 67 counties; therefore, surrogate wells are used for some counties.

- **Soil Moisture**

Palmer Drought Severity Index Soil moisture information is provided by NOAA in the form of the "Palmer Drought Severity Index." The Palmer Index is a computed value, based on a number of meteorological and hydrological factors; it is compiled weekly by the Climate Prediction Center of the National Weather Service. Palmer values of:

- -2.00 to -2.99 indicate a watch status
- -3.00 to -3.99 indicate warning
- -4.00 and less indicate emergency

The Palmer Indices are available for the 10 Palmer regions of the state and are updated weekly[43]. See **Table 3.1.3.2.2** below for the Palmer Drought Severity Index.

Severity Category	PSDI 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
Sever drought	-3.0 to -3.99	Warning
Extreme drought	-4.0 or less	Emergency

Table 3.1.3.2.2: Palmer Drought Severity Index

- **Reservoir storage levels**

Depending on the total quantity of storage and the length of the refill period for the various reservoirs, DEP uses varying percentages of storage draw down to indicate the 3 drought

[43] USGS, 1984

stages for each of the reservoirs. The worst drought event on record for Pennsylvania occurred in 1963, when precipitation statewide averaged below normal for 10 of 12 months. Drought emergency status led to widespread water use restrictions, and reservoirs dipped to record low levels. Corn, hay, and other agricultural products shriveled in parched fields, causing economic losses. Governor William Scranton sought drought aid for Pennsylvania in the face of mounting agricultural losses, and the event became a Presidentially declared disaster in September 1963.

DEP and PEMA manage droughts based on a 3-stage process. The indicators are used to identify, generally on a county basis, the overall water supply conditions. These indicators are used by DEP and PEMA to manage water supply droughts. While some of the indicators could be used as well to help identify meteorological or agricultural or other types of droughts, the primary objective is to identify and manage water supply droughts.

- **Drought Watch**

Generally, when 3 or more of the indicators are signaling a drought watch condition for a county or group of counties, DEP will notify PEMA of the developing conditions and will ask PEMA to convene a meeting of the Commonwealth Drought Task Force. Based upon recommendations from the Task Force, including direction from the Governor, the Secretary of DEP may issue a drought watch on behalf of the Governor. Press releases are issued to the media and letters are sent to all public water suppliers in the affected area, notifying them of the need to monitor their own supplies and begin following their drought contingency plans and to update their plans if necessary. Approved drought contingency plans are valid for only 3 years from the date of approval. Citizens are requested to voluntarily reduce water usage by about 5%. DEP increases its monitoring activities from monthly to weekly and begins to monitor the status of public water suppliers in the affected area. Regular meetings of the Task Force are also scheduled to review developing conditions. The general goal is to reduce water use by 5-10 percent through voluntary water conservation.

General guidelines to follow when in a drought watch may contain such practices as the following:

- Run water only when necessary.
- Avoid running the faucet while brushing your teeth or shaving, or letting the shower run for several minutes before use.
- Check for household leaks.
- Run dishwashers and washing machines only with full loads.
- Replace older appliances with high-efficiency, front-loading models that use about 30 percent less water and 40 to 50 percent less energy.
- Install low-flow plumbing fixtures and aerators on faucets.

- **Drought Warning**

When the indicators signal a warning condition, a similar process is followed, leading to a drought warning announcement, again by the Secretary of DEP on behalf of the Governor. Press releases are issued to the media and letters are again sent to all public water suppliers in the affected area, notifying them of the developing conditions. Citizens are asked to voluntarily reduce water use by 10-15 percent. Frequency of Task Force meetings may be increased as well.

- **Drought Emergency**

When an emergency is indicated (and upon the recommendation of the Task Force), PEMA convenes a meeting of the Emergency Management Council under the chair of the Lt. Governor. Upon consideration of all the information available, including input from the county commissioners and county emergency management staff in the affected counties, the council may recommend that the Governor issue a proclamation of drought emergency. Upon issuance of the emergency proclamation by the Governor, Chapters 118, 119, and 120 of the Emergency Management Regulation become effective. Again, letters are sent to the public water suppliers. DEP increases its monitoring activities from weekly to daily, and drought reports may be prepared daily and posted on the DEP drought website. PEMA's county drought task forces meet on a regular basis and the Commonwealth Drought Task Force may begin weekly meetings to ensure continued coordination among the agencies. During an emergency, the Commonwealth Drought Coordinator is responsible for overseeing and coordinating the day-to-day drought management activities of DEP and is also responsible for reviewing and either granting or denying requests for variances from the Chapter 119 nonessential water use restrictions[44].

Also provided by DEP are two possible restrictions that could happen as a result of drought:

- **Nonessential Water Use Restrictions**

The drought management activities most visible to the general public during a declared drought emergency are the nonessential water use restrictions required by Chapter 119. These restrictions are designed to achieve a reduction in overall water use of up to 25%. The overall objective of all drought management activities is to protect public health, safety, and welfare, with health and safety being paramount. To help protect welfare, water use restrictions are limited, at least initially, to nonessential uses. These restrictions apply generally to watering of lawns, gardens, and shrubs; washing vehicles and paved surfaces; filling swimming pools; and use of water for ornamental purposes. Chapter 119.6 states: "If compliance with the prohibition of nonessential use of water would result in extraordinary hardship upon a water user, the water user may apply for an exemption or variance. These requests are reviewed and variances are either granted or denied by the Commonwealth Drought Coordinator."

- **Water Rationing**

In some cases, the Chapter 119 water use restrictions may not be sufficient to protect the supplies of an individual public water supplier. When an individual supplier's sources are so depleted as to threaten health and safety, it may become necessary to ration water within that system in order to protect the sources for these most essential uses. Under the provisions of Chapter 120, a public water supplier or a municipality may request approval to ration water within its service area. Rationing water is a more severe measure than merely banning nonessential uses of water. Under rationing, each customer on the system is allotted a given

[44] DEP, 2016

amount of water, based on a method of allotment developed by the supplier or municipality. Generally it will be based on a percentage of previous usage or on a specific daily quantity per household. These restrictions are more likely to have some effect on welfare, because industry and commerce may be cut back as well. Under Pennsylvania law, only the Governor has authority to ration resources, including water resources. For this reason, approval from the Commonwealth Drought Coordinator, acting as agent for the Emergency Management Council and on behalf of the Governor, is required for a water supplier or municipality to ration water. Requests are reviewed by the Commonwealth Drought Coordinator to ensure that rationing is justified and that appropriate rationing methods will be employed[45].

3.1.3.3. Past Occurrence

Figure 3.1.3.3.1 below, from the Public Opinion, was taken on Dec 26, 2016 at the Long Pine Run Dam in Adams County. Normally at that time of year, the person in the photo would have been underwater, in a year with normal precipitation.

Figure 3.1.3.3.1: Long Pine Run Dam Drought Impact (Dec 2016)

Table 3.1.3.3.1 below represents the times that Franklin County has been under anything except for a “normal” status for drought conditions from November 18, 1982 through July 10, 2015.

[45] DEP, 2016

Dates	Drought Status	Dates	Drought Status
Nov 9, 2016 – May 16, 2017	Watch	Mar 15, 1999 – Jun 10, 1999	Watch
Jun 17, 2015 – Jul 10, 2015	Watch	Dec 3, 1998 – Mar 15, 1999	Warning
Sep 16, 2010 – Nov 10, 2010	Warning	Jul 17, 1997 – Nov 13, 1997	Watch
Aug 6, 2007 – Feb 15, 2008	Watch	Sep 1, 1995 – Dec 18, 1995	Watch
Apr 11, 2006 – Jun 30, 2006	Watch	Oct 21, 1991 – Jun 23, 1992	Warning
Nov 7, 2002 – Dec 19, 2002	Watch	**Jul 24, 1991 – Oct 21, 1991**	**Emergency**
Feb 12, 2002 – Nov 7, 2002	**Emergency**	Jun 28, 1991 – Jul 24, 1991	Warning
Nov 6, 2001 – Feb 12, 2002	Warning	Jul 7, 1988 – Dec 12, 1988	Watch
Aug 8, 2001 – Nov 6, 2001	Watch	Jul 29, 1985 – Dec 19, 1985	Watch
Sep 30, 1999 – May 5, 2000	Watch	Apr 26, 1985 – Jul 29, 1985	Watch
Jul 20, 1999 – Sep 30, 1999	**Emergency**	**Nov 18, 1980 – Apr 20, 1982**	**Emergency**
Jun 10, 1999 – Jul 20, 1999	Warning		

Table 3.1.3.3.1: History of Drought in Franklin County (1980-2017)[46]

3.1.3.4. Future Occurrence

It is difficult to forecast the severity and frequency of future drought events in Pennsylvania, and Franklin County is no different. There is no pattern to the history of drought events in the county. The past occurrences happen randomly and the durations are consistent with past averages. In the past 10 years, we have only experienced 19 months under Drought Watch/Warning status, approximately 16% of the time. Additionally, Franklin County has not exceeded a Drought Watch in over 7 years.

Historically, 9 of 10 areas in the Commonwealth are under a drought warning or emergency 5-10% of the time while one area in central Pennsylvania is under a drought warning or emergency 10-15% of the time. Overall, with most of the Commonwealth being in severe or extreme drought less than 15% of the time, the probability of future droughts is considered ***possible*** as defined in **Section 1.2**.

The USGS routinely monitors well levels across the state. Measurements from the Franklin County Observation Well can be found in **Figure 3.1.3.4.1** below[47].

[46] DEP, 2017
[47] USGS, 2017

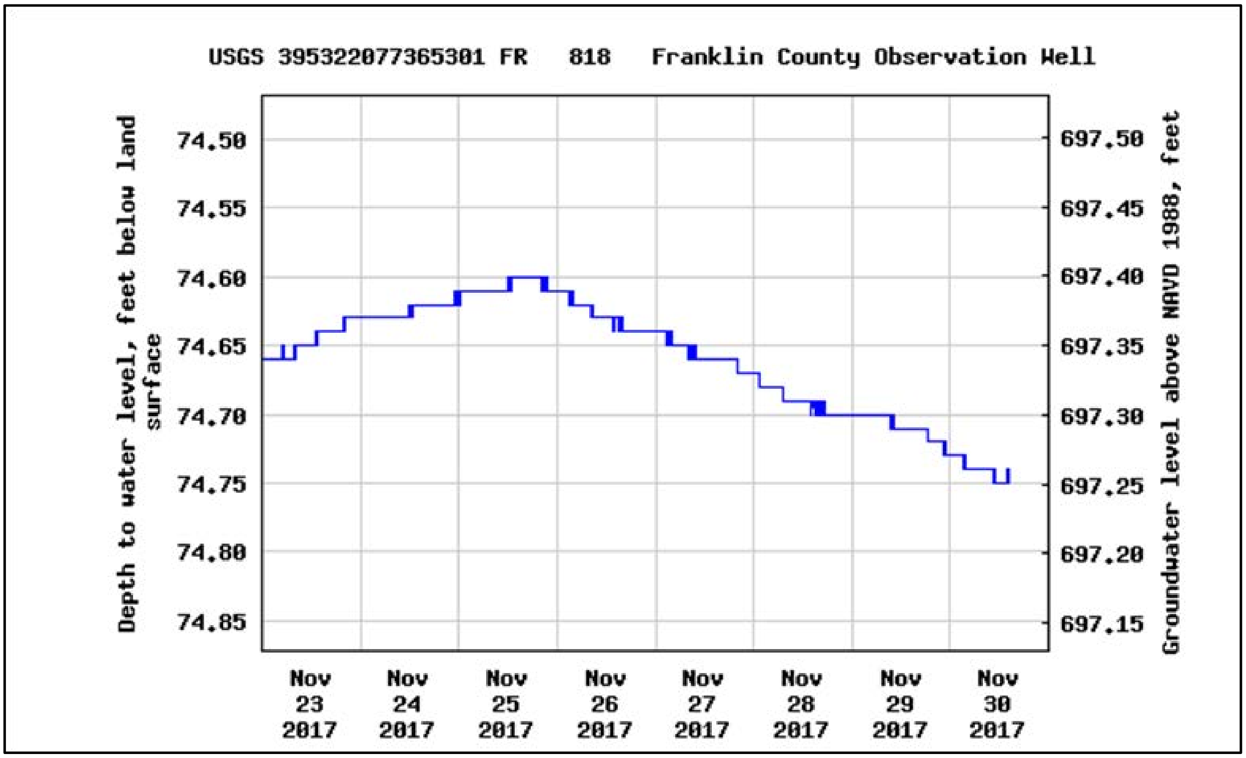


Figure 3.1.3.4.1: Sample of Franklin County Well Observations (Nov 2017)

Another factor to consider when dealing with drought is that other counties can have an impact at a local level. For example, the reservoir (Long Pine Run Dam) in Michaux State Forest in Adams County supplies drinking water to the largest borough (Chambersburg) in Franklin County. Therefore, the drought status of neighboring counties can also have impacts on the local communities.

3.1.3.5. Vulnerability Assessment

As a hazard, droughts primarily impact water supply and agricultural land. Areas of the Commonwealth that rely on private wells are more impacted by water supply reductions than areas of the Commonwealth on public water supply; frequently, these areas reliant on groundwater wells are more rural in nature. In 2018, records from the Pennsylvania Groundwater Information System showed a total of 12,634 domestic water wells in the county[48].

According to the National Drought Mitigation Center at the University of Nebraska-Lincoln (2013), environmental impacts of drought include:

- Damage to animal species in the form of reduced water and feed availability.
- Degradation of fish and wildlife habitat, migration and concentration issues (too many or too few animals in a given area), stress to endangered species and loss of biodiversity.
- Lower water levels in reservoirs, lakes, and ponds.
- Reduced stream flow.

[48] DCNR, 2018

- 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.
- Loss of trees.
- Increased number and severity of fires.
- Reduced soil quality and erosion issues.
- Increased dust or pollutants.

Figure 3.1.3.5.1 represents the municipality hazard threat risk assessment for Drought in Franklin County. One can see from **Figure 3.1.3.5.1** below, 7 municipalities ranked this hazard as either a Catastrophic or Major and 10 of the remaining 15 municipalities rated it as a Moderate risk. This self-assessment by the municipalities ranks the Drought hazard as the number 5 highest threat in the county and is considered an overall Moderate risk.

Drought
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	3	30%	3	20%	1	10%	4	10%	2.6	10.12%	0.2631
Chambersburg Borough	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	14.05%	0.3091
Fannett Township	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	1.59%	0.0350
Greencastle Borough	2	30%	2	30%	4	20%	1	10%	4	10%	2.5	2.73%	0.0683
Greene Township	2	30%	2	30%	3	20%	1	10%	4	10%	2.3	11.82%	0.2719
Guilford Township	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	9.38%	0.2064
Hamilton Township	1	30%	1	30%	4	20%	1	10%	4	10%	1.9	7.29%	0.1385
Letterkenny Township	3	30%	3	30%	4	20%	1	10%	4	10%	3.1	1.58%	0.0490
Lurgan Township	1	30%	1	30%	2	20%	1	10%	4	10%	1.5	1.42%	0.0213
Mercersburg Borough	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	0.97%	0.0213
Metal Township	2	30%	2	30%	1	20%	2	10%	4	10%	2.0	1.13%	0.0226
Mont Alto Borough	1	30%	2	30%	3	20%	1	10%	4	10%	2.0	1.01%	0.0202
Montgomery Township	3	30%	1	30%	4	20%	1	10%	4	10%	2.5	3.68%	0.0920
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	4	20%	1	10%	4	10%	1.9	2.86%	0.0543
Quincy Township	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	3.41%	0.0750
Shippensburg Borough	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	0.75%	0.0165
Southampton Township	3	30%	1	30%	3	20%	2	10%	4	10%	2.4	5.49%	0.1318
St Thomas Township	3	30%	3	30%	3	20%	1	10%	4	10%	2.9	3.79%	0.1099
Warren Township	2	30%	2	30%	4	20%	2	10%	4	10%	2.6	0.21%	0.0055
Washington Township	2	30%	1	30%	2	20%	1	10%	4	10%	1.8	9.55%	0.1719
Waynesboro Borough	2	30%	2	30%	4	20%	1	10%	4	10%	2.5	7.02%	0.1755
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.261

Figure 3.1.3.5.1: Municipal Drought Threat Vulnerability Self-Assessment

Jurisdictions with large amounts of farmland and high agricultural yields, like Franklin County are more likely to be affected by drought hazards. According to the 2012 US Department of Agriculture Agricultural Census, Franklin County was ranked number 4 in the state for agricultural revenue.

3.1.4. Earthquake

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 1-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in the loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake.

3.1.4.1. Location and Extent

Per the DCNR, earthquakes are not common in Pennsylvania. Earthquakes in Pennsylvania occur primarily in the southeastern and northwestern portions of the state. However, earthquakes have also occurred sporadically across the state. While the majority of events are small, there has been moderate size events recorded, as well. A comprehensive study of seismicity in PA was conducted in 2013-2015 by the Pennsylvania State Seismic Network (PASEIS), which is made up of seismic stations in Pennsylvania State Parks and Penn State University campuses. These stations measure seismic activity across the state, based on magnitude and depth. Based on the study, Franklin County has a documented history of only one earthquake, originating in the county, since 1931.

3.1.4.2. Range of Magnitude

Earthquake magnitude is typically measured by using the Richter scale, a scale which describes the energy release of an earthquake. **Table 3.1.4.2.1** summarizes the effects of an earthquake at various magnitudes.

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded
3.5 – 5.4	Often felt, but rarely cause damage
Under 6.0	At most, slight damage to well designed buildings; can cause major damage to poorly constructed buildings over small regions
6.1 – 6.9	Can be destructive in areas where people live; up to about 100 kilometers across
7.0 – 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

Table 3.1.4.2.1: Richter Scale Magnitude and Associated Earthquake Size Effects

While the Richter scale measures the size or magnitude of an earthquake and related effects, intensity is typically measured by the Modified Mercalli scale as shown in **Table 3.1.4.2.2**.

Scale	Intensity	Description of Efects	Richter Magnitudes
I	Instrumental	Detected only on seismograph	Less than 4.2
II	Feeble	Some people feel it	Less than 4.2
III	Slight	Felt by people resting; like a truck rumbling by	Less than 4.2
IV	Moderate	Felt by people walking	Less than 4.2
V	Slightly Strong	Sleepers awake; church bells ring	Less than 4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	Less than 5.4
VII	Very Strong	Mild alarm, walls crack, plaster falls	Less than 6.1
VIII	Destructive	Moving cars lose control, masonry fractures, poorly constructed buildings are damaged	Less than 6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break	Less than 6.9
X	Disastrous	Ground cracks profusely, many buildings destroyed, landslides widespread	Less than 7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes, and cables destroyed; general triggering of other hazards	Less than 8.1
XII	Catastrophic	Total destruction, trees fall, ground rises and falls in waves	Greater than 8.1

Table 3.1.4.2.2: Modified Mercalli Intensity Scale with Associated Impacts

The economic and environmental impact of earthquakes can be devastating, especially when flooding, landslides, poor water quality, broken pipes, and downed lines occur as the result of earthquake.

3.1.4.3. Past Occurrence

Earthquakes are relatively rare on the East Coast of the United States, but there have been a few that were felt in Franklin County in the recent past. The first was in August of 2011 where a magnitude 5.8 earthquake centered in Virginia was felt throughout the county. The next event occurred in Franklin County in 2013. It had a magnitude 2.1 on the Richter scale and a depth of 3.1 miles (5 Km). The epicenter was in Guilford Township. See **Table 3.1.4.3.1** below for the past events.

Date	Magnitude	Depth	Epicenter
23 Aug 2011	5.8	0.5 miles	Virginia
16 June 2013	2.1	3.1 miles	Guilford Township

Table 3.1.4.3.1: Earthquakes Felt or Located in Franklin County (2007-2017)

Although both events were felt by residents in the county, there was little to no damage reported. See **Figure 3.1.4.3.1** below for an example of minor damage caused by the Aug 2011 earthquake.

Figure 3.1.4.3.1: Chimney Damage (Fayetteville, PA) due to Aug 2011 Earthquake[49]

[49] The Record Herald, 2011

3.1.4.4. Future Occurrence

The probability of a minor earthquake in Franklin County is low, but possible, given the history of events. Franklin County may also feel the impact of an event occurring in a neighboring county or outside of the state, which can occur in the documented range of 3.5 or lower. Per the USGS survey models the chance of an incident above 5.0 on the Richter scale in Franklin County is less than 1% over the next 50 years. Therefore, the future occurrence of an earthquake in Franklin County can be considered ***unlikely*** as defined by the Risk Factor Methodology probability criteria (See **Section 1.2**).

3.1.4.5. Vulnerability Assessment

Figure 3.1.4.5.1 represents the municipality hazard threat risk assessment for Earthquakes in Franklin County. One can see from **Figure 3.1.4.5.1** below, 4 municipalities ranked this hazard as a Major risk and 6 of the remaining 18 municipalities rated it as a Moderate risk. This self-assessment by the municipalities ranks the Earthquake hazard as the number 15 highest threat in the county and is considered an overall Minor risk.

Earthquake
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	1	30%	2	30%	3	20%	4	10%	1	10%	2.0	10.12%	0.2024
Chambersburg Borough	1	30%	4	30%	4	20%	4	10%	1	10%	2.8	14.05%	0.3934
Fannett Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.59%	0.0159
Greencastle Borough	1	30%	3	30%	3	20%	4	10%	1	10%	2.3	2.73%	0.0628
Greene Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	11.82%	0.1891
Guilford Township	1	30%	2	30%	3	20%	4	10%	1	10%	2.0	9.38%	0.1876
Hamilton Township	1	30%	1	30%	4	20%	4	10%	1	10%	1.9	7.29%	0.1385
Letterkenny Township	2	30%	2	30%	2	20%	2	10%	1	10%	1.9	1.58%	0.0300
Lurgan Township	1	30%	2	30%	1	20%	4	10%	1	10%	1.6	1.42%	0.0227
Mercersburg Borough	1	30%	4	30%	4	20%	4	10%	1	10%	2.8	0.97%	0.0272
Metal Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	1.13%	0.0237
Mont Alto Borough	1	30%	1	30%	1	20%	2	10%	1	10%	1.1	1.01%	0.0111
Montgomery Township	1	30%	2	30%	4	20%	4	10%	1	10%	2.2	3.68%	0.0810
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	0.14%	0.0017
Peters Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	2.86%	0.0372
Quincy Township	1	30%	1	30%	4	20%	1	10%	1	10%	1.6	3.41%	0.0546
Shippensburg Borough	1	30%	1	30%	4	20%	4	10%	1	10%	1.9	0.75%	0.0143
Southampton Township	2	30%	4	30%	2	20%	4	10%	1	10%	2.7	5.49%	0.1482
St Thomas Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	3.79%	0.0493
Warren Township	1	30%	4	30%	2	20%	4	10%	1	10%	2.4	0.21%	0.0050
Washington Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	9.55%	0.0955
Waynesboro Borough	2	30%	2	30%	4	20%	4	10%	1	10%	2.5	7.02%	0.1755
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.967

Figure 3.1.4.5.1: Municipal Earthquake Threat Vulnerability Self-Assessment

Overall, the probability of a minor earthquake impacting Franklin County is possible, but low, based on the documentation available. The probability of a major earthquake, in excess of 5.0 on the Richter scale is far less likely.

3.1.5. Environmental Hazards

The release of hazardous materials into the local environment can be generated from a fixed facility, pipeline, or along any route of travel, and may be the result of carelessness, technical failure, external incidents, or an intentional act against the facility/container. The volatility of products being stored or transported, along with the potential impact on a local community, may increase the risk of intentional acts against a facility or transport vehicle. The release of certain products deemed to be hazardous materials can have an immediate adverse impact on the general population ranging from the inconvenience of evacuations to injury and even death. In addition to human impacts, any release can compromise the local environment through the contamination of soil, groundwater, or local flora and fauna.

For the purposes of this document, explosions are included under Environmental Hazard, as all reported and confirmed explosions have been the result of the loss of containment of a hazardous material, thus creating the explosion. According to the National Fire Protection Agency, the definition of explosion is “the sudden conversion of potential energy (chemical or mechanical) into kinetic energy with the production and release of gases under pressure, or the release of gas under pressure. These high-pressure gases then do mechanical work such as moving, changing, or shattering nearby materials.” This pairing of the two hazards is a natural process, as once the explosion occurs the product released is always considered a hazardous material.

3.1.5.1. Location and Extent

Franklin County has 139 identified facilities that utilize, ship, or house chemicals that are considered hazardous in nature. Of the 139 identified, 60 facilities have been identified under the Superfund Amendments and Reauthorization Act (SARA) as exceeding the quantity threshold for reporting. These facilities are shown in **Figure 3.1.5.1.1** below and listed by municipality in **Table 3.1.5.1.1**.

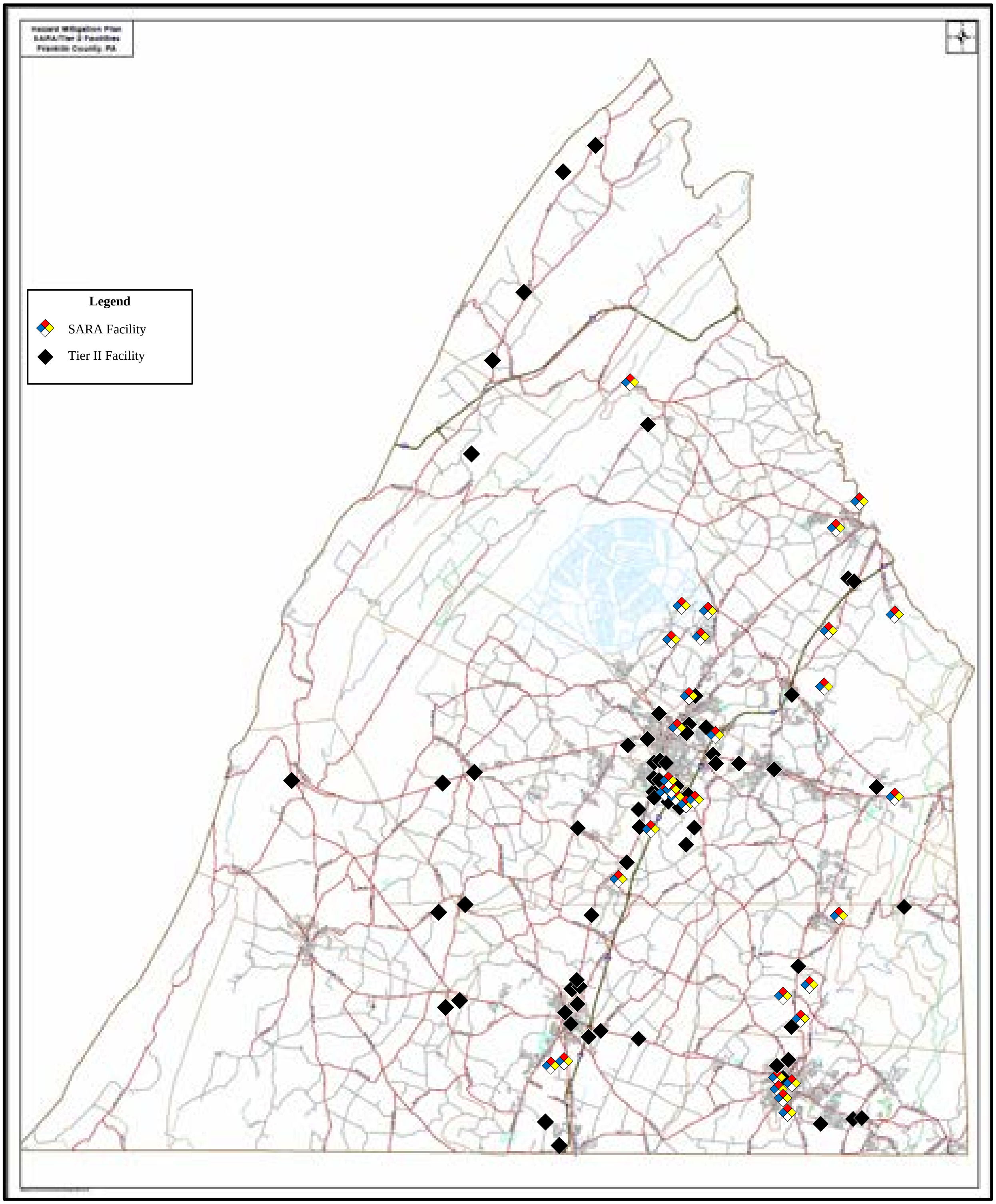


Figure 3.1.5.1.1: Hazardous Materials Processing Facilities in Franklin County (Dec 2017)

Municipality	SARA Facilities	Storage tanks	Totals	% of Population
Antrim Township	10	2	**12**	9.95%
Chambersburg Borough	11	3	**14**	13.55%
Fannett Township	4	1	**5**	1.70%
Greencastle Borough	3	2	**5**	2.67%
Greene Township	5	14	**19**	11.16%
Guilford Township	15	4	**19**	9.71%
Hamilton Township	3	3	**6**	7.21%
Letterkenny Township	1	1	**2**	1.55%
Lurgan Township	0	0	**0**	1.44%
Mercersburg Borough	0	0	**0**	1.04%
Metal Township	1	0	**1**	1.25%
Mont Alto Borough	0	0	**0**	1.14%
Montgomery Township	1	0	**1**	4.09%
Orrstown Borough	0	0	**0**	0.18%
Peters Township	3	1	**4**	2.96%
Quincy Township	3	9	**12***	3.70%
Shippensburg Borough	0	0	**0**	0.72%
Southampton Township	2	2	**4**	5.34%
St Thomas Township	3	1	**4**	3.97%
Warren Township	0	0	**0**	0.25%
Washington Township	5	2	**7**	9.36%
Waynesboro Borough	4	2	**6**	7.06%
Totals	**74**	**47**	**121**	**100%**
*** The number of environmental threat facilities in each municipality is roughly proportional to the population density of that municipality, Quincy Township being the exception.**				

Table 3.1.5.1.1: Number of SARA and HAZMAT Facilities per Municipality (Dec 2017)

Additionally, Franklin County has 3 major gas distribution pipelines traversing the county. These distribution systems carry a variety of petro-chemicals, sometimes at pressures exceeding 300 psi[50]. These systems are shown in **Figure 3.1.5.1.2** below.

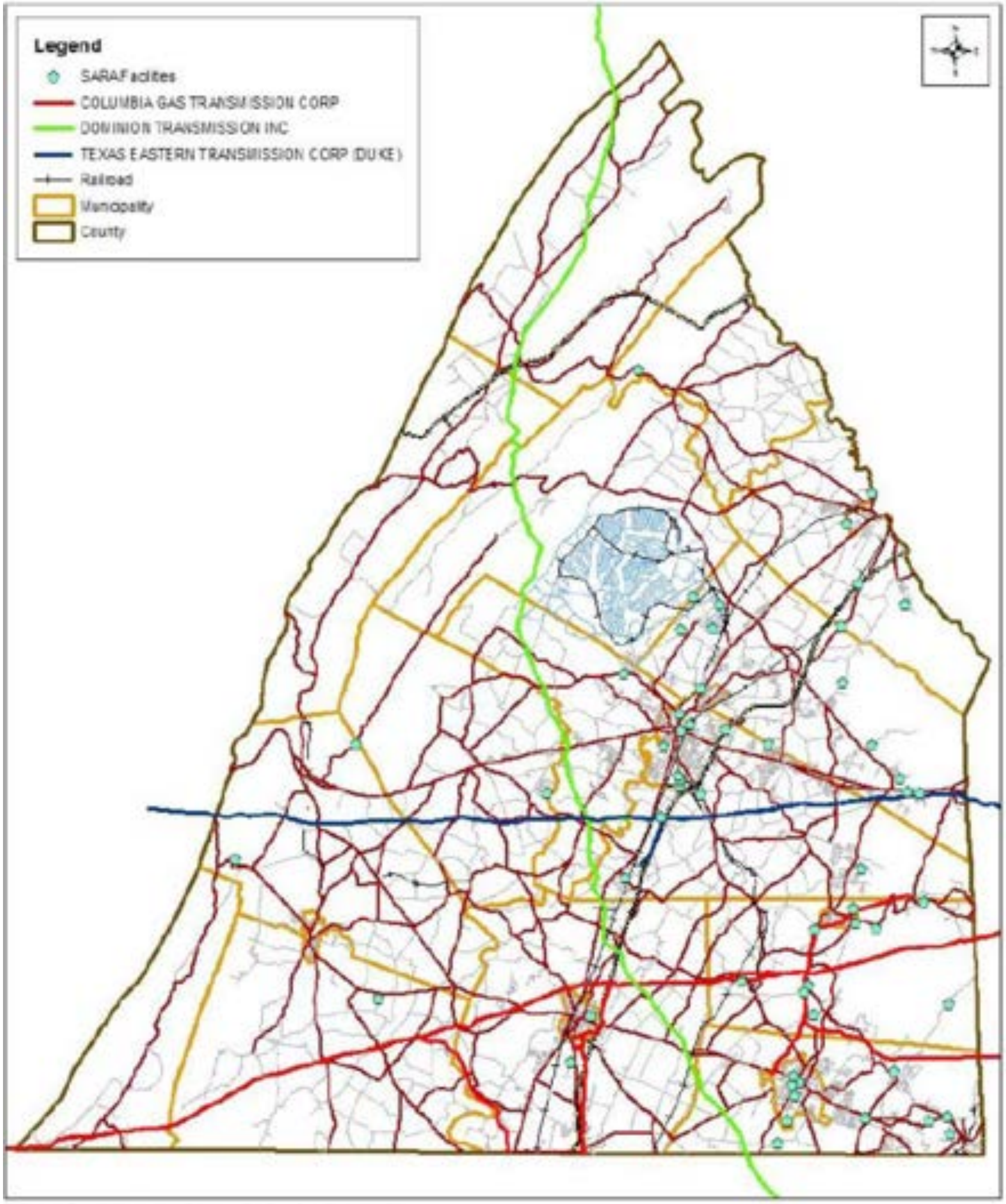


Figure 3.1.5.1.2: Major Gas Pipelines in Franklin County (Dec 2017)

[50] PUC, Exhibit 10

Hazardous materials are classified by the Department of Transportation (DOT) into nine classes based on the chemical characteristics producing the risk. The nine classifications are:

- 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

Franklin County's past occurrences of hazardous materials releases are accidental and are not considered acts of terrorism or criminal in nature. While past occurrences have not been deemed intentional, the impact from the 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.

In addition to the major routes of transportation, each fixed facility identified within the Cumberland Valley poses a potential threat to the surrounding community.

3.1.5.2. Range of Magnitude

Within Franklin County we have a major transportation corridor with over 600 miles of major highway, 2 rail hubs, and 3 Major gas pipeline systems that provide for an increase in transportation of hazardous materials through rail, air, and road. These routes of transportation combined with the number of fixed facilities and end users of hazardous materials have provided for an incidence of frequent chemical and petroleum product releases.

Environmental hazards incidents within Franklin County can range from minor petroleum spills to industrial based incidents.

3.1.5.3. Past Occurrence

Environmental hazard incidents within Franklin County occur on a regular basis with the majority being handled by the local first responders with guidance from DEP. Franklin County does report a number of incidents to PEMA. **Table 3.1.5.3.1** below lists the significant Hazardous Materials incidents responded to in the county from May 2007 through Apr 2017. Of note in this table is that Greene Township is the residence of the Letterkenny Army Depot, where several chemicals are used for vehicle maintenance and repair. This may explain the higher numbers for Greene Township incidents attributed to chemical spills other than petro-chemicals.

Municipality	Petro-Chemical (Liquid)	Petro-Chemical (Gas)	Other Chemicals	Totals
Antrim Township	1	5	1	**7**
Chambersburg Borough	1	0	2	**3**
Fannett Township	0	0	0	**0**
Greencastle Borough	0	3	0	**3**
Greene Township	5	5	8	**18***
Guilford Township	0	11	1	**12**
Hamilton Township	1	2	0	**3**
Letterkenny Township	0	0	0	**0**
Lurgan Township	0	0	0	**0**
Mercersburg Borough	1	2	0	**3**
Metal Township	0	0	0	**0**
Mont Alto Borough	0	3	0	**3**
Montgomery Township	0	1	1	**2**
Orrstown Borough	0	0	0	**0**
Peters Township	0	0	0	**0**
Quincy Township	0	5	0	**5**
Shippensburg Borough	0	0	0	**0**
Southampton Township	0	1	0	**1**
St Thomas Township	1	0	1	**2**
Warren Township	0	0	0	**0**
Washington Township	1	3	0	**4**
Waynesboro Borough	0	9	0	**9**
Totals	**11**	**50****	**14**	**75**
* Includes Letterkenny Army Depot ** A total of 4 Major Gas Transmission Line Leaks included in these numbers				

Table 3.1.5.3.1: Hazardous Materials Incidents in Franklin County (2007-2017)[51]

[51] Franklin County CAD System, 2007-2017

Another interesting fact from **Table 3.1.5.3.1** is that the majority of the releases are related to gaseous petro-chemical releases, but most of these are due to vehicles backing into natural gas lines or gas line damage due to nearby construction. However, there were 4 incidents over this time span in which a major gas transmission line leak was addressed.

3.1.5.4. Future Occurrence

Due to the wide scope of definition of environmental hazards, ranging from a small spill to a large release of a highly volatile or toxic hazardous material, incidents are considered ***highly likely*** as defined by the Risk Factor Methodology criteria (See **Section 1.2**).

3.1.5.5. Vulnerability Assessment

Figure 3.1.5.5.1 represents the municipality hazard threat risk assessment for Environmental Hazards in Franklin County. One can see from **Figure 3.1.5.5.1** below, 4 municipalities ranked this hazard as a Major risk and 9 of the remaining 18 municipalities rated it as a Moderate risk. This self-assessment by the municipalities ranks Environmental Hazards as the number 12 highest threat in the county and is considered an overall Moderate risk.

Environmental Hazards Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	3	20%	4	10%	2	10%	2.4	10.12%	0.2429
Chambersburg Borough	2	30%	1	30%	2	20%	4	10%	2	10%	1.9	14.05%	0.2670
Fannett Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.59%	0.0175
Greencastle Borough	2	30%	2	30%	4	20%	4	10%	2	10%	2.6	2.73%	0.0710
Greene Township	2	30%	1	30%	1	20%	4	10%	2	10%	1.7	11.82%	0.2009
Guilford Township	4	30%	2	30%	2	20%	4	10%	2	10%	2.8	9.38%	0.2626
Hamilton Township	1	30%	1	30%	3	20%	4	10%	2	10%	1.8	7.29%	0.1312
Letterkenny Township	3	30%	2	30%	3	20%	4	10%	2	10%	2.7	1.58%	0.0427
Lurgan Township	1	30%	2	30%	2	20%	4	10%	2	10%	1.9	1.42%	0.0270
Mercersburg Borough	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	0.97%	0.0107
Metal Township	3	30%	2	30%	1	20%	3	10%	2	10%	2.2	1.13%	0.0249
Mont Alto Borough	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	1.01%	0.0222
Montgomery Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	3.68%	0.0810
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	0.14%	0.0018
Peters Township	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	2.86%	0.0400
Quincy Township	2	30%	2	30%	3	20%	4	10%	2	10%	2.4	3.41%	0.0818
Shippensburg Borough	2	30%	2	30%	3	20%	4	10%	2	10%	2.4	0.75%	0.0180
Southampton Township	3	30%	2	30%	3	20%	4	10%	2	10%	2.7	5.49%	0.1482
St Thomas Township	3	30%	2	30%	1	20%	4	10%	2	10%	2.3	3.79%	0.0872
Warren Township	1	30%	2	30%	3	20%	3	10%	2	10%	2.0	0.21%	0.0042
Washington Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	9.55%	0.2101
Waynesboro Borough	2	30%	1	30%	1	20%	4	10%	2	10%	1.7	7.02%	0.1193
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.112

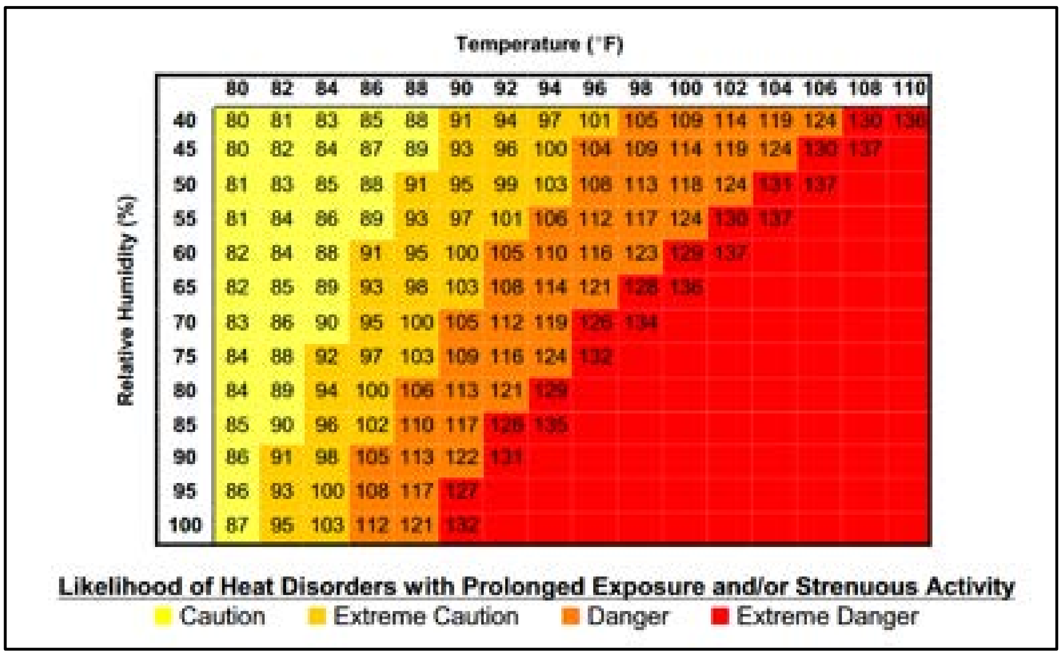
Figure 3.1.5.5.1: Municipal Environmental Hazards Threat Vulnerability Self-Assessment

Environmental hazards have the greatest impact on the residential population within Franklin County. The majority of incidents reported within Franklin County are the result of motor vehicle accidents or spills/leaks within or at a residential structure.

The economic loss from environmental hazards and explosion incidents ranges from non-recordable to larger losses. The impact on the local economy from a single incident is almost impossible to measure due to the complexity of work lost, revenue losses, and loss of future business.

3.1.6. Extreme Temperatures

This section provides a hazard profile and vulnerability assessment for the Extreme Temperature hazard in Franklin County, including both extreme heat and extreme cold conditions. Extreme heat can be described as temperatures that hover 10 degrees F or more above the average high temperatures for a region during the Summer months. Extreme Heat is usually discussed using the term Heat Index. The Heat Index or the "Apparent Temperature" is an accurate measure of how hot it really feels when the Relative Humidity (RH) is added to the actual air temperature[52]. See **Figure 3.1.6.1** below for the Heat Index chart.



Temperature (°F)

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

Likelihood of Heat Disorders with Prolonged Exposure and/or Strenuous Activity

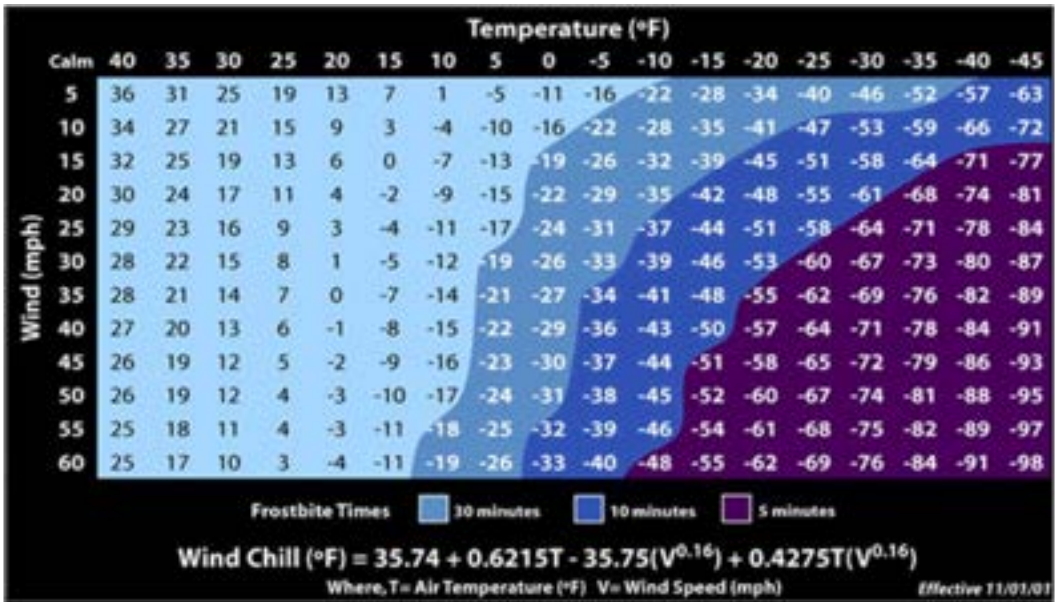
Caution Extreme Caution Danger Extreme Danger

Figure 3.1.6.1: National Weather Service Heat Index (HI)

Parameters for extreme cold temperature events vary across different regions of the United States, but Franklin County and other areas accustomed to winter weather, below 0 degrees F may be considered extreme cold. However, Wind Chill Factor is the common terminology use to discuss extreme cold temperatures. Wind Chill Factor is only defined for temperatures at or

[52] NOAA

below 50 degrees F and wind speeds above 3 mph[53]. Combined with increases in wind speed, extreme cold temperatures in Pennsylvania can be life threatening to those exposed for extended periods of time. See **Figure 3.1.6.2** below for the Wind Chill chart.



Temperature (°F)

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

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill } (^\circ F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Figure 3.1.6.2: National Weather Service Wind Chill Chart

3.1.6.1. Location and Extent

Franklin County can experience many different temperature extremes in the Summer and Winter months. Areas most susceptible to extreme heat include urban environments, which tend to retain the heat well into the night, leaving little opportunity for dwellings to cool. Areas most susceptible to extreme cold include higher elevations where the temperatures are naturally colder and access ways are more susceptible to closure due to severe weather, essentially isolating “at risk” communities.

Figure 3.1.6.1.1 shows the mean maximum temperatures throughout Pennsylvania per county.

[53] NOAA

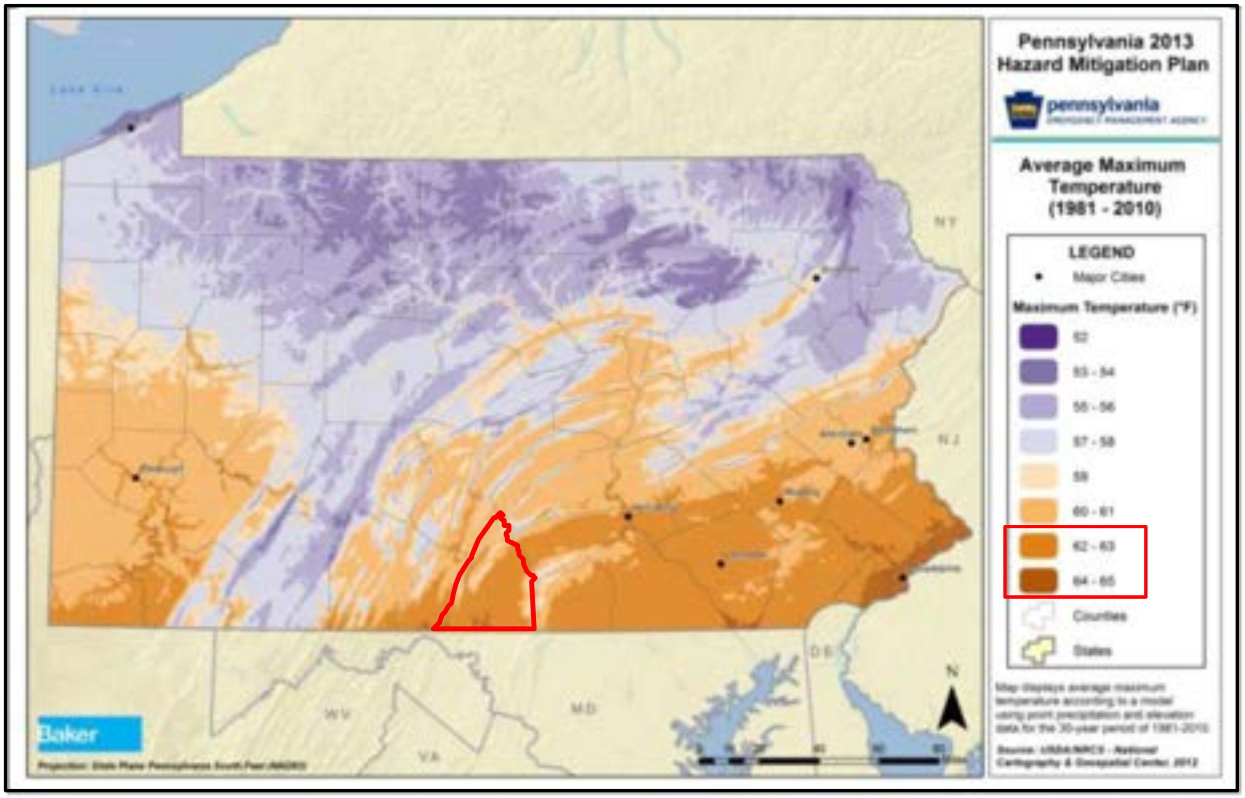


Figure 3.1.6.1.1: Average Maximum Temperature throughout Pennsylvania (1981-2010)[54]

June, July, and August are typically the warmest months in Franklin County (See **Figure 3.1.6.1.2** below.

[54] PEMA, 2013

Max Temperatures (degrees F) per Month since 2012													Average Maximum Temperature 2012 - 2017
	2012		2013		2014		2015		2016		2017		
	Chambersburg (USC00361354)	South Mountain (USC368308)	Chambersburg (USC00361354)	South Mountain (USC368308)	Chambersburg (USC00361354)	South Mountain (USC368308)	Chambersburg (USC00361354)	South Mountain (USC368308)	Chambersburg (USC00361354)	South Mountain (USC368308)	Chambersburg (USC00361354)	South Mountain (USC368308)	
January	43.0	39.6	40.4	38.0	32.6	30.7	34.8	31.7	36.6	34.5	40.9	39.2	36.83
February	47.1	43.1	39.0	34.9	36.1	34.2	31.0	28.0	40.4	40.0	51.4	48.9	39.51
March	62.7	58.6	45.7	41.5	46.0	41.2	48.1	44.0	58.6	53.6	48.8	44.9	49.48
April	64.8	59.5	63.2	60.0	61.9	58.6		60.0	62.6	59.5	69.0	65.1	62.20
May	77.5	72.4	72.5	67.6	74.4	69.5	77.9	74.1	69.5	65.4	69.5	64.4	71.23
June	81.7	76.9	81.4	76.6	81.3	76.5	79.7	75.7	80.7	77.1	82.0	77.1	78.90
July	88.9	83.2	85.5	80.8	82.8	79.2	82.6	79.6	86.9	81.6	84.6	79.8	82.96
Aug	84.0	79.2	81.1	76.0	79.2	75.6	83.6	79.3	87.0	82.3	80.5	75.7	80.30
September	75.8	73.0	76.4	72.3	76.0	72.5	78.9	76.0	79.9	77.4			75.82
October	62.7	60.0	65.3	62.0	64.9	61.3	63.0	59.9	66.8	64.7			63.06
November	48.4	45.8	49.2	46.1	48.5	44.8	57.8	55.1	56.3	54.4			50.64
December	45.5	42.8	42.2	40.4	42.4	41.2	52.0	50.3	41.0	40.7			43.85

Indicates that data was not available at time of this HMP draft (10/11/2017)

Figure 3.1.6.1.2: Maximum Temperatures per Month (2012-2017)[55]

Given the definition of extreme heat identified in **Section 3.1.6**, and the average high temperatures for the County's hottest months (**Figure 3.1.6.1.2**), extreme heat can vary from mid to high 80s and apparent heat can be even higher with an increase in relative humidity (See **Figure 3.1.6.1**).

Figure 3.1.6.1.3 shows the mean minimum temperatures throughout Pennsylvania per county.

[55] NOAA/NCEI

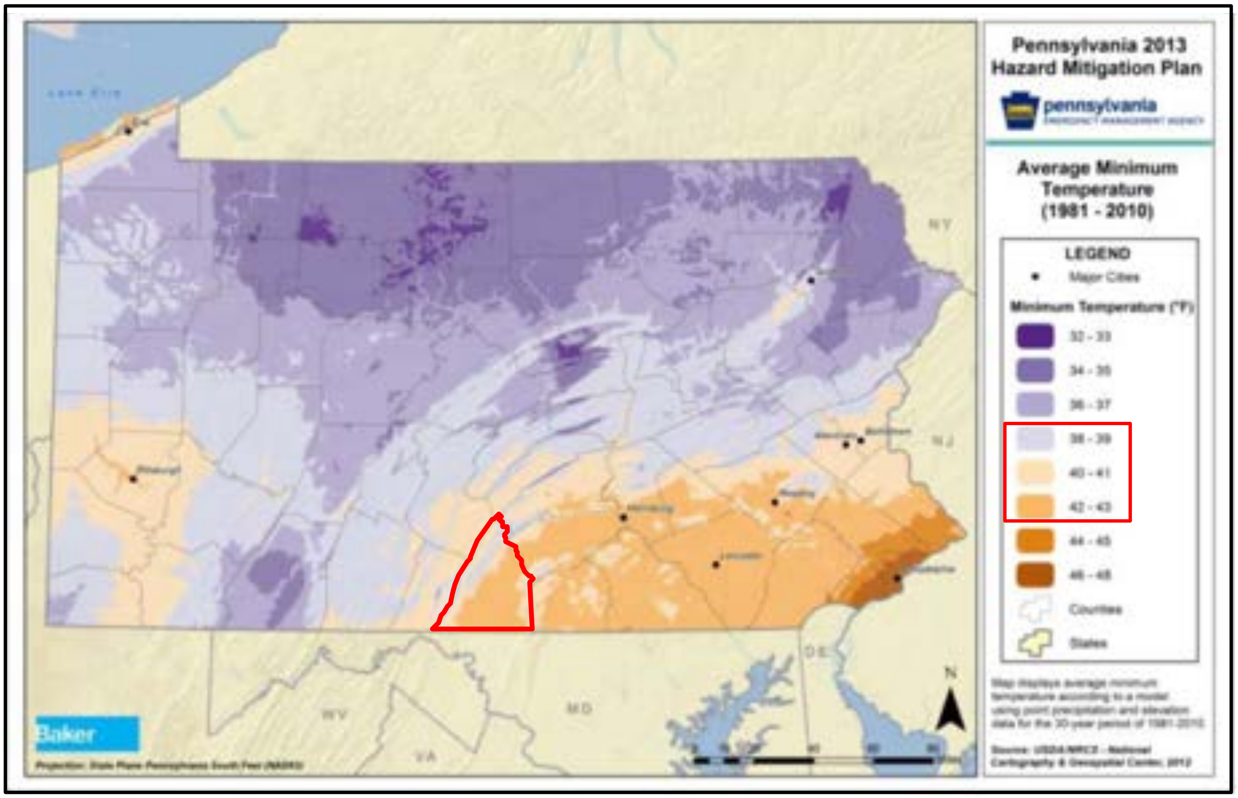


Figure 3.1.6.1.3: Average Minimum Temperature throughout Pennsylvania (1981-2010)[56]

Because of our geographic location in the northeast, Franklin County is more likely to experience extreme cold temperatures in the Winter months (November through March). **Figure 3.1.6.1.4** below shows the minimum monthly temperatures for Franklin County over the past five (5) years.

[56] PEMA, 2013

Min Temperatures (degrees F) per Month since 2012	2012 Chambersburg (USC00361354)	2012 South Mountain (USC368308)	2013 Chambersburg (USC00361354)	2013 South Mountain (USC368308)	2014 Chambersburg (USC00361354)	2014 South Mountain (USC368308)	2015 Chambersburg (USC00361354)	2015 South Mountain (USC368308)	2016 Chambersburg (USC00361354)	2016 South Mountain (USC368308)	2017 Chambersburg (USC00361354)	2017 South Mountain (USC368308)	Average Maximum Temperature 2012 - 2017
January	26.3	22.2	26.0	21.3	15.2	11.1	20.3	16.0	20.4	17.1	28.9	26.5	20.94
February	29.9	26.4	24.2	19.6	20.7	15.5	12.6	7.6	24.5	21.8	30.8	29.5	21.93
March	39.6	35.3	31.2	25.9	27.1	20.3	28.3	22.2	36.5	32.5	30.9	24.9	29.56
April	42.0	35.6	42.7	38.2	40.1	35.4		36.5	39.0	36.6	47.0	45.5	39.87
May	56.8	53.1	51.8	46.1	52.7	47.6	57.1	52.4	50.9	48.1	51.0	48.5	51.34
June	59.9	54.9	62.2	58.1	62.2	56.2	62.9	59.0	60.7	57.2	60.7	57.4	59.28
July	67.6	62.3	66.4	63.5	63.0	58.8	66.1	60.7	66.3	62.9	65.6	62.2	63.78
Aug	64.2	59.8	61.8	57.4	60.4	55.4	62.1	58.2	65.4	63.3	61.0	57.2	60.52
September	55.7	51.4	53.2	48.9	56.3	51.5	59.0	55.2	59.2	56.7			54.71
October	45.9	43.3	47.7	43.2	47.5	43.9	43.5	39.8	47.2	44.0			44.60
November	32.5	28.4	32.6	28.6	32.1	28.2	39.7	36.3	36.3	33.1			32.78
December	32.0	28.7	27.5	26.1	30.9	27.0	36.8	35.8	27.9	24.6			29.73

Indicates that data was not available at time of this HMP draft (10/11/2017)

Figure 3.1.6.1.4: Minimum Temperatures per Month (2012-2017)[57]

Given the definition of extreme cold (Wind Chill) identified in **Section 3.1.6**, and the average low temperatures for the County's coldest months (**Figure 3.1.6.1.4**), extreme cold can dip as low as single digits with just a 25 mph sustained wind (See **Figure 3.1.6.2**).

3.1.6.2. Range of Magnitude

NOAA's heat alert procedures are based mainly on Heat Index (HI) values (See **Figure 3.1.6.1** above). The Heat Index indicates the temperature the body feels. It is important to note that the HI values are devised for shady, light wind conditions. Exposure to full sunshine can increase the heat index values by up to 15 degrees F.

[57] NOAA/NCEI

Exposure to heat can cause health problems indirectly, such as through the increased workload on the heart. This can be especially dangerous to young children and individuals with pre-existing medical conditions, typically the elderly whose bodies cannot manage the physical stress these events cause. Extremely high temperatures can cause heat stress, which can be divided into four categories (See **Table 3.1.6.2.1** below).

Danger Category	Heat Disorders	Apparent Temperature (degrees F)
I (Caution)	Fatigue is possible with prolonged exposure and physical activity.	80 to 90
II (Extreme Caution)	Sunstroke, heat cramps, and heat exhaustion are possible with prolonged exposure and physical activity	90 to 105
III (Danger)	Sunstroke, heat cramps, and heat exhaustion are likely; heat stroke is possible with prolonged exposure and physical activity	105 to 130
IV (Extreme Danger)	Heatstroke or sunstroke are immanent	>130

Table 3.1.6.2.1: Four Categories of Heat Stress[58]

The following impacts can be observed following an extreme temperature event:

- Health Impacts: Prolonged exposure to cold temperatures can lead to frost bite and/or hypothermia. This is especially true in areas where the primary source of heating is provided through or supplemented by electrical heat sources. When the power is lost due winter storm damage, the elderly and young children without a heat source can be extremely vulnerable to the extreme cold conditions. However, extreme heat waves, can prove more deadly over a shorter duration, especially in areas where air conditioning is not present or lost due to power outages. The age of housing in the area can also be a factor in the health impacts of extreme heat conditions. **Table 3.1.24.5.1** in the Winter Storm hazard profile indicates that over 34% of houses in the county were built prior to 1960, meaning they were likely built without central air conditioning. This means the high risk communities can be in harm's way even if the power is not interrupted.

- Transportation: Cold weather can impact automotive engines and stress metal bridge structures. Highways and railroad tracks can become distorted in high heat, due to expansion of materials as they get hotter. Disruptions to the transportation network and accidents caused by extreme temperatures represent an additional risk as motorists can become stranded in these harsh elements.

[58] PEMA, 2013

- Agriculture: Absolute temperature and duration of extreme cold can have devastating effects on trees and winter crops. Livestock is especially vulnerable to heat, and crop yields can be impacted by heat waves that occur during key development stages.

- Energy: Energy consumption rises significantly during both extreme cold and extreme heat conditions. Residents are placed in extreme danger when any fuel shortages or utility failures prevent the heating or cooling of a dwelling. Utility Interruptions are specifically profiled in **Section 3.1.22**.

Franklin County's worst-case extreme heat scenario would be an excessive heat spell occurring during a summer holiday weekend, such as the Fourth of July. Summer holiday weekends bring people out of their air-conditioned work environments and homes and into the outdoors, often despite dangerous heat and humidity levels. The issue can be exacerbated due to heavy loads on the energy grid causing rolling brown-outs or black-outs. Couple this with reduced electrical generation/maintenance manpower coverage over the holiday and this could lead to extended periods of heat exposure without a means of relief.

The worst-case extreme cold temperature scenario involves extended below 0 temperatures and chilling winds that could threaten safety of residents and continuity of utilities. There are several nursing homes and assisted living centers in the county that would have to relocate these mobility challenged residents if the loss of utilities cause heating system failures. Add these to the number of single family home residents that also would be looking for shelter if they do not have a secondary source of heat in their homes, and you rapidly have a humanitarian crisis on your hands.

3.1.6.3. Past Occurrence

Data from the National Centers for Environmental Information reports that there have been 260 extreme temperature event days in Pennsylvania between 1950 and 2017, resulting in a total of 437 deaths and 448 injuries. Ninety-seven (97) of these event days have been a result of extreme cold, resulting in 30 deaths and 1 injury. There have been 121 extreme heat event days, resulting in 355 deaths and 378 injuries[59].

A refined search of the National Centers for Environmental Information database was performed for Franklin County. **Table 3.1.6.3.1** below illustrates all events contained in this database from 1993 through 2017.

[59] PEMA, 2013

Type of Event	Date	Temperature Extreme	Injuries	Deaths
Extreme Cold/Wind Chill	2/15/2015	Wind Chill of -25 to =35 degrees F	0	0
Extreme Cold/Wind Chill	1/6/2014	Wind Chill of -25 to -50 degrees F	0	0
Excessive Heat	7/21/2011	Heat Index of 105 to 115 degrees F	0	0
Extreme Cold/Wind Chill	2/5/2007	Wind Chill of -10 to -15 degrees F	0	0
Excessive Heat	8/1/2006	Heat Index of 103 to 108 degrees F	0	0
Excessive Heat	7/31/2006	Heat Index of 98 to 103 degrees F	0	0
Excessive Heat	7/17/2006	Heat Index of 96 to 101 degrees F	0	0

Table 3.1.6.3.1: Franklin County Extreme Temperature Events (1993-2018)[60]

3.1.6.4. Future Occurrence

Because of its location and geography, Franklin County is more likely to encounter extreme cold than excessively hot weather. However, both are possibilities and must be planned for. We have high risk communities that are particularly susceptible to these threats and mitigation plans need to be made to plan for either scenario.

The future occurrence of extreme temperature can be considered ***likely*** as defined by the Risk Factor Methodology probability criteria (See **Section 1.2**).

3.1.6.5. Vulnerability Assessment

The entire county, including all critical infrastructure, is vulnerable to the effects of extreme temperatures. Refer to **Table 3.1.6.5.1** below for specific critical facilities in the municipalities subject to extreme temperatures. These numbers include nursing homes, hospitals, and assisted living communities as well as schools and day care facilities that impact our members of the community at the greatest risk to this threat.

[60] NOAA/NCEI

Municipality	Total Number of Critical Facilities	Nursing Homes/ Assisted Living/ Hospital Facilities	Schools/Daycares
Antrim Township	75	1	27
Chambersburg Borough	97	23	34
Fannett Township	27	3	7
Greencastle Borough	24	1	10
Greene Township	100	5	33
Guilford Township	85	3	28
Hamilton Township	47	0	22
Letterkenny Township	20	0	1
Lurgan Township	21	0	8
Mercersburg Borough	10	1	4
Metal Township	15	0	4
Mont Alto Borough	6	0	2
Montgomery Township	12	0	2
Orrstown Borough	1	0	0
Peters Township	22	0	5
Quincy Township	48	4	12
Shippensburg Borough	5	0	4
Southampton Township	30	2	11
St Thomas Township	20	1	4
Warren Township	2	0	0
Washington Township	46	1	12
Waynesboro Borough	45	8	17
Total	**758**	**53**	**247**

Table 3.1.6.5.1: Critical Facilities at Risk of Extreme Temperatures

Figure 3.1.6.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Extreme Temperature hazard. 5 of 22 municipalities rated this threat as a Major event. Additionally, 10 of the remaining 17 municipalities rank this as a Moderate threat. This was ranked as the number 6 highest threat in the county.

Extreme Temperature
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	4	20%	1	10%	3	10%	2.4	10.12%	0.2429
Chambersburg Borough	4	30%	1	30%	4	20%	1	10%	3	10%	2.7	14.05%	0.3794
Fannett Township	2	30%	2	30%	3	20%	1	10%	3	10%	2.2	1.59%	0.0350
Greencastle Borough	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	2.73%	0.0655
Greene Township	2	30%	1	30%	3	20%	1	10%	3	10%	1.9	11.82%	0.2246
Guilford Township	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	9.38%	0.2251
Hamilton Township	1	30%	1	30%	4	20%	2	10%	3	10%	1.9	7.29%	0.1385
Letterkenny Township	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	1.58%	0.0379
Lurgan Township	1	30%	2	30%	4	20%	3	10%	3	10%	2.3	1.42%	0.0327
Mercersburg Borough	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	0.97%	0.0233
Metal Township	2	30%	2	30%	1	20%	1	10%	3	10%	1.8	1.13%	0.0203
Mont Alto Borough	1	30%	2	30%	3	20%	1	10%	3	10%	1.9	1.01%	0.0192
Montgomery Township	3	30%	2	30%	4	20%	1	10%	3	10%	2.7	3.68%	0.0994
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	3	10%	1.4	0.14%	0.0020
Peters Township	2	30%	1	30%	4	20%	2	10%	3	10%	2.2	2.86%	0.0629
Quincy Township	3	30%	2	30%	4	20%	1	10%	3	10%	2.7	3.41%	0.0921
Shippensburg Borough	2	30%	1	30%	4	20%	1	10%	3	10%	2.1	0.75%	0.0158
Southampton Township	2	30%	1	30%	2	20%	3	10%	3	10%	1.9	5.49%	0.1043
St Thomas Township	3	30%	2	30%	3	20%	3	10%	3	10%	2.7	3.79%	0.1023
Warren Township	2	30%	2	30%	4	20%	2	10%	3	10%	2.5	0.21%	0.0053
Washington Township	2	30%	1	30%	2	20%	1	10%	3	10%	1.7	9.55%	0.1624
Waynesboro Borough	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	7.02%	0.1685
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.259

Figure 3.1.6.5.1: Municipal Extreme Temperatures Threat Vulnerability Self-Assessment

Extreme temperatures generally occur for a short period of time, but can cause a wide range of impacts, particularly to vulnerable populations that may not have access to adequate heating and/or cooling. This natural hazard can also cause impacts to agriculture (crops and animals) and infrastructure (pipe bursts and power failures) negatively affecting the economy of Franklin County.

3.1.7. Flood, Flash Flood, and Ice Jam

Floodplains are lowlands, adjacent to rivers, creeks, and streams that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. However, in assessing the potential spatial extent of flooding it is important to know that a floodplain associated with a flood that has a 10% chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2%-annual chance of occurring. The National Flood Insurance Program (NFIP), for which its Flood Insurance Rate Maps (FIRMs) are published, identifies the 1%-annual-chance flood which is used to delineate the Special Flood Hazard Area (SFHA) and Base Flood Elevations. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania, and Franklin County local governments. Refer to **Appendix C** for a list of terms used to define the SFHA.

Figure 3.1.7.1 shows an example from the website used (http://www.region2coastal.com/view-flood-maps-data/what-is-my-bfe-address-lookup-tool/) to determine specific property's effective Flood Zone. In this example we used the address for the Franklin County Department of Emergency Services. The figure illustrates that this address falls within the Flood Zone "X", which, as defined in **Appendix C**, means it is in the Moderate to Minimal Risk Areas. Any interested residential or commercial property owner can access this website to check their effective Flood Zone. This tool was developed for FEMA Region II, so not all fields are populated, such as Base Flood elevation, but it will give Franklin County property owners enough information to determine if flood insurance through the NFIP is warranted.

Enter an address to view effective and updated flood risk information for that location:

390 New York Ave, Chambersburg PA | Get Details | Clear Details

Approximate Address Identified: 390 New York Ave, Chambersburg, Pennsylvania, 17201

Updated FEMA Flood Hazard Data

FEMA flood hazard data currently available for coastal areas of New York and New Jersey is provided below to help you understand the current flood risk to your property and to guide Sandy recovery and rebuilding efforts.

Note: This tool provides flood zone and Base Flood Elevation (BFE) information for areas affected by ***coastal flood risk****. However,* ***riverine flood zone*** *information will also be returned by the tool in communities where preliminary FIRMs have been released.*

Attribute Name	Attribute Value
What is the most recent FEMA flood hazard data source available for this location?	Please contact your local floodplain administrator for more information.
What is my property's Base Flood Elevation (BFE)? (For AO Zones, the flood depth will be shown instead of an elevation; For N/A results, please contact your local floodplain administrator for more information.)	N/A
What is my property's Flood Zone? (For N/A results, please contact your local floodplain administrator for more information.)	N/A
Is my Property in the Area of Moderate Wave Action?	N/A
What is the estimated ground elevation at this location? (See licensed surveyor for actual elevation of your building)	N/A
What does my FEMA Flood Hazard Map Panel Look Like?	N/A
View your property on our Interactive Web Tool	Link to Web Tool
Where can I get the GIS data for my property area?	N/A

Effective Flood Insurance Data

This information is from the effective Flood Insurance Rate Map for your community. It is used to determine who must buy flood insurance and how much it costs. It may also be used by your community to regulate development in flood prone areas.

Attribute Name	Attribute Value
What is my property's current effective Base Flood Elevation?	N/A
What is my property's current effective Flood Zone?	X

Figure 3.1.7.1: Example from FEMA Base Flood Level Address Lookup Tool

3.1.7.1. Location and Extent

The countywide Digital Flood Insurance Rate Map (DFIRM) was published for Franklin County on January 18, 2012. All communities within the County are now shown on a single set of countywide DFIRMs. Previous FIRMs and Flood Boundary and Floodway Maps (FBFM) were digitized to produce a DFIRM that is compatible with geographic information systems (GIS). These maps can be used to identify the expected spatial extent of flooding from a 1%-annual-chance event. The following water courses are considered flood sources in the most recent DFIRMs: Burns Creek, Doylestown Stream, Dry Run, Main Branch and West Branch of the Conococheague Creek, Fetty Stewart Run, Trout Run, Conodoguinet Creek, Township Run, Broad Run, Buck Run, Johnston Run, Blue Spring Creek, Licking Creek, Welsh Run, Muddy Run, Back Creek, Campbell Run, Wilson Run, Dennis Creek, Rocky Spring Branch, Rowe Run, Laughlin Run, Clippingers Run, Paxton Run, Middle Spring Creek, Furnace Run, Mains Run, Mountain Run, Phillaman Run, Cold Spring Run, Stump Run, Rocky Mountain Creek, Raccoon Creek, Carbaugh Run, East and West Branch of the Antietam Creek, Biesecker Run, Red Run, and Paddy Run.

Figure 2.1.4 in **Section 2,** County Profile, shows the location of major watercourses in Franklin County and **Figure 2.1.2** in the same section shows all the watersheds impacted in the county. Flood events caused by ice jams would be limited primarily to the Conococheague Creek, the Antietam Creek, and the Conodoquinet Creek.

Figure 3.1.7.1.1 shows all the Franklin County DFIRM panels. However, in order to see the details of the panels more clearly, the map was segregated into 4 separate quadrants.

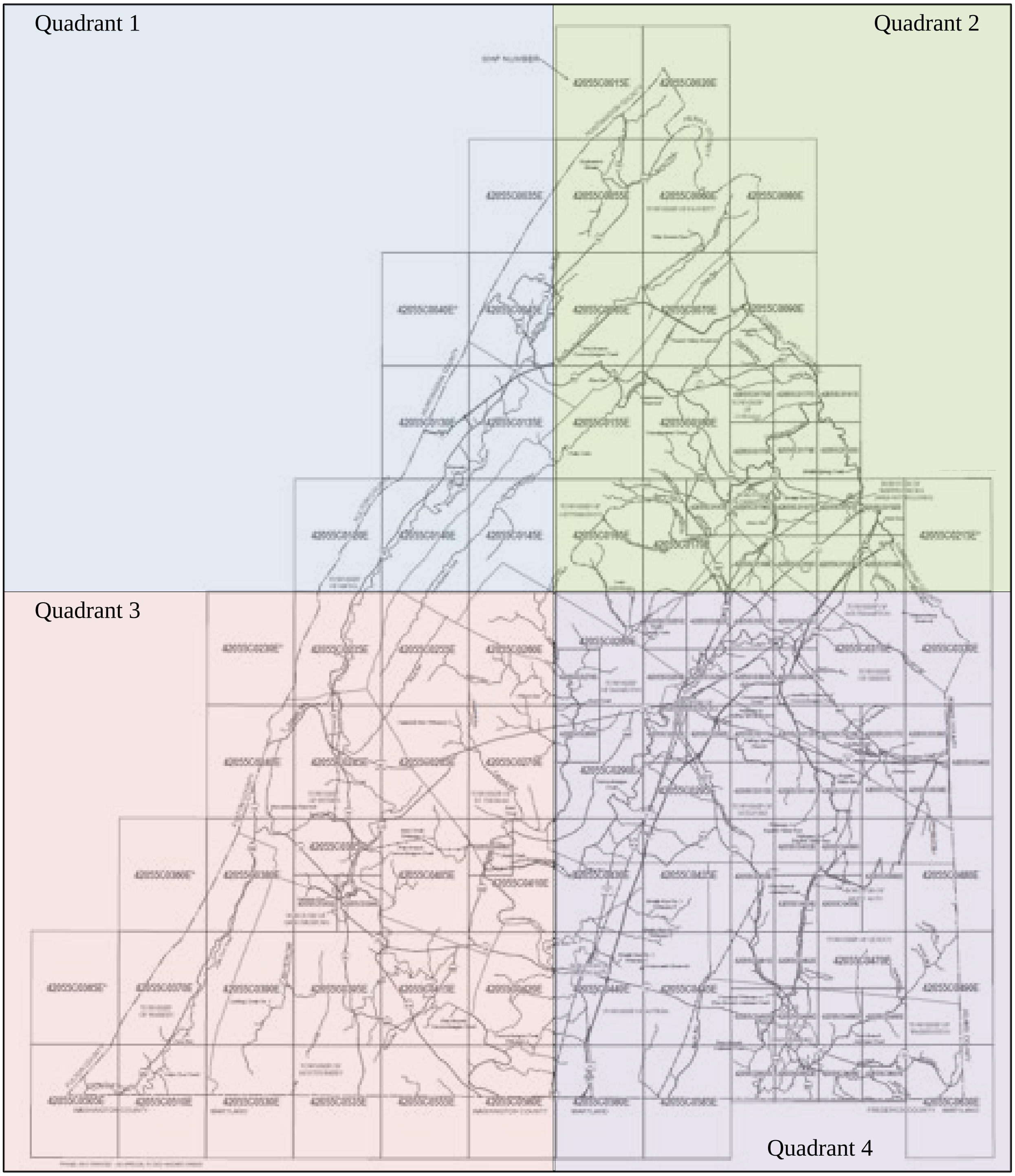


Figure 3.1.7.1.1: Franklin County DFIRM Map with Quadrants (Jan 2012)

Table 3.1.7.1.1 below lists the panels contained in each of these 4 quadrants.

Quadrant 1	Quadrant 2		Quadrant 3		Quadrant 4		
42055C0035E	42055C0015E	42055C0179E	42055C0230E	42055C0406E	42055C0278E	42055C0312E	42055C0480E
42055C0040E	42055C0020E	42055C0183E	42055C0235E	42055C0410E	42055C0280E	42055C0313E	42055C0440E
42055C0045E	42055C0055E	42055C0165E	42055C0255E	42055C0365E	42055C0281E	42055C0314E	42055C0445E
42055C0130E	42055C0060E	42055C0170E	42055C0260E	42055C0370E	42055C0282E	42055C0316E	42055C0461E
42055C0135E	42055C0080E	42055C0167E	42055C0240E	42055C0390E	42055C0283E	42055C0317E	42055C0462E
42055C0120E	42055C0065E	42055C0186E	42055C0245E	42055C0395E	42055C0284E	42055C0318E	42055C0463E
42055C0140E	42055C0070E	42055C0187E	42055C0265E	42055C0415E	42055C0301E	42055C0319E	42055C0464E
42055C0145E	42055C0090E	42055C0188E	42055C0270E	42055C0420E	42055C0302E	42055C0336E	42055C0470E
	42055C0155E	42055C0189E	42055C0360E	42055C0505E	42055C0303E	42055C0338E	42055C0468E
	42055C0160E	42055C0191E	42055C0380E	42055C0510E	42055C0304E	42055C0340E	42055C0469E
	42055C0176E	42055C0192E	42055C0385E	42055C0530E	42055C0310E	42055C0430E	42055C0490E
	42055C0177E	42055C0193E	42055C0383E	42055C0535E	42055C0330E	42055C0435E	42055C0580E
	42055C0181E	42055C0194E	42055C0384E	42055C0555E	42055C0286E	42055C0455E	42055C0585E
	42055C0178E	42055C0215E	42055C0405E	42055C0560E	42055C0290E	42055C0452E	42055C0601E
					42055C0291E	42055C0454E	42055C0602E
					42055C0292E	42055C0456E	42055C0606E
					42055C0295E	42055C0458E	42055C0607E
					42055C0311E	42055C0460E	42055C0630E

Table 3.1.7.1.1: List of Panels in Each Quadrant

Larger views of these quadrants are shown in **Figures 3.1.7.1.2** – **3.1.7.1.5** below.

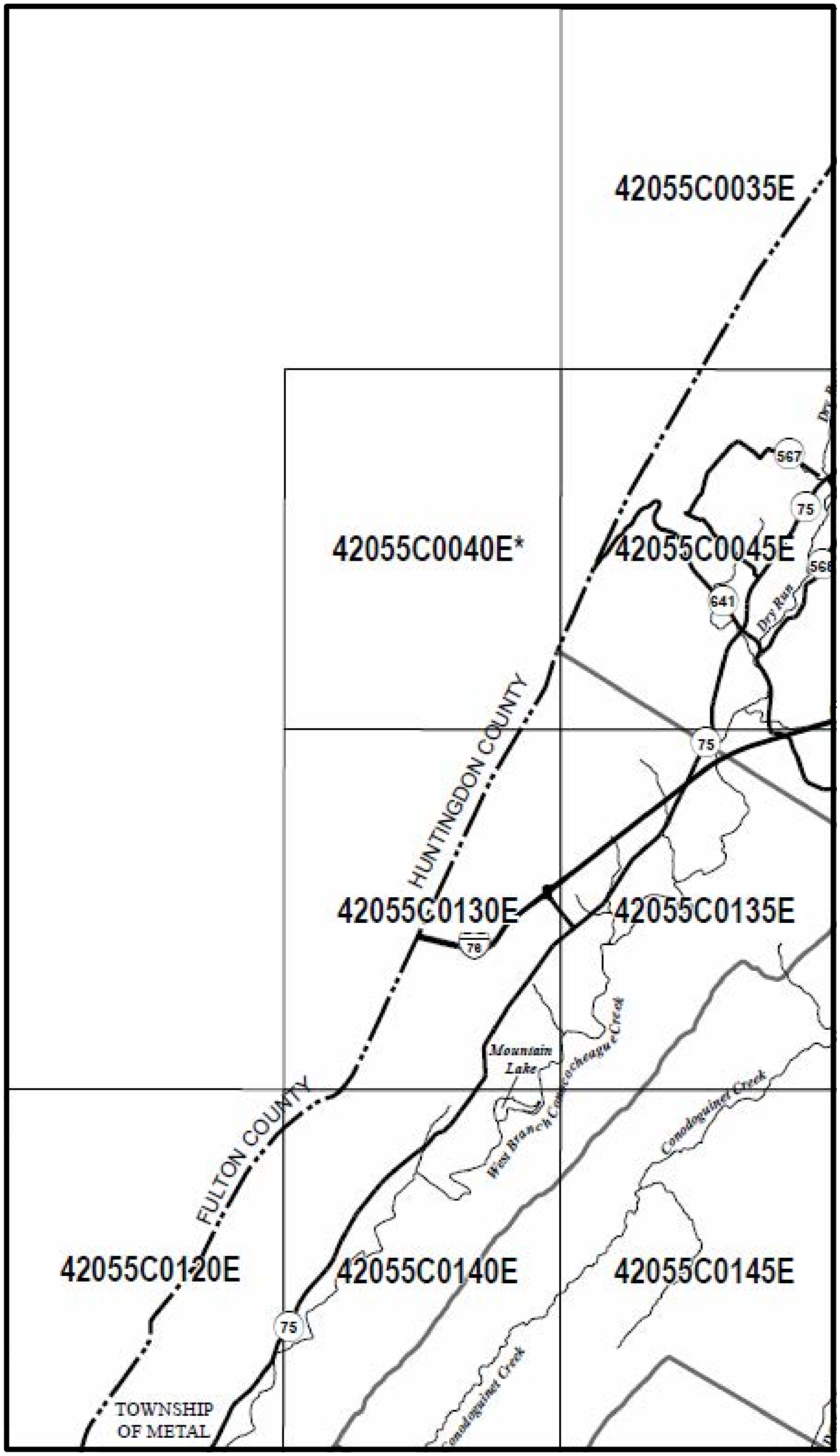


Figure 3.1.7.1.2: Quadrant 1 of County DFIRM Map

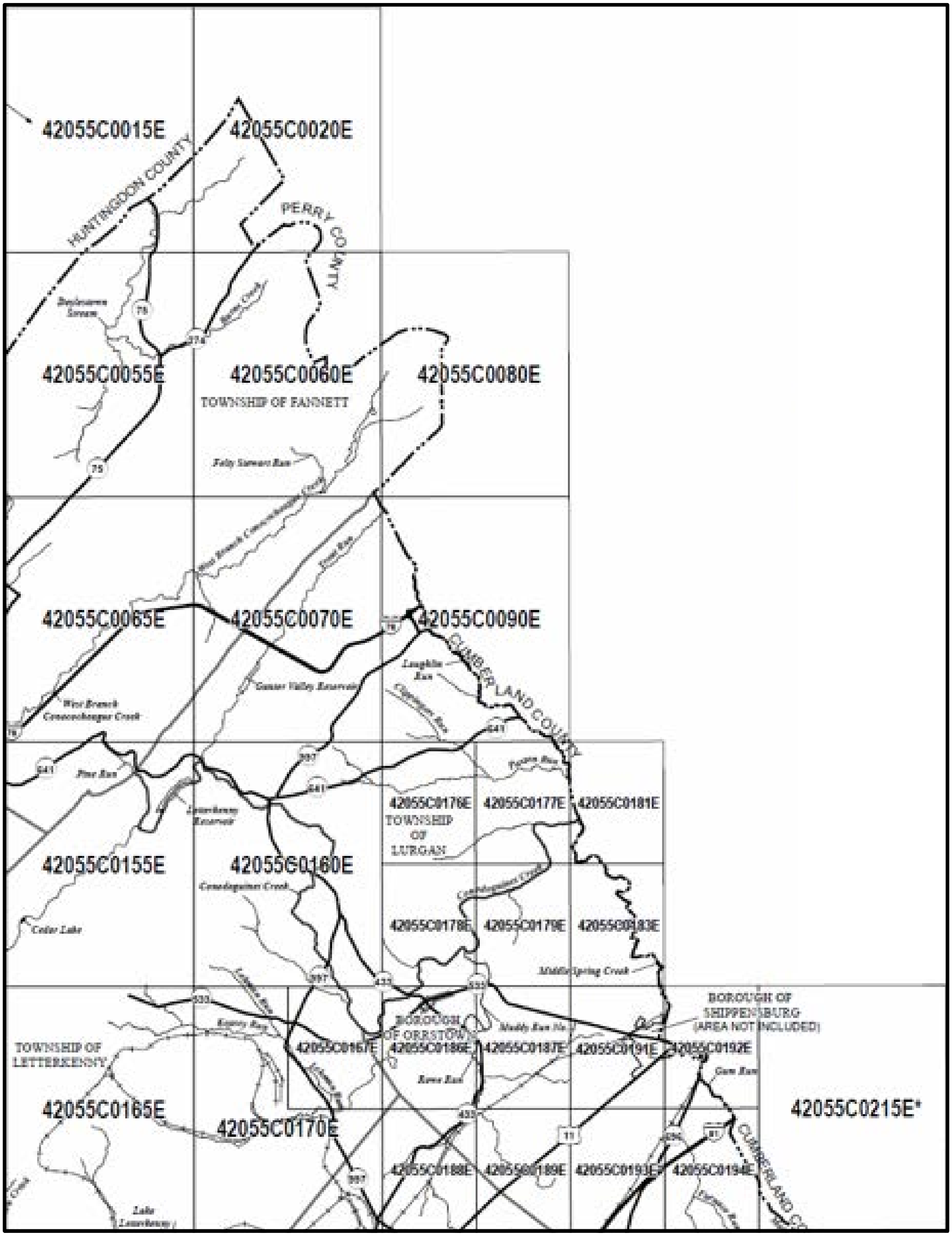


Figure 3.1.7.1.3: Quadrant 2 of County DFIRM Map

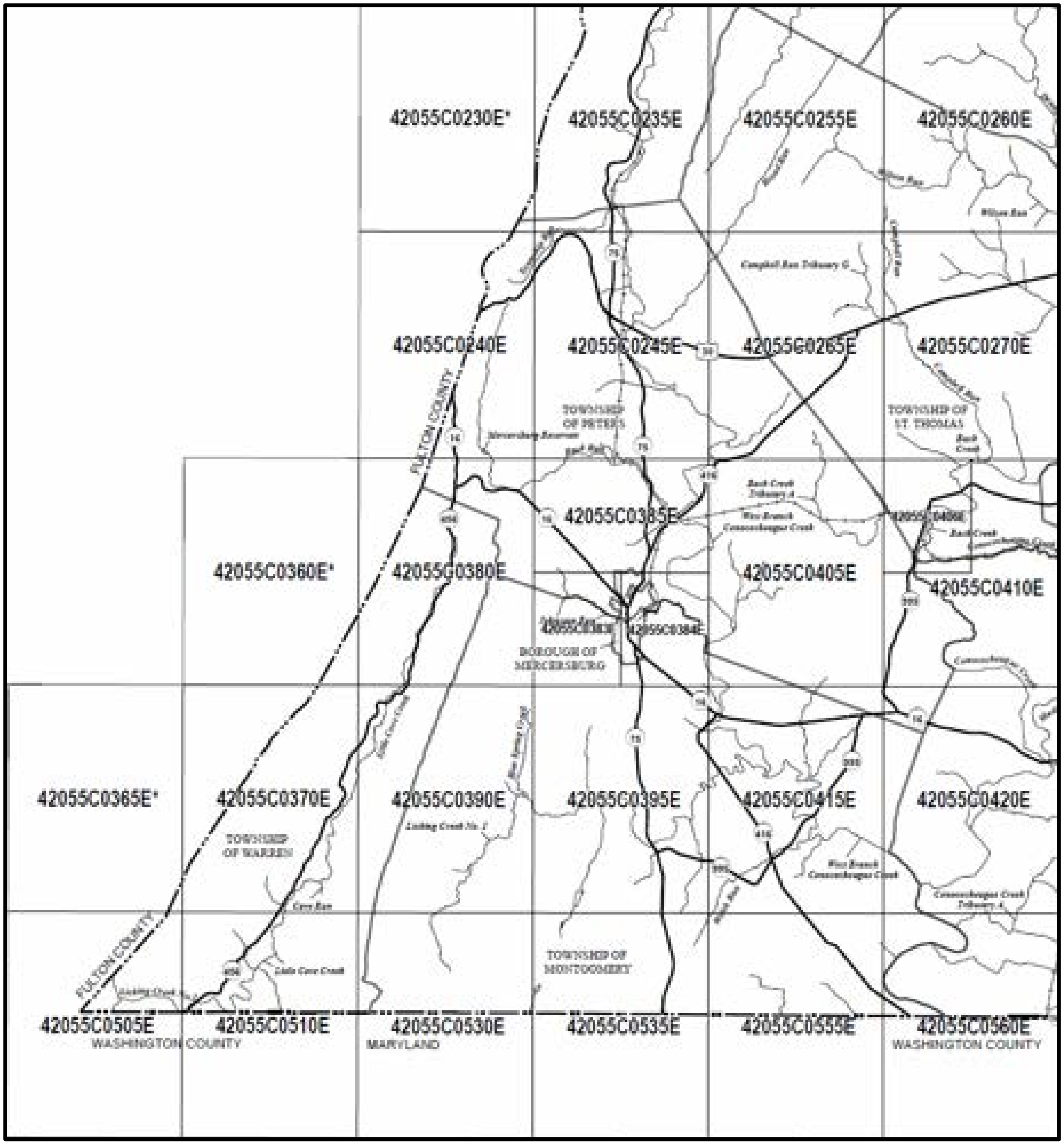


Figure 3.1.7.1.4: Quadrant 3 of County DFIRM Map

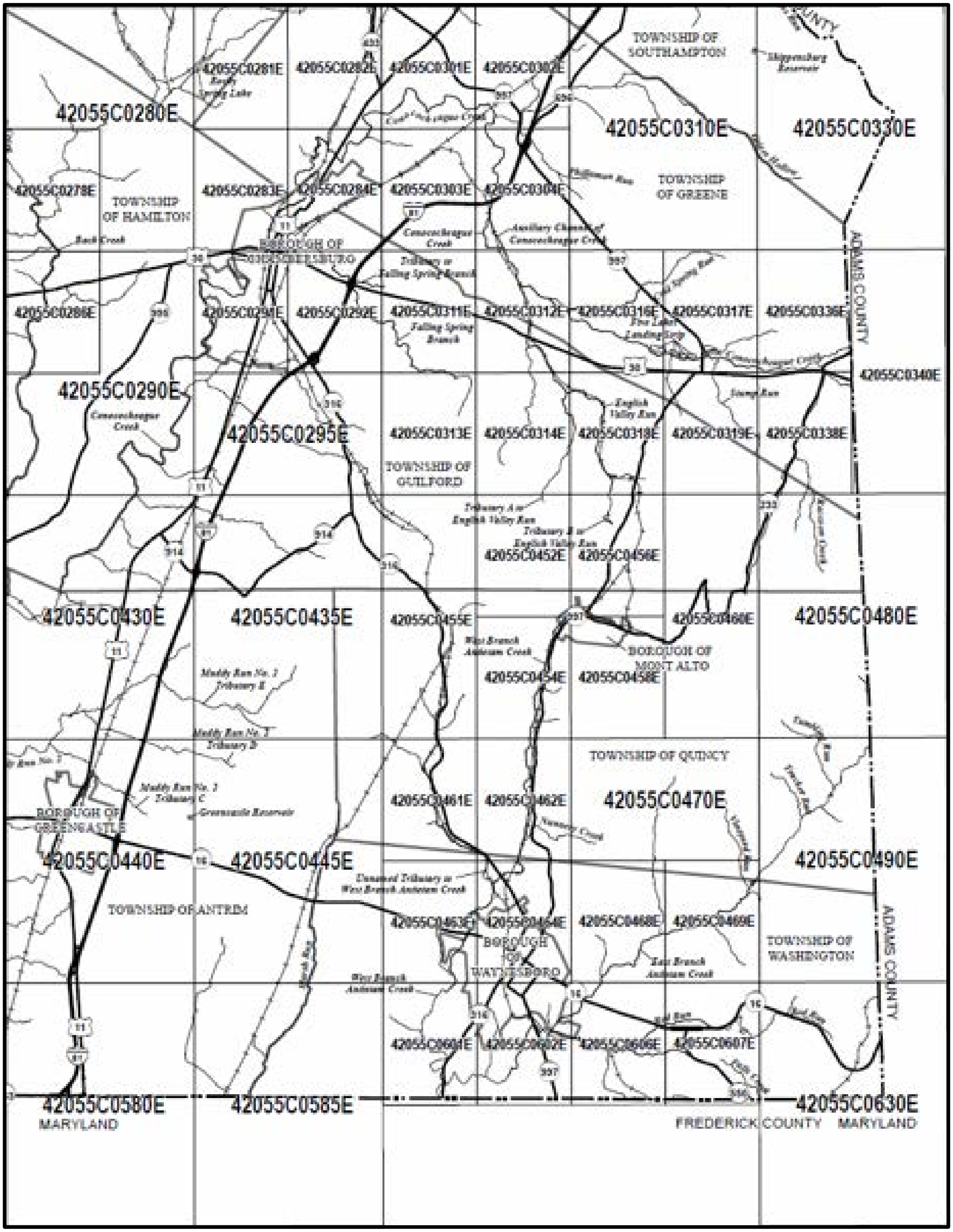


Figure 3.1.7.1.5: Quadrant 4 of County DFIRM Map

The Franklin County DFIRM consists of 118 panels. These panels are shown in **Appendix D** of this document.

Typically, built-up communities create conveyance systems to handle storm-water runoff. Sometimes debris clogs the conveyance system and prohibits the conveyance system from transporting storm-water runoff from the drain inlet to the discharge point. Debris can be, but not limited to, leaves and tree branches. Sometimes the pipes from the conveyance system can decay in time thus creating a cave-in of the pipe. If the conveyance system does not work, localized flooding within the built-up communities within Franklin County can occur thus creating numerous hazards across the community.

Some homes within Franklin County may not be near watercourses but still may be susceptible to flooding in their basements because of high water tables. This type of flooding may affect hot water heaters and other important utility equipment in the home.

Additionally, flooding can negatively impact local water treatment and wastewater treatment facilities by introducing or spreading contaminants. Franklin County has 5 water treatment facilities and 9 wastewater treatment facilities. However, of these 14 critical facilities, only 1 lies within the 1%-annual chance floodplain and that is in Washington Township. Fortunately, there is no history of this type of flooding impact in Franklin County. We have experienced boil water advisories due to water main breaks but these have been minor, localized, and short in duration.

Water contamination is still a major problem considering the number of residences serviced by these facilities and the number of private wells and septic systems that do lie within the 1%-annual chance flood zone.

3.1.7.2. Range of Magnitude

Floods are considered hazards when people and property are affected. Injuries and deaths can occur when people are swept away by flood currents or when bacteria and disease are spread by moving or stagnant floodwaters. Most property damage results from inundation by sediment filled water. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious developed areas. Conditions can be exacerbated by obstructions, which prevent normal flow through the waterway, such as fallen trees.

Several factors determine the severity of floods, including rainfall 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. The county has sloping terrain, especially near the mountains, which can contribute to more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and storm water, particularly in areas with poorly planned storm water drainage systems.

In Central Pennsylvania, 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 snowpack throughout contributing watersheds, although the snowpack 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.

Summer floods have occurred from intense rainfall on previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time that can result in flash flood events.

The most severe flooding in Central Pennsylvania has been associated with the Susquehanna River Basin, which drains directly into the Chesapeake Bay and is the largest river basin on the U.S. Atlantic Coast. Franklin County lies within the Potomac River Basin and Lower Susquehanna River Basin, which means that it is subject to heavy precipitation events that may occur outside of the county in the upper reaches of the Basin. Tropical Storm Agnes in 1972 created the worst flooding conditions on record for Franklin County.

Floods are naturally occurring events that benefit riparian systems which have not been disrupted by human actions. Such benefits include groundwater recharge and the introduction of nutrient rich sediment, which improves soil fertility. However, the destruction of riparian buffers, changes to land-use and land cover throughout a watershed, and introduction of chemical or biological contaminants which often accompany human presence cause environmental harm when floods occur. Hazardous material facilities are potential sources of contamination during flood events. Other environmental impacts of flooding include: water-borne diseases, suffocation of tree species non-tolerant to excess water, heavy siltation, damage or loss of crops, and drowning of both humans and animals.

The NFIP identifies Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. The following definition of RL and SRL properties from the Hazard Mitigation Assistance (HMA) Unified Guidance from July 2013 reflects changes made in the Biggert-Waters Flood Insurance Reform Act of 2012:

A **Repetitive Loss (RL)** property is a structure, as defined for the HMA program, covered by a contract for flood insurance made available under the NFIP that:

(a) Has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25% of the market value of the structure at the time of each such flood event; and
(b) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage. (Please note: Homes are eligible for Increased Cost of Compliance (ICC) coverage after first loss, however cost for ICC is part of all policies.)

A **Repetitive Loss (RL)** property is also defined by FEMA, as it relates to the NFIP program, as an NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978.

A **Severe Repetitive Loss** property is a structure that:

(a) Is covered under a contract for flood insurance made available under the NFIP; and
(b) Has incurred flood related damage
  (i) For which 4 or more separate claims payments have been made under flood insurance coverage with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or
  (ii) For which at least 2 separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

Table 3.1.7.2.1 below contains the numbers of Repetitive Loss (RL) properties per municipality in Franklin County as reported by FEMA on 12/29/2017. Franklin County has no Severe Repetitive Loss properties at this time.

Municipality	2-4 Family		ASSMD Condo		Non-residential		Other Residential		Single Family		Total	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Antrim Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Chambersburg Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Fannett Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Greencastle Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Greene Township	0	0	0	0	0	0	0	0	**4**	0	**4**	**0**
Guilford Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Hamilton Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Letterkenny Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Lurgan Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Mercersburg Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Metal Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Mont Alto Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Montgomery Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Orrstown Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Peters Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Quincy Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Shippensburg Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Southampton Township	0	0	0	0	0	0	0	0	**2**	0	**2**	**0**
St Thomas Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Warren Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Washington Township	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Waynesboro Borough	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**6**	**0**

Table 3.1.7.2.1: Repetitive Loss Properties per Municipality (Dec 2017)

Floods are the most common and costly natural catastrophe in the United States. In terms of economic disruption property damage, and loss of life, floods are "nature's number-one disaster." For that reason, flood insurance is almost never available under industry-standard homeowner's and renter's policies. The best way for citizen to protect their property against flood losses is to purchase flood insurance through the NFIP. Congress established the NFIP in 1968 to help control the growing cost of federal disaster relief. The NFIP is administered by FEMA, part of the U.S. Department of Homeland Security. The NFIP offers federally-backed flood insurance in communities that adopt and enforce effective floodplain management ordinances to reduce future flood losses.

Since 1983, the chief means of providing flood insurance coverage has been a cooperative venture of FEMA and private insurance industry known as the Write Your Own (WYO) Program. This partnership allows qualified property and casualty insurance companies to "write" (that is, issue) and service the NFIP's Standard Flood Insurance Policy (SFIP) under their own names.

At one point, nearly 90 WYO insurance companies issued and serviced the SFIP under their own names. More than 4.4 million federal flood insurance policies are in force. These policies represent $650 billion in flood insurance coverage for homeowners, renters, and business owners throughout the United States and its territories. As of 2016, the number of WYO insurance companies decreased to 79.

In 2012, the U.S. Congress passed the Biggert-Waters Flood Insurance Reform Act. This act was intended to change the way that the NFIP is run including insurance policy rate increases to reflect true risk and changes in how the Flood Insurance Rate Map (FIRM) updates impact policy holders.

In March of 2014, President Obama signed the Homeowner Flood Insurance Affordability Act (HFIAA) of 2014 into law. This law repealed and modified certain provisions of the Biggert-Waters Flood Insurance Reform Act and makes additional program changes to other aspects of the program not covered by that Act. Many provisions of the Biggert-Waters Flood Insurance Reform Act remain and are still being implemented.

As a result of the changes, in April 1, 2015, every new or renewed NFIP policy includes an annual surcharge required by the HFIAA. The surcharge amount depends on the use of your insured building and the type of policy insuring the building, regardless of its flood zone or date of construction.

The NFIP provides flood insurance to individuals in communities that are members of the program. Membership in the program is contingent on the community adopting and enforcing floodplain management and development regulations. The NFIP is based on the voluntary participation of communities of all sizes. In the context of this program, a "community" is a political entity, whether an incorporated city, town, township, borough, or village, or an unincorporated area of a county or parish, that has legal authority to adopt and enforce floodplain management ordinances for the area under its jurisdiction.

National Flood Insurance is available only in communities that apply for participation in the NFIP and agree to implement prescribed flood mitigation measures. Newly participating communities are admitted to the NFIP's Emergency Program. Most of these communities quickly earn "promotion" to the Regular Program.

The Emergency Program is the initial phase of a community's participation in the NFIP. In return for the local government's agreeing to adopt basic floodplain management standards, the NFIP allows local property owners to buy modest amounts of flood insurance coverage.

In return for agreeing to adopt more comprehensive floodplain management measures, an Emergency Program community can be "promoted" to Regular Program. Local policyholders immediately become eligible to buy greater amounts of flood insurance coverage.

The minimum floodplain management requirements include:

- Review and permit all development in the SFHA;
- Elevate new and substantially improved residential structures above the Base Flood Elevation;
- Elevate or dry flood proof new and substantially improved non-residential structures; Limit development in floodways;
- Locate or construct all public utilities and facilities so as to minimize or eliminate flood damage;
- Anchor foundation or structure to resist floatation, collapse, or lateral movement.

In addition, Regular Program communities are eligible to participate in the NFIP's Community Rating System (CRS). Under the CRS, policyholders can receive premium discounts of 5 to 45% as their cities and towns adopt more comprehensive flood mitigation measures. **Table 3.1.7.2.2** lists the Franklin County municipalities participating in the NFIP along with the date of the initial FIRM and the current effective map date. Note that all municipalities in the county participate in the most up to date data as of the time this plan was updated in 2018.

Community Identification Number	Municipality	Initial Flood Hazard boundary Map	Initial FIRM Identified	Current Effective Map Date
421233	Antrim Township	9/20/1974	4/24/1981	1/18/2012
420469	Chambersburg Borough	12/21/1973	7/17/1978	1/18/2012
422424	Fannett Township	2/7/1975	10/29/1982	1/18/2012
420470	Greencastle Borough	9/10/1976	1/18/2012	1/18/2012
421649	Greene Township	12/6/1974	11/2/1990	1/18/2012
421650	Guilford Township	1/3/1975	6/18/1990	1/18/2012
421651	Hamilton Township	9/6/1974	6/18/1990	1/18/2012
422425	Letterkenny Township	12/20/1974	9/17/1982	1/18/2012
421652	Lurgan Township	11/1/1974	9/1/1978	1/18/2012
420471	Mercersburg Borough	4/23/1976	3/1/1986	1/18/2012
421653	Metal Township	1/24/1975	9/1/1986	1/18/2012
420472	Mont Alto Borough	7/26/1974	7/16/1990	1/18/2012
422426	Montgomery Township	12/13/1974	8/1/1986	1/18/2012
421654	Peters Township	9/13/1974	9/1/1986	1/18/2012
421655	Quincy Township	12/27/2014	7/16/1990	1/18/2012
421657	Southampton Township	5/31/1974	5/15/1986	1/18/2012
421656	St Thomas Township	9/13/1974	7/16/1990	1/18/2012
422427	Warren Township	1/24/1975	9/1/1986	1/18/2012
421658	Washington Township	9/8/1974	6/3/1986	1/18/2012
420473	Waynesboro Borough	12/3/1976	11/1/1985	1/18/2012

Table 3.1.7.2.2: Franklin County Municipal Participation in the National Flood Insurance Program

3.1.7.3. Past Occurrence

Franklin County has a history of flooding events. Flash flooding is the most common type of flooding that occurs in the county. **Table 3.1.7.3.1** lists flood event information from 1996 to 2017 obtained from the NCDC/NCEI databases. According to NCDC/NCEI and Franklin County EMA records the storm listed for July 2017 is the last recorded Flash Flooding event (**Figure 3.1.7.3.2**) in Franklin County as of this 2018 plan update.

Location	Date	Time	Type	Rain	Death	Injuries	Property Damage	Crop Damage
Yeakle Hill	06/12/2014	1640	Flood/Heavy Rain		0	0	$0	$0
Yeakle Hill	05/16/2014	0720	Flood/Heavy Rain	4.0"	0	0	$0	$0
Yeakle Hill	10/10/2013	2200	Flood/Heavy Rain	10.0"	0	0	$0	$0
Yeakle Hill	10/29/2012	1700	Flood/Heavy Rain	8.0"	0	0	$0	$0
Upper Strasburg	03/13/2010	1600	Flood/Heavy Rain/Snow Melt	4.0"	0	0	$0	$0
Caledonia Park	01/25/2010	0730	Flood/Heavy Rain	4.0"	0	0	$0	$0
Sylvan	05/12/2008	0200	Flood/Heavy Rain		0	0	$0	$0
Sylvan	04/26/2008	2200	Flood/Heavy Rain		0	0	$0	$0
Countywide	03/28/2005	2130	Flood		0	0	$0	$0
Countywide	09/28/2004	1200	Flood		0	0	$0	$0
Countywide	09/17/2004	1500	Flood		0	0	$0	$0
Countywide	02/06/2004	1700	Flood		0	0	$0	$0
Countywide	12/11/2003	0541	Flood		0	0	$0	$0
Countywide	01/19/1996	0900	Flood		0	0	$0	$0
Totals					**0**	**0**	**$0**	**$0**

Table 3.1.7.3.1: Flood Events in Franklin County (1996-2018)

Table 3.1.7.3.2 below contains information on Flash Flood events in the county between 1996 and 2018.

Location	Date	Time	Type	Rain	Death	Injuries	Property Damage	Crop Damage
Shimpstown	07/28/2017	2215	Flash Flood		0	0	$0	$0
Mainsville	06/08/2015	1700	Flash Flood	4.0"	0	0	$0	$0
Yeakle Mill	06/12/2014	1503	Flash Flood		0	0	$0	$0
Sylvan	09/27/2011	1300	Flash Flood		0	0	$0	$0
Greencastle	09/09/2011	1600	Flash Flood	8.0"	0	0	$0	$0
Guilford Springs	05/26/2011	1835	Flash Flood		0	0	$0	$0
Weltys	04/28/2011	0400	Flash Flood		0	0	$0	$0
Amberson	04/16/2011	1800	Flash Flood		0	0	$0	$0
Mercersburg	05/23/2010	0300	Flash Flood		0	0	$25K	$0
Grindstone Hill	07/23/2009	1622	Flash Flood	6.0"	0	0	$50K	$0
New Franklin	06/10/2009	2113	Flash Flood		0	0	$0	$0
Waynesboro	06/01/2007	2100	Flash Flood		0	0	$0	$0
Shippensburg	05/10/2007	2000	Flash Flood	3.0"	0	0	$0	$0
Countywide	06/27/2006	1700	Flash Flood		0	0	$0	$0
Greencastle	06/26/2006	0630	Flash Flood		0	0	$0	$0
Greencastle	06/25/2006	1200	Flash Flood		0	0	$0	$0
Greencastle	07/16/2005	2030	Flash Flood		0	0	$0	$0
Waynesboro	09/01/2003	2100	Flash Flood		0	0	$0	$0
Greencastle	06/03/2003	2100	Flash Flood		0	0	$0	$0
St Thomas	06/22/2001	1945	Flash Flood		0	0	$0	$0
Chambersburg	06/21/2001	2330	Flash Flood		0	0	$0	$0
Greencastle	07/28/2000	1830	Flash Flood		0	0	$0	$0
South Portion	09/08/1998	1730	Flash Flood	3.0"	0	0	$0	$0
Quincy	06/23/1998	1730	Flash Flood		0	0	$0	$0
Countywide	04/19/1998	1900	Flash Flood		0	0	$0	$0
Countywide	03/20/1998	2330	Flash Flood		0	0	$0	$0
Countywide	01/08/1998	1300	Flash Flood		0	0	$0	$0
Countywide	11/07/1997	1900	Flash Flood		0	0	$0	$0
East Portion	09/11/1997	0050	Flash Flood		0	0	$0	$0
Greencastle	06/18/1997	1845	Flash Flood		0	0	$0	$0
Southeast	12/01/1996	2300	Flash Flood		0	0	$0	$0
St Thomas	10/19/1996	1000	Flash Flood		0	0	$0	$0
Northern	09/13/1996	0400	Flash Flood		0	0	$0	$0
Upper Strasburg	09/06/1996	1730	Flash Flood		0	0	$0	$0
Countywide	0719/1996	0800	Flash Flood		0	0	$0	$0
Greencastle	07/08/1996	1800	Flash Flood	3.5"	0	0	$0	$0
St Thomas	06/20/1996	2000	Flash Flood		0	0	$0	$0
St Thomas	06/18/1996	2000	Flash Flood	12.0"	1	0	$1,000K	$0
St Thomas	06/11/1996	2200	Flash Flood	4.7"	0	0	$500K	$0
Countywide	01/19/1996	0900	Flash Flood		0	0	$0	$0
Totals					**1**	**0**	**$1,575K**	**$0**

Table 3.1.7.3.2: Franklin County Flash Flood Events (1996-2017)

There are no known significant flood events in Franklin County which can be attributed directly to an ice jam.

3.1.7.4. Future Occurrence

In Franklin County, flooding occurs commonly and can occur during any season of the year. Therefore, the future occurrence of floods in Franklin County can be considered ***highly likely*** as defined by the Risk Factor Methodology in **Section 1.2**.

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) 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%-annual-chance flood, also known as the base flood, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1%-annual-chance flood is a flood which has a 1% chance of occurring over a given year. The DFIRMs are used to identify areas subject to the 1- and 0.2%-annual-chance flooding. Areas subject to 2% and 10% annual chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained with the Flood Insurance Study Report.

Table 3.1.7.4.1 shows a range of flood recurrence intervals and associated probabilities of occurrence. Although the information is from 2001, it is still considered the best available information on this topic.

Recurrence Interval	Chance of Occurrence in Any Given Year (%)
10 year	10
50 year	2
100 year	1
500 year	0.2

Table 3.1.7.4.1: Recurrence Intervals and Probabilities[61]

3.1.7.5. Vulnerability Assessment

Franklin County is vulnerable to flooding that causes loss of lives, property damage, and road closures. For purposes of assessing vulnerability, the county focused on community assets that are located in the 1%-annual-chance floodplain. While greater and smaller floods are possible, information about the extent and depths for this floodplain is available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each

[61] USGS

local municipality showing the FEMA-designated 1%-annual-chance flood hazard area, critical facilities, and transportation routes are included in **Appendix D** of this document.

Table 3.1.7.5.1 below list all the critical facilities and private/commercial structures that fall with the 1%-annual chance floodplain by municipality. It should be noted that the values of the buildings in the floodplain were taken from the tax assessment database (base year 1961). The values were multiplied by a factor of 7.63 to get the estimated current year value. This factor is given to the county by the state and is based off of sales in the previous year. Additionally, the costs only reflect land and structure value of the property. It does not include Content Loss, Functionality Loss, or Displacement Costs. Furthermore, there are some properties in the database that reflect a $0 assessment due to their taxable status. Therefore, the value numbers below are very conservative and actual loss values could be substantially higher.

Municipality	Total Number of Critical Facilities in Municipality	Number of Critical Facilities in 1% Floodplain	Value of Critical Facilities in 1% Floodplain (1961)	Estimated (2017) Value of Critical Facilities in 1% Floodplain	Number of Private/ Commercial Buildings in 1% Floodplain	Value of Private/ Commercial Buildings in 1% Floodplain	Estimated (2017) Value of Private/ Commercial Buildings in 1% Floodplain
Antrim Township	75	2	$2,590	$19,762	241	$3,709,060	$28,300,128
Chambersburg Borough	97	12	$8,404,750	$64,128,243	249	$11,221,080	$85,616,840
Fannett Township	27	2	$23,540	$179,610	81	$573,660	$4,377,026
Greencastle Borough	24	0	$0	$0	0	$0	$0
Greene Township	100	9	$155,650	$1,187,610	727	$7,372,310	$56,250,725
Guilford Township	85	4	$23,420	$178,695	169	$6,158,110	$46,986,379
Hamilton Township	47	2	$6,190	$47,230	57	$810,760	$6,186,099
Letterkenny Township	20	1	$32,720	$249,654	73	$27,445,470	$209,408,936
Lurgan Township	21	2	$35,260	$269,034	32	$289,240	$2,206,901
Mercersburg Borough	10	0	$0	$0	34	$232,750	$1,775,883
Metal Township	15	1	$4,600	$35,098	55	$430,810	$3,287,080
Mont Alto Borough	6	2	$42,310	$322,825	71	$425,780	$3,248,701
Montgomery Township	12	2	$0	$0	112	$2,195,410	$16,750,978
Orrstown Borough	1	0	$0	$0	0	$0	$0
Peters Township	22	2	$7,400	$56,462	142	$4,062,700	$30,998,401
Quincy Township	48	7	$41,960	$320,155	230	$4,027,890	$30,732,801
Shippensburg Borough	5	0	$0	$0	1	$0	$0
Southampton Township	30	1	$24,040	$183,425	113	$2,068,990	$15,786,394
St Thomas Township	20	2	$2,300	$17,549	102	$1,660,800	$12,671,904
Warren Township	2	0	$0	$0	19	$308,030	$2,350,269
Washington Township	46	7	$451,670	$3,446,242	262	$4,770,950	$36,402,349
Waynesboro Borough	45	0	$0	$0	12	$314,980	$2,403,297
Total	**758**	**58**	**$9,258,400**	**$70,641,592**	**2,782**	**$78,078,780**	**$595,741,091**
Total Estimated (2017) Value of Structures in 1% Floodplain							**$666,382,683**

Table 3.1.7.5.1: Franklin County Critical Facilities in the 1% Floodplain (Jan 2018)

Figure 3.1.7.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Flood, Flash Flood, and Ice Jam hazard. 4 of 22 municipalities rated this threat as Major. Additionally, 10 of the remaining 18 municipalities rank this as a Moderate threat. This was the ranked as the number 13 highest threat in the county.

Flood/Flash Flood/Ice Jam Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	2	20%	1	10%	3	10%	2.0	10.12%	0.2024
Chambersburg Borough	2	30%	1	30%	1	20%	3	10%	3	10%	1.7	14.05%	0.2386
Fannett Township	2	30%	2	30%	3	20%	4	10%	3	10%	2.5	1.59%	0.0398
Greencastle Borough	2	30%	2	30%	3	20%	4	10%	3	10%	2.5	2.73%	0.0683
Greene Township	2	30%	1	30%	1	20%	3	10%	3	10%	1.7	11.82%	0.2009
Guilford Township	3	30%	1	30%	3	20%	3	10%	3	10%	2.4	9.38%	0.2251
Hamilton Township	1	30%	1	30%	3	20%	4	10%	3	10%	1.9	7.29%	0.1385
Letterkenny Township	3	30%	1	30%	3	20%	2	10%	3	10%	2.3	1.58%	0.0363
Lurgan Township	2	30%	2	30%	2	20%	4	10%	3	10%	2.3	1.42%	0.0327
Mercersburg Borough	1	30%	1	30%	1	20%	1	10%	3	10%	1.2	0.97%	0.0116
Metal Township	2	30%	2	30%	2	20%	2	10%	3	10%	2.1	1.13%	0.0237
Mont Alto Borough	1	30%	1	30%	2	20%	2	10%	3	10%	1.5	1.01%	0.0152
Montgomery Township	3	30%	1	30%	3	20%	2	10%	3	10%	2.3	3.68%	0.0846
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	3	10%	1.4	0.14%	0.0020
Peters Township	2	30%	1	30%	3	20%	4	10%	3	10%	2.2	2.86%	0.0629
Quincy Township	3	30%	2	30%	4	20%	1	10%	3	10%	2.7	3.41%	0.0921
Shippensburg Borough	2	30%	1	30%	2	20%	3	10%	3	10%	1.9	0.75%	0.0143
Southampton Township	3	30%	1	30%	2	20%	4	10%	3	10%	2.3	5.49%	0.1263
St Thomas Township	2	30%	2	30%	2	20%	2	10%	3	10%	2.1	3.79%	0.0796
Warren Township	2	30%	2	30%	3	20%	2	10%	3	10%	2.3	0.21%	0.0048
Washington Township	2	30%	2	30%	3	20%	4	10%	3	10%	2.5	9.55%	0.2388
Waynesboro Borough	2	30%	1	30%	1	20%	4	10%	3	10%	1.8	7.02%	0.1264
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.065

Figure 3.1.7.5.1: Municipal Flood, Flash Flood, and Ice Jam Threat Vulnerability Self-Assessment

3.1.8. Hailstorm

Hail forms inside a thunderstorm where there are strong updrafts of warm air and downdrafts of cold water. If a water droplet is picked up by the updrafts, it can be carried well above the freezing level. 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 and carried back into the cold air and re-freeze. With each trip above and below the freezing level, the frozen droplet adds another layer of ice. The frozen droplet, with many layers of ice, falls to the ground as hail[62]. The National Weather Service (NWS) defines hail as: showery precipitation in the form of irregular pellets or balls of ice more than 5 millimeters in diameter, falling from a cumulonimbus cloud[63]. **Figure 3.1.8.1** below illustrates the process of hail formation.

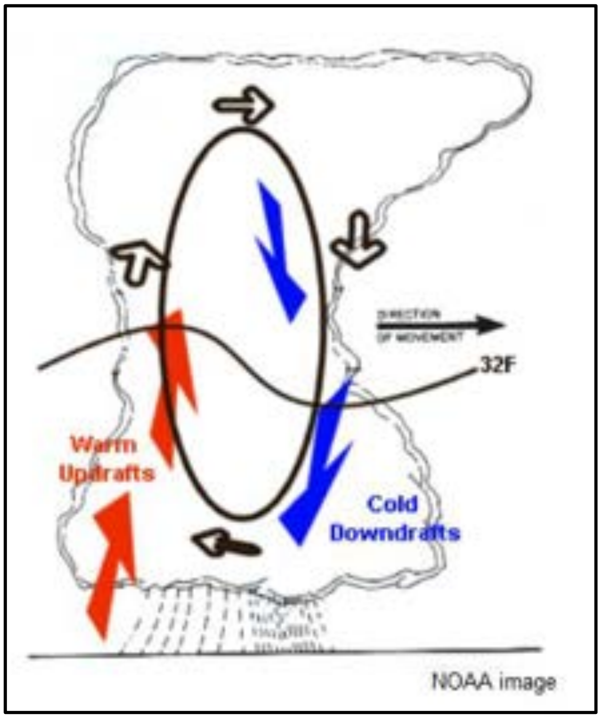


Figure 3.1.8.1: Hail Formation

The size of hailstones is a direct function of the size and severity of the thunderstorm. The higher the temperatures at the earth's surface, the greater the strength of the updrafts, and the greater the amount of time hailstones are suspended, giving them more time to increase in size. See **Table 3.1.8.1** below for common hail stone sizes.

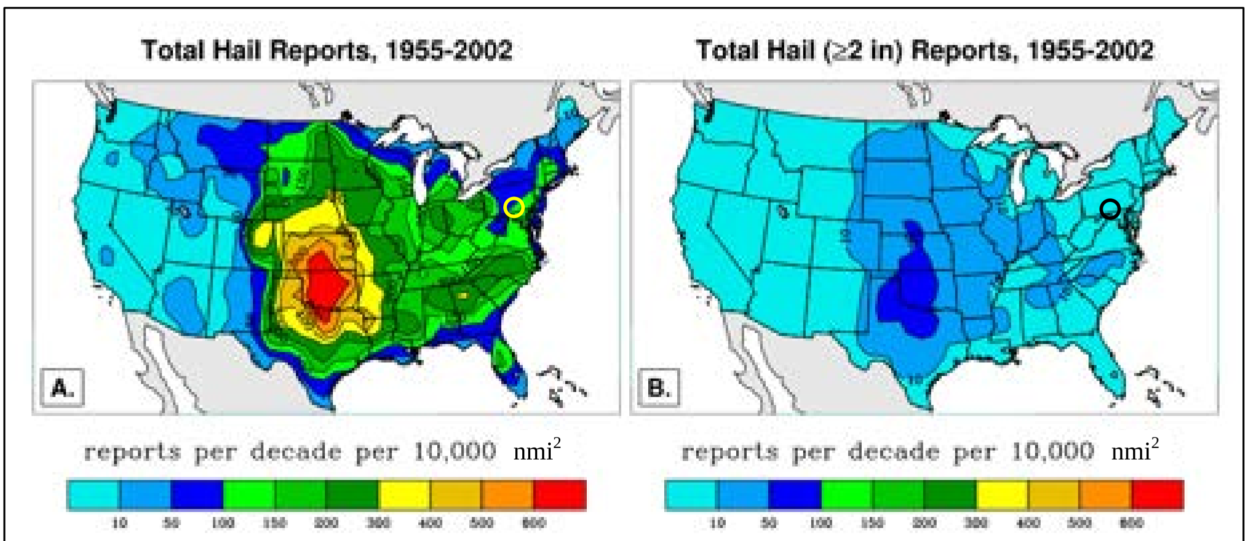
[62] NOAA/NWS
[63] NOAA/NWS

Size	Diameter (in.)
Pea	0.25
Marble/Mothball	0.50
Dime/Penny	0.75
Nickel	0.88
Quarter	1.00
Ping-Pong Ball	1.50
Golf Ball	1.75
Tennis Ball	2.50
Baseball	2.75
Teacup	3.00
Grapefruit	4.00
Softball	4.50

Table 3.1.8.1: Hail Stone Sizes

3.1.8.1. Location and Extent

Figure 3.1.8.1.1 below illustrates the frequency of hail events tracked across the continental United States from 1955 through 2002. One can see from these maps that Franklin County falls into the area where between 50 and 150 hail events were recorded in this time span (yellow and black circles added to highlight Franklin County).



nmi^2 is a unit of area measure identified as square nautical miles

Figure 3.1.8.1.1: Geographic Distribution of Hail

3.1.8.2. Range of Magnitude

Hail damage to crops is estimated at $1.3 billion annually in the US. Additionally, property damage is estimated at $1 billion annually[64]. Hail occurs most frequently in states within the southern and central plains. However, because hail accompanies thunderstorms, hail damage is possible throughout the entire US[65]. Damage to crops, roofs, windows, heating/cooling units, and vehicles are typically the most significant impacts of hail storms.

3.1.8.3. Past Occurrence

Franklin County has experienced 37 recorded hail events on 19 separate days since 2007[66]. **Figure 3.1.8.3.1** shows a map of these hail events in Franklin County since 2007.

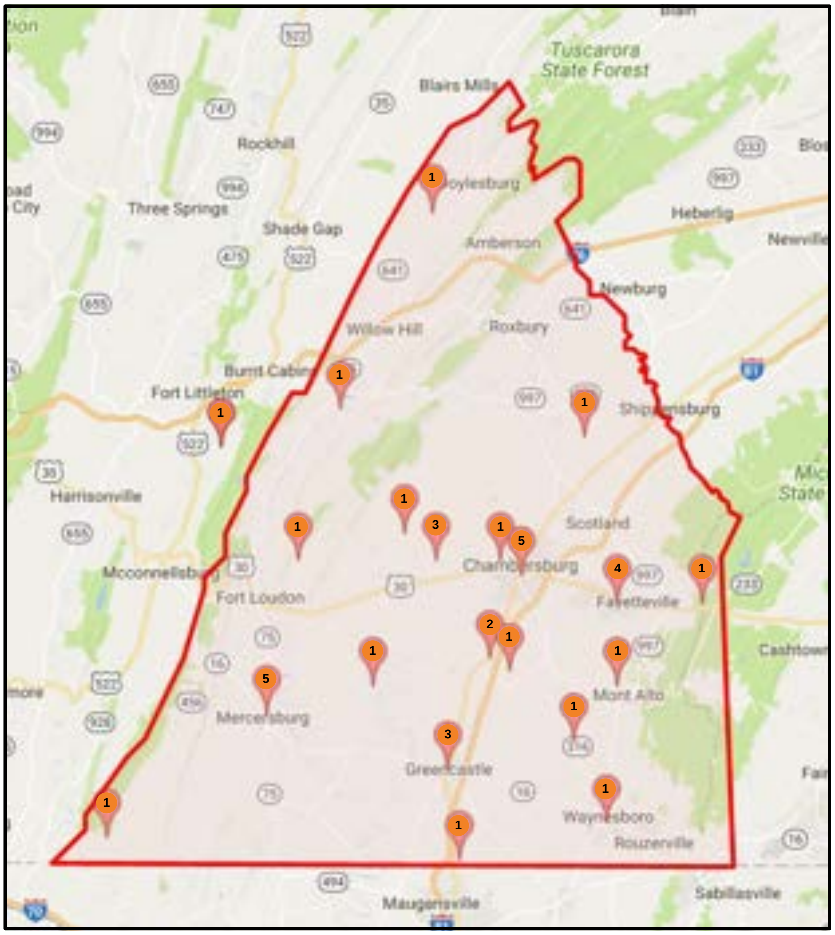


Figure 3.1.8.3.1: Franklin County Hail Events (2007-2017)

Table 3.1.8.3.1 below lists these events with the largest size of hail observed on those days at each location reported.

64 Illinois State Water Survey
65 NOAA/NWS/NCEP/SPC
66 NOAA/NCEI

Location	Municipality	Date	Time (hrs)	Hail Size (in)
Middlesburg	Antrim Township	8/4/2015	0130	1.00
Metal	Metal Township	8/7/2013	1815	1.00
Yeakle Mill	Warren Township	5/22/2013	1652	0.88
Pinola	Southampton Township	8/3/2012	1313	0.88
Mercersburg	Mercersburg Borough	6/26/2012	2025	0.75
Mercersburg	Mercersburg Borough	5/29/2012	1445	0.88
Elbrook	Quincy Township	4/26/2012	1925	1.00
Mont Alto	Mont Alto Borough	4/26/2012	1920	1.00
East Fayetteville	Greene Township	4/26/2012	1913	1.00
East Fayetteville	Greene Township	5/27/2011	1750	1.00
Edenville	St Thomas Township	5/26/2011	1730	0.88
Chambersburg	Chambersburg Borough	5/26/2011	1720	1.00
Mercersburg	Mercersburg Borough	5/26/2011	1710	1.00
Marion	Guilford Township	5/26/2011	1708	1.50
Marion	Guilford Township	5/26/2011	1705	1.00
Williamson	St Thomas Township	5/26/2011	1705	1.00
Mercersburg	Mercersburg Borough	5/26/2011	1644	1.75
Mercersburg	Mercersburg Borough	5/26/2011	1638	1.50
Chambersburg	Chambersburg Borough	5/26/2011	1635	1.00
Marion	Guilford Township	5/26/2011	1622	1.00
Edenville	St Thomas Township	5/14/2010	1715	0.75
Fannettsburg	Metal Township	7/24/2009	1405	1.00
Chambersburg	Chambersburg Borough	7/11/2009	1425	1.00
Chambersburg	Chambersburg Borough	7/11/2009	1424	1.00
Chambersburg	Chambersburg Borough	7/11/2009	1414	0.88
Greencastle	GreencastleBorough	6/13/2009	1718	0.75
Waynesboro	Waynesboro Borough	6/9/2009	1435	0.88
Greencastle	Greencastle Borough	6/9/2009	1356	1.00
East Fayetteville	Greene Township	6/9/2009	1355	0.88
Caledonia Park	Greene Township	8/10/2008	1330	1.00
East Fayetteville	Greene Township	8/10/2008	1327	1.75
Chambersburg	Chambersburg Borough	8/10/2008	1305	1.00
Edenville	St Thomas Township	8/10/2008	1250	1.00
Roxbury	Lurgan Township	7/27/2008	1018	0.88
Ft Louden	Peters Township	6/10/2008	1640	0.88
Greencastle	Greencastle Borough	7/29/2007	1800	1.00
Edenville	St Thomas Township	6/19/2007	1525	0.75

Table 3.1.8.3.1: Recorded Hail Events in Franklin County (2007-2018)

From the figure above, one can see that Franklin County has on average experienced at least one hail event per year since 2007. Some years have experienced multiple event days and multiple locations and some years have had no events. There is no indication that this trend will change.

3.1.8.4. Future Occurrence

It is not possible to predict formation of a hail storm with more than a few days' lead time. However, the past occurrences described in **Section 3.1.8.3** indicate that hail storm events in Franklin County will occur on average about once a year, and typically between the months of April and August. **Figure 3.1.8.4.1** below shows the total hail events/square nautical mile in the United States taken from data collected between 1955 and 2002[67].

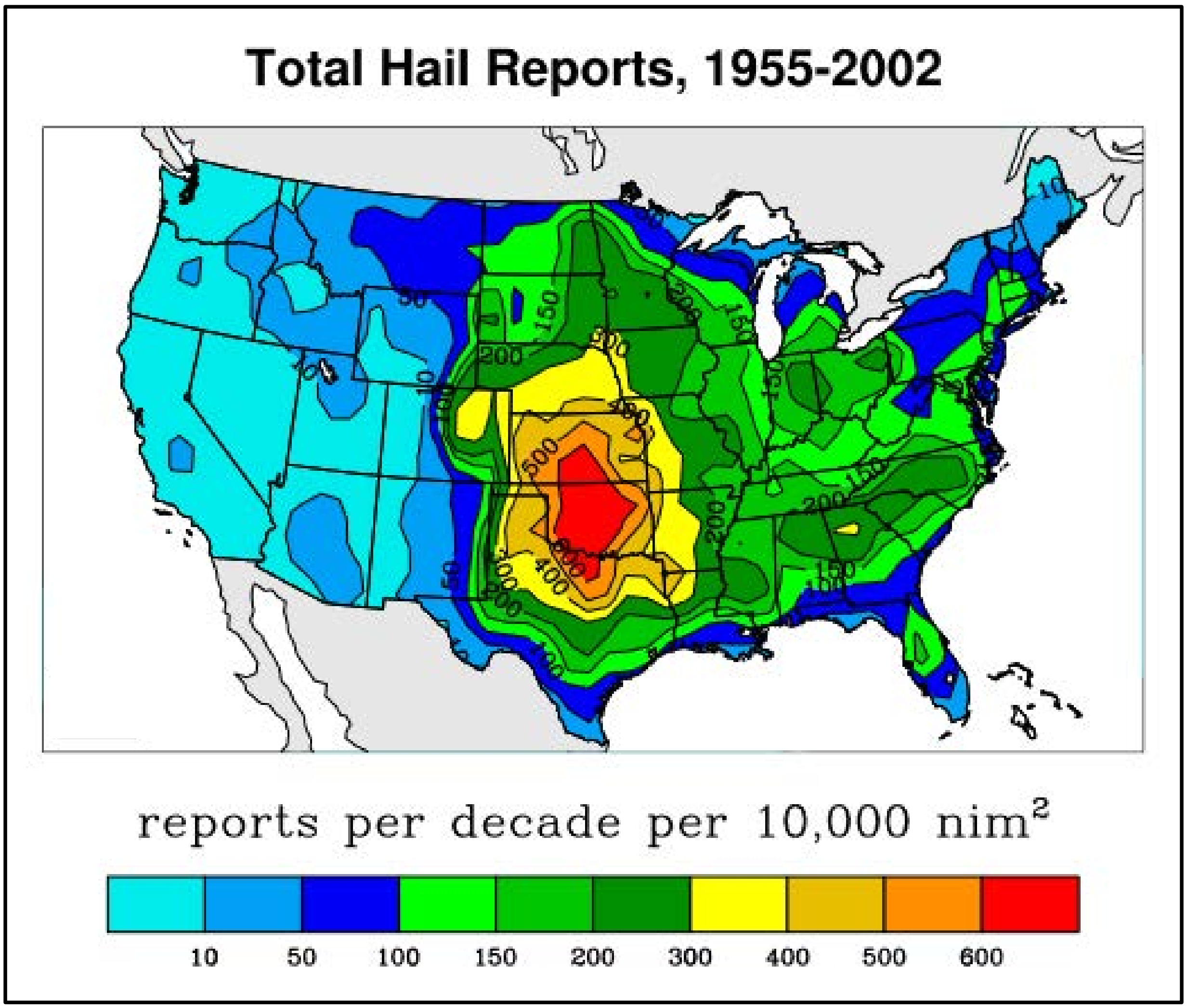


Figure 3.1.8.4.1: Hail Events per Square Nautical Mile in the Continental United States

Nation-wide as well as county specific historical data shows that Franklin County is at a relatively low risk of hail storms as compared to the mid-west, but they will occur. Future

[67]NOAA/NWS/NCEP/SPC

occurrences of hail storms can be considered ***likely*** as defined by the Risk Factor Methodology probability criteria (See **Section 1.2**).

3.1.8.5. Vulnerability Assessment

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 due to these storms is relatively small because a single storm does not cause widespread devastation, but a storm may cause significant damage with a focused area. Refer to **Tables 2.4.5 and 2.4.6, Section 2,** for the specific number of critical facilities in the municipalities subject to hail hazards.

Figure 3.1.8.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Hailstorm hazard. One can see that 15 of 22 municipalities rated this threat as either a Major or Moderate event. This is considered a Moderate threat ranked as the number 11 threat overall for Franklin County.

Hailstorm
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	3	20%	2	10%	1	10%	2.1	10.12%	0.2125
Chambersburg Borough	4	30%	1	30%	4	20%	4	10%	1	10%	2.8	14.05%	0.3934
Fannett Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.59%	0.0159
Greencastle Borough	2	30%	2	30%	4	20%	3	10%	1	10%	2.4	2.73%	0.0655
Greene Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	11.82%	0.2128
Guilford Township	4	30%	1	30%	3	20%	4	10%	1	10%	2.6	9.38%	0.2439
Hamilton Township	2	30%	1	30%	4	20%	4	10%	1	10%	2.2	7.29%	0.1604
Letterkenny Township	2	30%	1	30%	4	20%	2	10%	1	10%	2.0	1.58%	0.0316
Lurgan Township	2	30%	2	30%	4	20%	4	10%	1	10%	2.5	1.42%	0.0355
Mercersburg Borough	2	30%	1	30%	4	20%	4	10%	1	10%	2.2	0.97%	0.0213
Metal Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.13%	0.0113
Mont Alto Borough	2	30%	1	30%	3	20%	3	10%	1	10%	1.9	1.01%	0.0192
Montgomery Township	3	30%	1	30%	4	20%	1	10%	1	10%	2.2	3.68%	0.0810
Orrstown Borough	2	30%	1	30%	1	20%	3	10%	1	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	2.86%	0.0343
Quincy Township	2	30%	1	30%	4	20%	2	10%	1	10%	2.0	3.41%	0.0682
Shippensburg Borough	2	30%	1	30%	4	20%	2	10%	1	10%	2.0	0.75%	0.0150
Southampton Township	3	30%	1	30%	2	20%	4	10%	1	10%	2.1	5.49%	0.1153
St Thomas Township	3	30%	3	30%	2	20%	4	10%	1	10%	2.7	3.79%	0.1023
Warren Township	2	30%	2	30%	3	20%	4	10%	1	10%	2.3	0.21%	0.0048
Washington Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	9.55%	0.0955
Waynesboro Borough	3	30%	1	30%	4	20%	4	10%	1	10%	2.5	7.02%	0.1755
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.117

Figure 3.1.8.5.1: Municipal Hailstorm Threat Vulnerability Self-Assessment

Hail can cause serious damage to homes, automobiles, aircraft, livestock, crops, and infrastructure. Areas of the county with large amounts of farmland and high agricultural yields are more likely to be the areas impacted the most by a sever hail event. As noted in **Section 2.1**, Franklin County is ranked number 4 in the state for agricultural production, so any impact to normal crop yields will have a major economic impact to the county. Of particular concern to Franklin County are corn, peaches, barley, and soybean crops[68], which can be damaged to the extent of total loss, especially if an event occurs later in the growing season.

3.1.9. Hurricane, Tropical Storm, and Nor'easter

Tropical cyclones which impact Pennsylvania develop within the tropical or sub-tropical waters of the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Those storms with maximum sustained wind speeds below 39 miles per hour are classified as tropical depressions. Cyclones with speeds between 39 and 74 miles per hour are classed as tropical storms. When sustained wind speeds reach 75 miles per hour, these storms are classified as hurricanes. Hurricanes are further classified using the Saffir-Simpson Scale, which is based on wind speeds (See **Figure 3.1.9.1**). It is not uncommon for high winds, flooding, and tornadoes to develop in conjunction with tropical weather systems.

Saffir-Simpson Hurricane Scale		
Category	Wind speed (mph)	Storm surge (feet)
5	156	More than18
4	131–155	13–18
3	111–130	9–12
2	96–110	6–8
1	74–95	4–5
Additional classifications		
Tropical storm	39–73	0–3
Tropical depression	0–38	0

Figure 3.1.9.1: Saffir-Simpson Hurricane Scale

Nor'easters are extra-tropical storms which typically develop from low pressure systems in the Atlantic Ocean north of North Carolina. They are especially prevalent during the Winter months. "Extra-tropical storms" is a term used to describe storms that have lost their tropical characteristics. For example, Hurricane Sandy was considered an extra-tropical storm when it reached Franklin County in 2012. While the extra-tropical designation indicates a change in the

[68] Penn State Agriculture Extension, Franklin County, 2015

weather pattern, the storm is still capable of gathering energy and producing hurricane force winds, thunderstorms, hail, and tornadoes.

3.1.9.1. Location and Extent

While Franklin County is located approximately 170 statutory miles from the Atlantic Coast, tropical storms can 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 of the storm. Therefore, all communities within Franklin County are equally subject to the impacts of hurricanes, tropical storms, and Nor'easters that track through or near the county. Areas in Franklin County that are subject to flooding, wind, and winter storm damage are particularly vulnerable.

3.1.9.2. Range of Magnitude

Intense precipitation and wind resulting in flood (see **Section 3.1.7**) and wind damage (see **Section 3.1.19**) are the most common impacts associated with coastal storm systems in Pennsylvania. Nor'easters develop as extra-tropical cyclonic weather systems over the Atlantic Ocean and are capable of producing winds equivalent to hurricane or tropical storm force; precipitation from these storms may also come in the form of heavy snow or ice (see **Section 3.1.24**).

A correlation between the wind speed of these storms and the expected damage they can cause is illustrated in **Figure 3.1.9.2.1** below.

Storm Category	Wind Speed (mph)	Description of Damages
1	74-95	MINIMAL: Damage is limited primarily to shrubbery and trees, unanchored mobile homes, and signs. No significant structural damage.
2	96-110	MODERATE: Some trees are toppled, some roof coverings are damaged, and major damage occurs to mobile homes. Some roofing material, door, and window damage.
3	111-130	EXTENSIVE: Some structural damage to small residences and utility buildings with minor amount of curtain wall failures. Mobile homes are destroyed. Large trees toppled. Terrain may be flooded well inland.
4	131-155	EXTREME: Extensive damage to roofs, windows, and doors; roof systems on small buildings completely fail. More extensive curtain wall failures. Terrain may be flooded well inland.
5	>155	CATASTROPHIC: Complete failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Massive evacuation of residential areas may be required.

Figure 3.1.9.2.1: Saffir-Simpson Scale and Associated Damages

3.1.9.3. Past Occurrence

The National Hurricane Center maintains records of all coastal storms occurring in the United States since the 1850s. **Table 3.1.9.3.1** lists all the storms that passed through or directly impacted Franklin County[69, 70, 71, 72, 73].

Event	Date	Outcome	US Damages
Hurricane Sandy	October 2012	Presidential Emergency Declaration	$18,750,000,000
Tropical Storm Lee	September 2011	Presidential Emergency Declaration	$1,600,000,000
Hurricane Irene	August 2011	Gubernatorial Proclamation of Emergency	$15,800,000,000
Tropical Depression Ernesto	September 2006	Gubernatorial Proclamation of Emergency	$500,000,000
Hurricane Ivan	September 2004	Presidential Disaster Declaration	$18,820,000,000
Tropical Storm Isabel	September 2003	No Declaration covering Franklin County	$5,370,000,000
Tropical Storm Agnes	June 1972	Presidential Disaster Declaration	$2,100,000,000

Table 3.1.9.3.1: Tropical Systems that Impacted Franklin County (1972-2017)

3.1.9.4. Future Occurrence

Although hurricanes and tropical storms can cause flood events consistent with 1% and 2%-annual chance frequency, their probability of occurrence is measured relative to wind speed. NOAA Hurricane Research Division published the map in **Figure 3.1.9.4.1** showing the probability of a named storm striking Pennsylvania. This figure does not provide information on the intensity of the storm, but does indicate that Pennsylvania, including Franklin County, has between a 6-12 % chance of being hit by a named storm between June and November of any given year. This translates as a probability of occurrence of ***possible***, as defined by the Risk Factor Methodology probability criteria (see **Section 1.2**).

[69] National Hurricane Center, 2011
[70] National Hurricane Center, 2006
[71] New York Daily News
[72] Masters, Jeff, 2011
[73] Insurance Information Institute

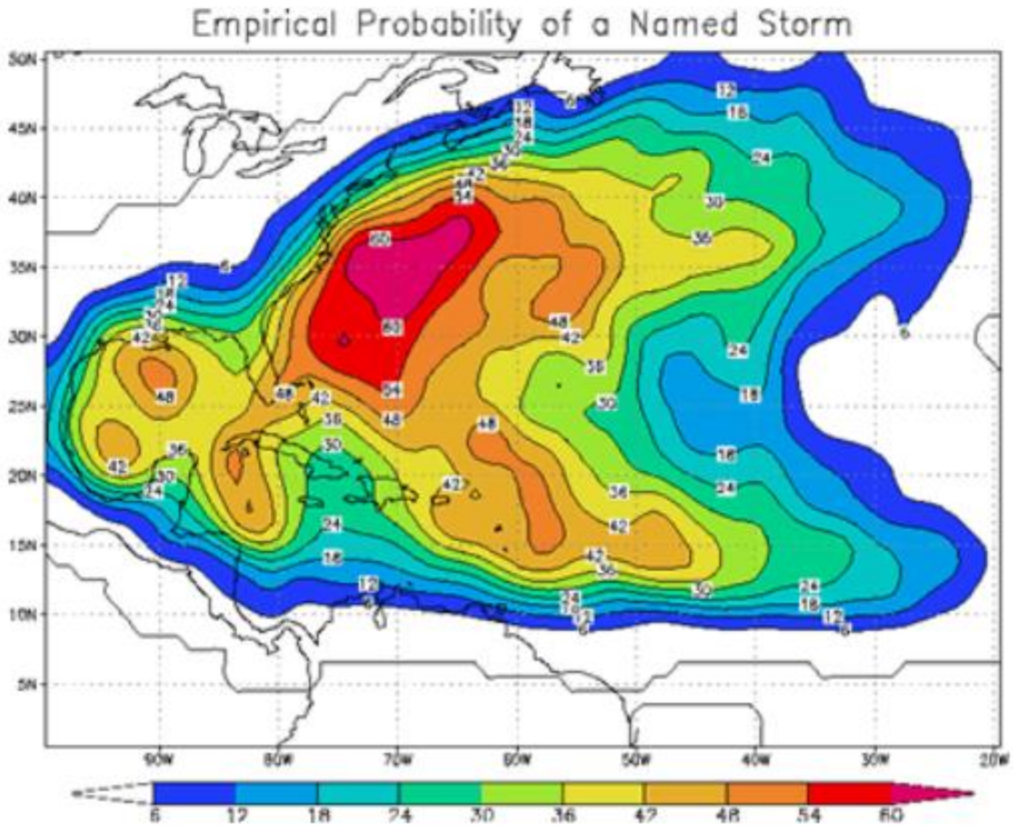


Figure 3.1.9.4.1: Probability of Named Storm Hitting the Continental United States[74]

3.1.9.5. Vulnerability Assessment

Based on all the information available, every community in Franklin County is equally vulnerable to the direct impacts of a Hurricane, Tropical Storm, or Nor'easter. These storms are not frequent events for Franklin County, but the possible damages to life and property from one of these events raises the risk factors significantly for our communities.

Figure 3.2.9.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Hurricane/Tropical Storm/Nor'easter hazard. One can see that 17 of 22 municipalities rated this threat as either a Major or Moderate event. This is a Major threat ranked number 2 overall for Franklin County.

[74] NOAA/Hurricane Research Division

Hurricane/Tropical Storm/Nor'easter Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	3	30%	2	30%	4	20%	1	10%	4	10%	2.8	10.12%	0.2834
Chambersburg Borough	2	30%	2	30%	4	20%	1	10%	4	10%	2.5	14.05%	0.3513
Fannett Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.59%	0.0207
Greencastle Borough	1	30%	3	30%	4	20%	4	10%	4	10%	2.8	2.73%	0.0764
Greene Township	2	30%	2	30%	4	20%	3	10%	4	10%	2.7	11.82%	0.3191
Guilford Township	2	30%	2	30%	4	20%	1	10%	4	10%	2.5	9.38%	0.2345
Hamilton Township	1	30%	1	30%	4	20%	1	10%	4	10%	1.9	7.29%	0.1385
Letterkenny Township	2	30%	2	30%	3	20%	4	10%	4	10%	2.6	1.58%	0.0411
Lurgan Township	2	30%	2	30%	4	20%	3	10%	4	10%	2.7	1.42%	0.0383
Mercersburg Borough	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	0.97%	0.0213
Metal Township	1	30%	3	30%	1	20%	1	10%	4	10%	1.9	1.13%	0.0215
Mont Alto Borough	1	30%	2	30%	2	20%	1	10%	4	10%	1.8	1.01%	0.0182
Montgomery Township	3	30%	2	30%	4	20%	1	10%	4	10%	2.8	3.68%	0.1030
Orrstown Borough	2	30%	1	30%	1	20%	3	10%	4	10%	1.8	0.14%	0.0025
Peters Township	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	2.86%	0.0629
Quincy Township	3	30%	2	30%	4	20%	1	10%	4	10%	2.8	3.41%	0.0955
Shippensburg Borough	2	30%	1	30%	4	20%	2	10%	4	10%	2.3	0.75%	0.0173
Southampton Township	3	30%	1	30%	2	20%	4	10%	4	10%	2.4	5.49%	0.1318
St Thomas Township	2	30%	2	30%	1	20%	4	10%	4	10%	2.2	3.79%	0.0834
Warren Township	3	30%	1	30%	4	20%	1	10%	4	10%	2.5	0.21%	0.0053
Washington Township	2	30%	2	30%	3	20%	3	10%	4	10%	2.5	9.55%	0.2388
Waynesboro Borough	3	30%	2	30%	4	20%	1	10%	4	10%	2.8	7.02%	0.1966
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.501

Figure 3.1.9.5.1: Municipal Hurricane/Tropical Storm/Nor'easter Threat Vulnerability Self-Assessment

A vulnerability assessment for hurricane and tropical storm focuses on the impacts of flooding and severe wind. Therefore, the specific impacts of flood related events are addressed in **Section 3.1.7**, and impacts to wind damage are addressed in **Section 3.1.19**. The county is also vulnerable to severe winter weather impacts caused by Nor'easters which are detailed in **Section 3.1.24**.

3.1.10. Invasive Species

The National Resources Conservation Service (NRCS) defines invasive species to be those that are non-native to an area and tend to spread to a degree that causes harm to the environment, local species, or human interests. These problem species have popped up in Pennsylvania over the years, primarily through travel and commerce that displaces them from their native ecosystem. If enough individuals of a species are present to form a breeding population, they can become an invasive species. This has come about from people using exotic plants as decorations, releasing hazardous pets to the wild when they can no longer care for them, and pests that hitch rides in imported foods. Once a new species is introduced, it can become very difficult to get rid of, or even to control. Local plants and animals get choked out by foreign competitors, forests get eaten away by pests, and croplands and pastures become less productive. We must control these species and the effects they cause, and prevent future invasive threats from occurring if we wish to preserve Pennsylvania's local beauty, wildlife, and productivity[75].

Invasive species threats are generally divided into two main subsets:

- **<u>Aquatic Invasive Species</u>** are nonnative viruses, invertebrates, fish, and aquatic plants that threaten the diversity or abundance of native species, the ecological stability of the infested waters, human health and safety, or commercial, agriculture, aquaculture, or recreational activities dependent on such waters**.**

- **<u>Terrestrial Invasive Species</u>** are nonnative arthropods, vascular plants, higher vertebrates, or pathogens that complete their lifecycle on land instead of in an aquatic environment and whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Most new introductions of invasive species occur because of human activity. There are a few key pathways to introduction into Pennsylvania:

- Contamination of internationally traded products.
- Hull fouling.
- Ship ballast water release.
- Discarded live fish bait.
- Intentional release.
- Escape from cultivation.
- Movement of soil, compost, wood, vehicles, or other materials and equipment.
- Unregulated sale of organisms.

[75] USDA/NRCS

- Smuggling activities.
- Hobby trading or specimen trading.

3.1.10.1. Location and Extent

Invasive Animals, and Insects:

Spotted Lanternfly:

The Spotted Lanternfly is an inch-long black, red, and white-spotted insect native to southeastern Asia (see **Figure 3.1.10.1.1** below). An invasive species in South Korea, it has attacked 25 plant species there that also grow in Pennsylvania.

According to Pennsylvania Secretary of Agriculture, this invasive insect threatens to destroy $18 billion worth of agricultural commodities like apples, grapes, and hardwoods inflicting a devastating impact on the livelihoods of producers and businesses.

The Pennsylvania Department of Agriculture states the quarantine is now in effect for the following counties: Lehigh, Northampton, Berks, Bucks, Chester, Montgomery, Carbon, Delaware, Lancaster, Lebanon, Monroe, Philadelphia, and Schuylkill (see **Figure 3.1.10.1.2** below for areas with confirmed presence). Although Franklin County is not currently on the list, anyone who finds the insects or egg masses outside quarantined areas should report sightings to badbug@pa.gov. Include photos, if possible, to help confirm the sighting. Suspect specimens can be submitted to the department's headquarters in Harrisburg or to any of its 6 regional offices. Specimens also can be submitted to county Penn State Agriculture Extension offices (Do not submit live specimens). You may also call the Invasive Species Report Line at 1-866-253-7189. Please provide details, including the location of the sighting and your contact information. Calls may not be returned immediately, as call volume is high. For more information about the Spotted Lanternfly, including photos and quarantine details, visit the PA Department of Agriculture.

Figure 3.1.10.1.1: Adult Spotted Lanternfly

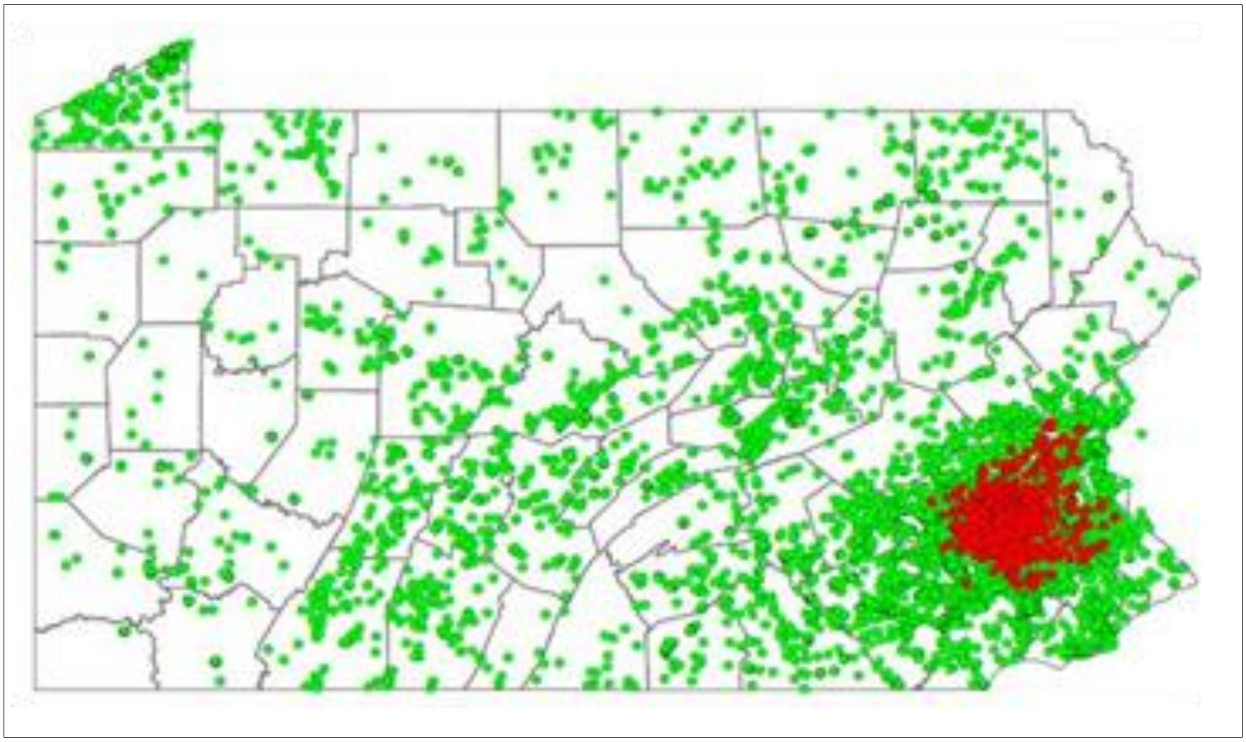


Figure 3.1.10.1.2: Areas in PA with Confirmed Spotted Lanternfly Presence (red dots)

Emerald Ash Borer (EAB):

Currently on the USDA's National Invasive Species interest list is the Emerald Ash Borer (Agrilus Planipennis Fairmaire). This invasive species is a half-inch long metallic green beetle originally from Asia that can be found in nearly every county of the commonwealth (see **Figure 3.1.10.1.3**). It was first identified in North America during 2002 and in western Pennsylvania during 2007. This insect was confirmed in Franklin County in 2010. The larval stage of this beetle is harmful, feeding exclusively on ash trees under the bark and killing them 3 to 5 years after infestation.

Signs and symptoms of an emerald ash borer (EAB) infestation include:

- Upper crown dieback.
- Epicormic branching.
- Bark splits.
- Bark flaking.
- Tissue damage resulting from woodpecker predation.
- D-shaped adult beetle exit holes in the bark.
- S-shaped larval feeding galleries just below the bark.

All native North American ash species, ash cultivars, and the white fringe tree are susceptible to the emerald ash borer. Emerald ash borer is a serious threat to the 323 million ash trees in the forests of Pennsylvania, including:

- Pumpkin ash - a state species of concern.
- Ash seed orchards managed by DCNR's Bureau of Forestry.
- White ash, green ash, black ash, blue ash, and the white fringe tree (a species in the same taxonomic family as ash).

Without active management, it is predicted that EAB will severely decimate populations of ash trees in the state. As of 2014, ash forests in Pennsylvania have been reduced by 12%. If the EAB spreads to the Commonwealth's 323 million ash trees, with the high mortality rate associated with the ash borer, Pennsylvania's hardwood forests would be devastated. This would have a serious impact on Pennsylvania's logging activities and its many state parks and game lands. The economic impact could be serious, stretching from logging to tourism to other production activities[76] dependent on Pennsylvania lumber. A 2010 Department of Agriculture report estimated that more than 80,000 Pennsylvanians have been employed in forest product industries, and Pennsylvania is the nation's leading producer of hardwood lumber. The economic impact of this industry is estimated at $25 billion, a significant potential loss should a hardwood-living invasive species take root in Pennsylvania[77].

Figure 3.1.10.1.3: Emerald Ash Borer

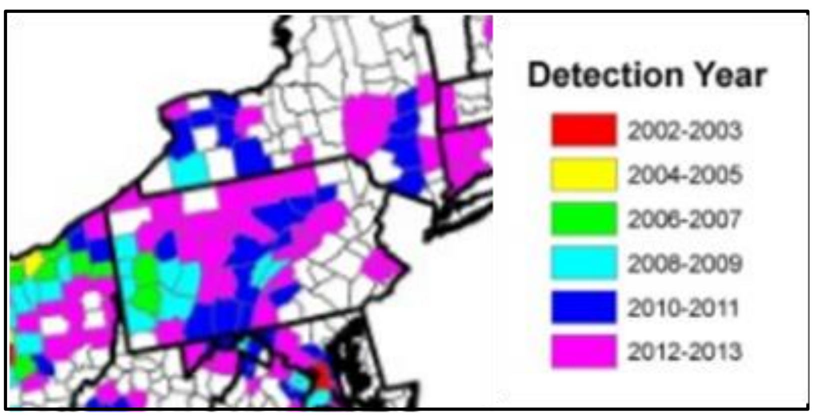


Figure 3.1.10.1.4: PA Emerald Ash Borer Proliferation

[76] PEMA, 2013
[77] Central Pennsylvania Forestry, 2011

Reptiles:

According to the Governor's Invasive Species Council of Pennsylvania (PISC), in Pennsylvania, there are no known invasive amphibian species and only two invasive reptiles. The red-eared slider (Trachemys scripta elegans) (**Figure 3.1.10.1.5**) and the yellow-bellied slider (Trachemys scripta scripta) (Figure **3.1.10.1.6**) turtles have established breeding populations in the commonwealth, particularly in the southeastern and southcentral counties. Both of these invasive turtle species are aggressive competitors for food, basking sites, and breeding habitat and represent significant threats to many native Pennsylvania turtle species including the red-bellied turtle (Pseudemys rubriventris) that is state listed as threatened. The rapid spread of both slider species is attributed to the intentional release of captive turtles that were kept as pets.

Figure 3.1.10.1.5: Red-eared Slider Turtle

Figure 3.1.10.1.6: Yellow-bellied Slider Turtle

Invasive Pathogens:

There are a number of reportable diseases documented in Pennsylvania, either currently or in the recent past, that pose significant environmental and economic threats and may be detrimental to public health and safety. At a minimum, more than 189 reportable or notifiable diseases in Pennsylvania are non-native and also highly invasive by their very nature. **Table 3.1.10.1.1** below contains examples of Animal and Human Pathogens with invasive characteristics that are of concern in the world, the nation, or in the Commonwealth.

Viruses	Bacterial Diseases	Prions
Avian Influenza	Botulism	Chronic Wasting Disease
Smallpox	Plague	Bovine Spongiform Encephalopathy
West Nile Virus	Samonellosis	
Foot and Mouth Disease	Brucellosis	
	Anthrax	
	Glanders	
	Q Fever	

Table 3.1.10.1.1: Invasive Pathogens

West Nile Virus**:**

West Nile fever is a case of mild disease in people, characterized by flu-like symptoms. West Nile fever typically lasts only a few days and does not appear to cause any long-term health effects. More severe disease due to a person being infected with this virus can be "West Nile encephalitis," West Nile meningitis, or West Nile meningoencephalitis. Encephalitis refers to an inflammation of the brain, meningitis is an inflammation of the membrane around the brain and the spinal cord, and meningoencephalitis refers to inflammation of the brain and the membrane surrounding it.

The principle route of human infection with West Nile virus is through the bite of an infected mosquito. Additional routes of infection have become apparent during the 2002 West Nile epidemic. It is important to note that these other methods of transmission represent a very small proportion of cases. Other methods of transmission include blood transfusion, organ transplantation, mother-to-child (ingestion of breast milk and transplacental), and occupational.

In 2000, West Nile virus appeared for the first time in Pennsylvania in birds, mosquitoes, and a horse. To combat the spread of West Nile virus, which is transmitted by mosquitoes, Pennsylvania has developed a comprehensive network. This network, which covers 40 counties, includes trapping mosquitoes, collecting dead birds, and monitoring horses, people, and in past years, sentinel chickens.

There are about 60 different species of mosquitoes in Pennsylvania. While most do not transmit West Nile virus, several mosquito species have been found to transmit the virus.

Mosquitoes lay their eggs in stagnant water around the home. Weeds, tall grass, shrubbery, and discarded tires also provide an outdoor home for adult mosquitoes. By eliminating places for mosquitoes to breed, we can go a long way to prevent West Nile virus.

Mosquitoes breed in standing water. Even a small bucket that has stagnant water in it for seven days can become home to up to 1,000 mosquitoes. Here are some easy tips to eliminate standing water:

- Dispose of tin cans, plastic containers, ceramic pots, or similar water holding containers that have accumulated on your property. Do not overlook containers that have become overgrown by aquatic vegetation.
- Pay special attention to discarded tires that may have accumulated on your property.
- Drill holes in the bottom of recycling containers that are left out of doors. Drainage holes that are located on the container sides collect enough water for mosquitoes to breed in.
- Clean clogged roof gutters on an annual basis, particularly if the leaves from surrounding trees have a tendency to plug up the drains. Roof gutters are easily overlooked but can produce millions of mosquitoes each season.
- Turn over plastic wading pools when not in use. A wading pool becomes a mosquito producer if it is not used on a regular basis.
- Turn over wheelbarrows and do not allow water to stagnate in birdbaths. Both provide breeding habitat for domestic mosquitoes.
- Aerate ornamental pools or stock them with fish. Water gardens are fashionable but become major mosquito producers if they are allowed to stagnate. Clean and chlorinate swimming pools that are not being used. A swimming pool that is left untended by a family that goes on vacation for a month can produce enough mosquitoes to result in neighborhood-wide complaints. Be aware that mosquitoes may even breed in the water that collects on swimming pool covers.

It is not necessary to limit any outdoor activities, unless local officials advise you otherwise. However, you can and should try to reduce your risk of being bitten by mosquitoes. In addition to reducing stagnant water in your yard, make sure all windows and doors have screens and that all screens are in good repair. If West Nile Virus is found in your area:

- Take normal steps to prevent insect bites.
- Wear shoes, socks, long pants, and a long-sleeved shirt when outdoors for long periods of time or when mosquitoes are most active.
- Consider the use of mosquito repellent, according to directions, when it is necessary to be outdoors. Wash all treated skin and clothing when returning indoors.

West Nile Virus continues to be a threat that is monitored heavily in Franklin County (see **Figure 3.1.10.1.7** below). According to Pennsylvania’s West Nile Control Program, there were a reported 48 positive samples collected this year. Forty-five (45) of those were positive mosquito samples, while 3 were positive veterinary samples.

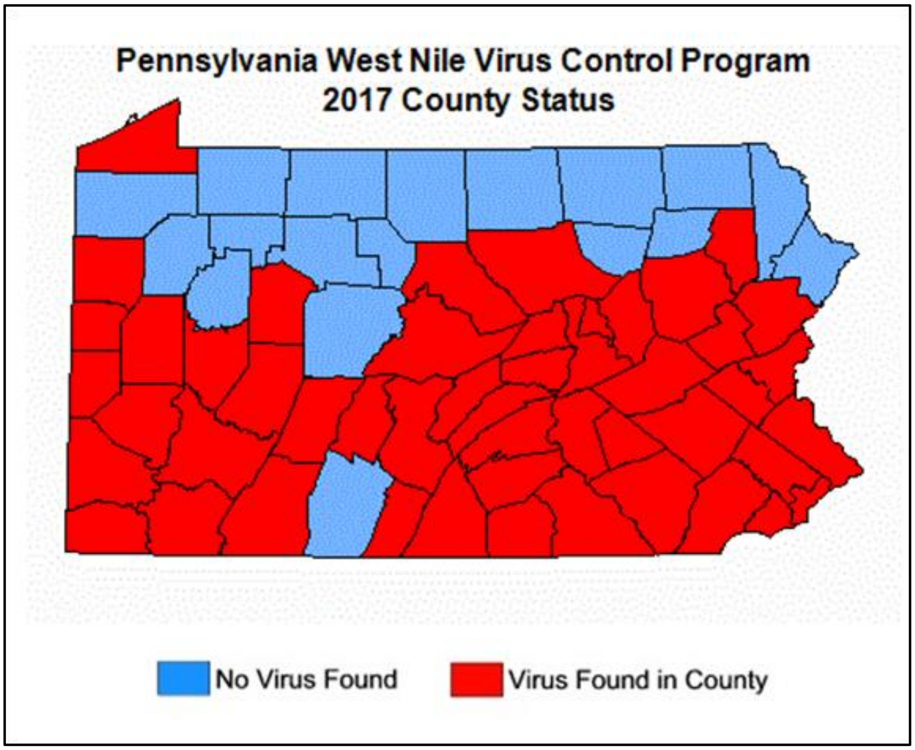


Figure 3.1.10.1.7: Proliferation of West Nile Virus in PA (2017)

Chronic Wasting Disease**:**

Chronic wasting disease (CWD) affects the brain and nervous system of infected cervids (deer, elk, and moose), eventually resulting in death (see **Figure 3.1.10.1.8** below).

Figure 3.1.10.1.8: Symptoms of Chronic Wasting Disease

Following the detection of CWD in both captive and free-ranging deer in Pennsylvania, an executive order was issued by the Game Commission to establish Disease Management Areas (DMAs). Within DMAs, rehabilitation of cervids; the use or possession of cervid urine-based attractants in an outdoor setting; the removal of high-risk cervid parts; and the feeding of wild, free-ranging cervids are prohibited. Increased testing continues in these areas to determine the distribution of the disease. Newly confirmed cases alter the boundaries of DMAs as the Game Commission continues to manage the disease and minimize its effect on free ranging cervids[78].

In Pennsylvania, CWD has been detected in these DMAs: DMA 1 on a captive deer farm in Adams County during 2012 (DMA 1 has since been eliminated); DMA 2 in multiple free-ranging deer in Bedford, Blair, Cambria, and Fulton counties since 2012, and captive deer farms in Bedford, Franklin, and Fulton counties during 2017; DMA 3 in two captive deer farms in Jefferson County during 2014 and a free-ranging deer in Clearfield County during 2017. In addition, CWD has been detected in wild or captive deer and/or elk in many other states and provinces.

Franklin County is located in Disease Management Area (DMA) 2. It is unlawful to remove any carcass suspected of CWD out of the DMA unless it is being taken to an approved processing location. As of the fall 2017, those locations are listed for Franklin County in **Table 3.1.10.1.2** below:

County	Approved Processing Centers
Franklin	Country Foods, 6032 Buttermilk Rd., Waynesboro, PA 17268, 717-729-1521
Franklin	Diehl's Custom Butchering, 1489 Roxbury Rd., Shippensburg, PA 17257, 717-658-7440
Franklin	Mountain Man Custon Butchering, 10125 Mountain Rd., Orrstown, PA 17244, 717-532-7295
Franklin	Stitely's Meat & Deer Processing, 3647 Haulman Rd., Chambersburg, PA, 717-264-3341

Table 3.1.10.1.2: Approved Processing Centers in Franklin County (DMA 2)

A list of DMA 2 high-risk parts dumpsters and deer head collection bins for FREE testing are listed in **Table 3.1.10.1.3** below:

Type	County	Location
Dumpster Only	Franklin	State Game Lands 235, 5329 Bricker Rd., Chambersburg, PA 17202.
Dumpster & Head Collection	Franklin	State Game Lands 124, 3703 Little Cove Rd., Mercersburg, PA 17236

Table 3.1.10.1.3: Drop Locations for CWD Testing Franklin County

A complete list for all counties is available at http://www.pgc.pa.gov/Wildlife/Wildlife-RelatedDiseases.

[78] Pennsylvania Game Commission

Lyme Disease**:**

According to the PA Lyme Resource Network, Lyme Disease is a bacterial infection transmitted to humans primarily through the bites of infected deer ticks (see **Figure 3.1.10.1.9** below). It is the fastest growing vector-borne infectious disease in the United States according to the Centers for Disease Control and Prevention. The CDC recently raised the number of estimated new cases of Lyme disease each year from 30,000 to 300,000. Some experts say the figure is far higher.

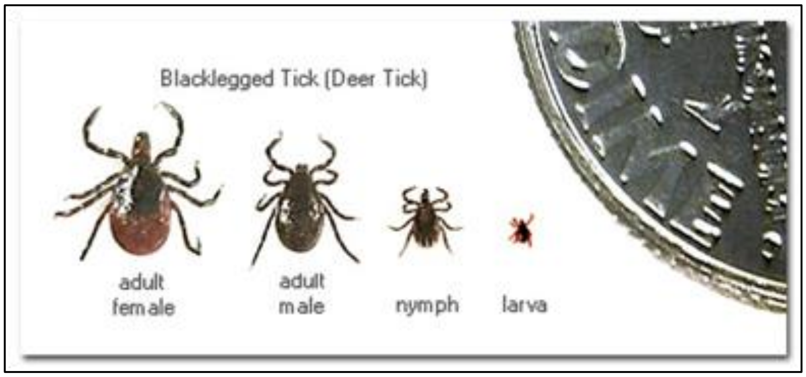


Figure 3.1.10.1.9: Illustration of a Deer Tick

Lyme disease is transmitted mostly by the nymphal deer tick. At this stage, the ticks are the size of a period at the end of a sentence. Many people are not aware when they've been bitten by a tick and may not make a connection when they begin to experience symptoms, which can be weeks, months, or even years after a tick bite. There are published cases of Lyme bacteria entering the human bloodstream within the hour of a bite, and some infections (Powassan Virus) can be transmitted in minutes or hours. This does not happen in every case. The longer the tick is attached, the greater the probability of disease transmission.

Initial symptoms may occur within a day or a week and often people think they just have a flu or virus. Symptoms include fever, headache, general achiness, swollen glands, fatigue, and a possible rash. But some patients may present with only neurological symptoms (headache, sleep disruption, memory, or concentration problems). The rash is seen in fewer than half of diagnosed cases. It is typically a bulls eye rash (see **Figure 3.1.10.1.10 below**), but it may also present in other forms like a round or oval reddish rash. If the bulls-eye rash is seen, it is a definitive diagnosis of Lyme disease and treatment should begin immediately. "Summer flues" are highly unusual and healthcare practitioners are informed to consider Lyme and Tick-borne diseases when patients experience a "Summer flu-like illness".

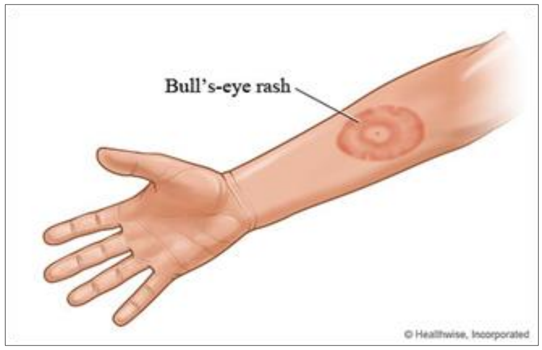


Figure 3.1.10.1.10: Bullseye Rash Symptom of Lyme's Disease

If the initial infection goes undiagnosed and untreated, the infection can progress disseminating throughout the body affecting any organ. In the heart, the bacteria may cause heart block or palpitations. Recent reports of sudden cardiac death due to Lyme carditis highlight the importance of prompt diagnosis and treatment of Lyme disease. When the bacteria affects the digestive system, patients may experience nausea, acid reflux, irritable bowel syndrome, poor digestion, or diarrhea. Endocrine disturbances such as hypothyroidism or menstrual irregularities are common. In the brain, Lyme disease may cause learning disabilities, memory impairment, headaches, sleep disturbances, and concentration problems often presenting like attention deficit disorder (ADD). There may also be joint swelling and pain, muscle soreness, twitching, and cramps . Some experience light and sound sensitivity. Most patients with Lyme Disease also have fatigue, which can be quite debilitating.

Over the last 5 years PA ranked number 1 for reported cases in the US (see **Figure 3.1.10.1.11** below for Franklin County Lyme Disease susceptibility). The PA Department of Health reports that there were 9,427 confirmed and probable cases of Lyme Disease in 2015 with 11,443 cases, a 21% increase, in 2016. Experts believe the actual number of cases is at least 10-12 times higher than the number reported. In 2015, the PA Department of Environmental Protection published a study showing Lyme Disease risk exists in all 67 counties in PA[79]. **Figure 3.1.10.1.12** shows the incidents of Lyme's Disease per region in PA.

[79] DEP, 2015

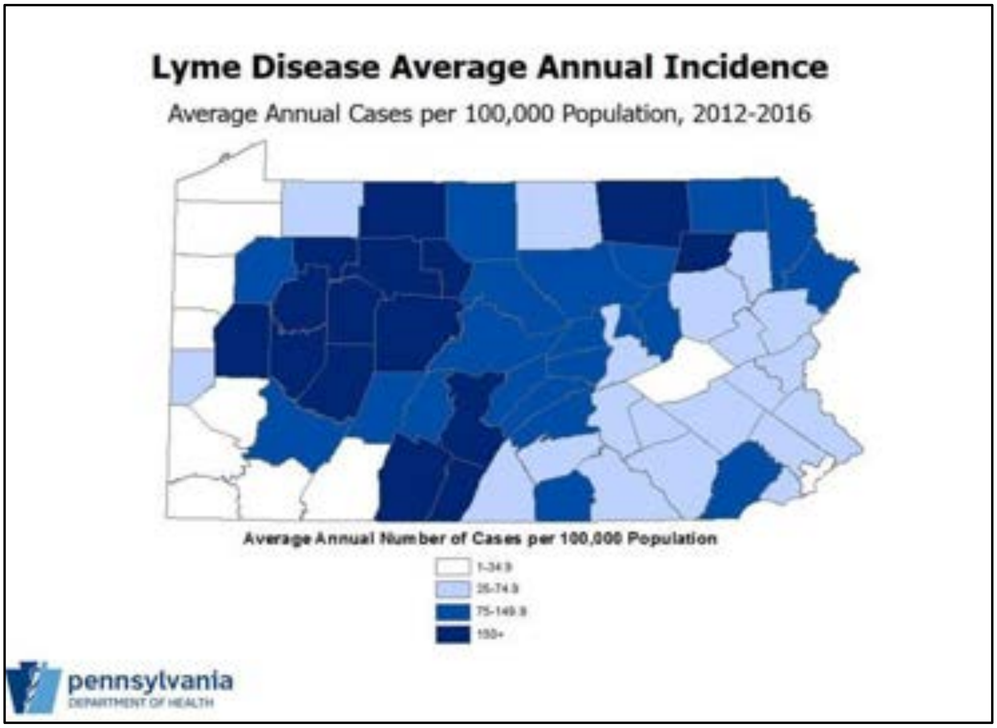


Figure 3.1.10.1.11: Lyme's Disease in Franklin County (2016)

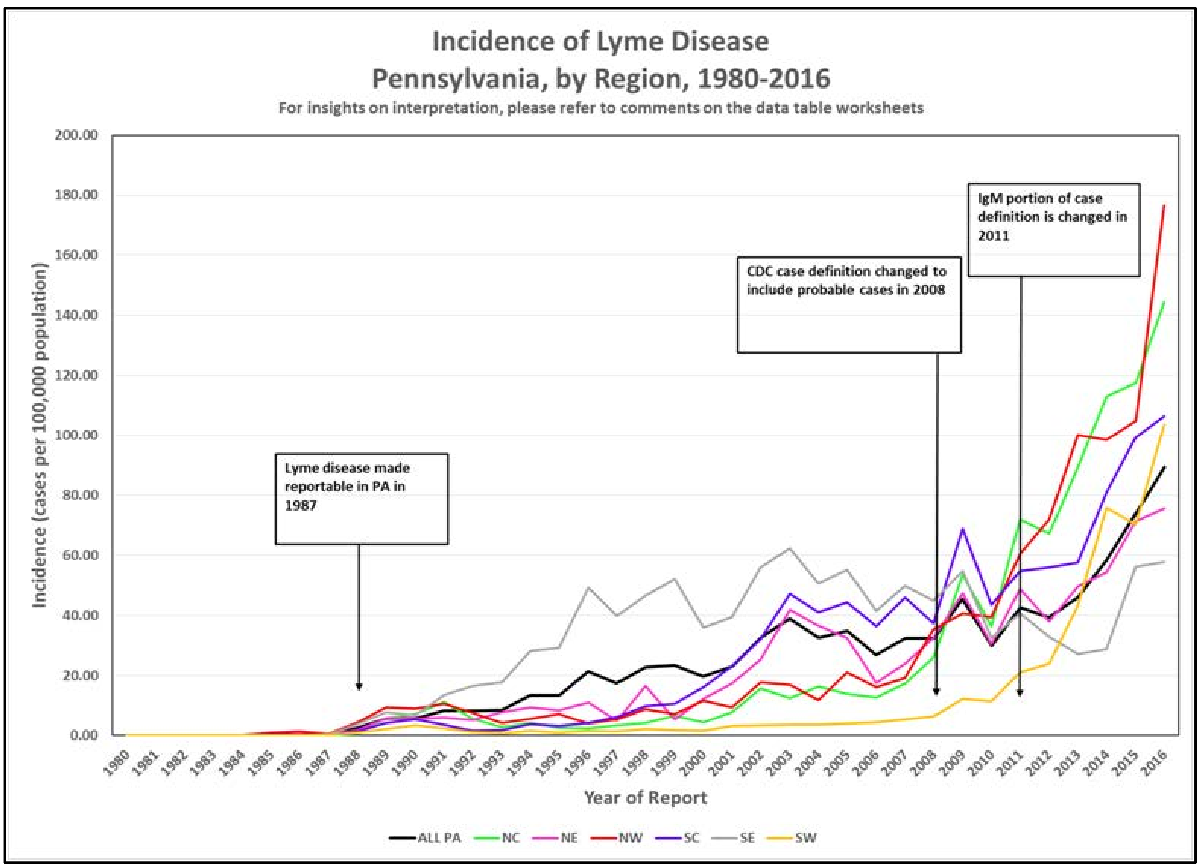


Figure 3.1.10.1.12: Lyme's Disease per Region in PA (1980-2016)

Figure 3.1.10.1.13 below is a chart that represents the number of confirmed Lyme Disease cases in Franklin County from 2000 through 2015[80].

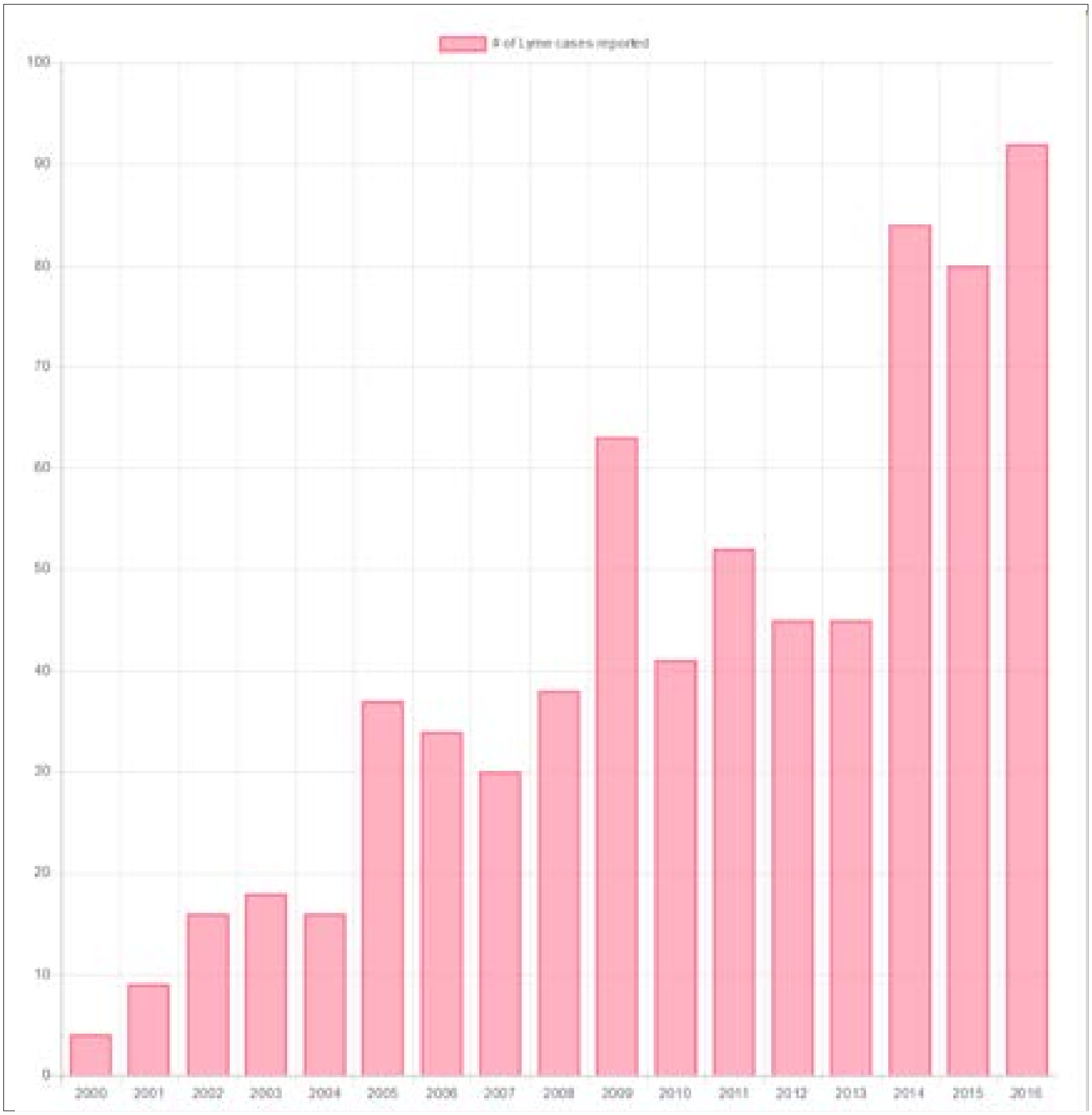


Figure 3.1.10.1.13: Franklin County Lyme's Disease Cases (2000-2016)

From 2000 - 2016, there were a total of 704 confirmed cases of Lyme's Disease in Franklin County. However, the data from the CDC only represents confirmed cases, the actual quantity of Lyme Disease cases may be far greater. Based on this information, we estimate the real number of cases of Lyme Disease in Franklin County to be closer to **7,040.**

[80] tickcheck.com, 2017

Invasive Plants

Invasive plants can include:

- Trees
- Shrubs
- Vines
- Grasses
- Flowers

A review of the USDA, National Agriculture Library[81] with respect to Franklin County revealed 24 plant species that have been documented as present in the county. These species are illustrated in **Figures 3.1.10.1.14** to **3.1.10.1.37** below.

Figure 3.1.10.1.14: Autumn Olive

Figure 3.1.10.1.15: Canadian Thistle

[81] USDA

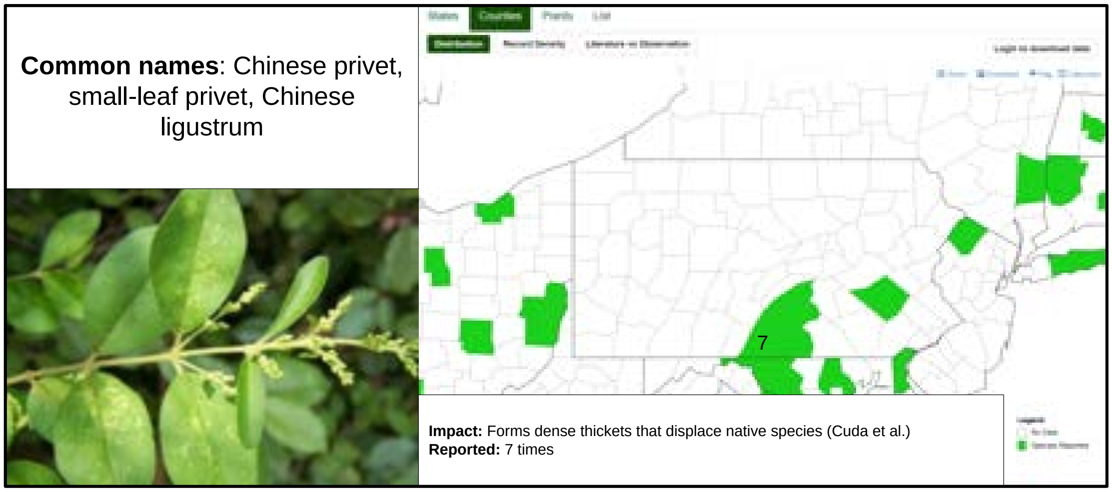


Figure 3.1.10.1.16: Chinese Privet

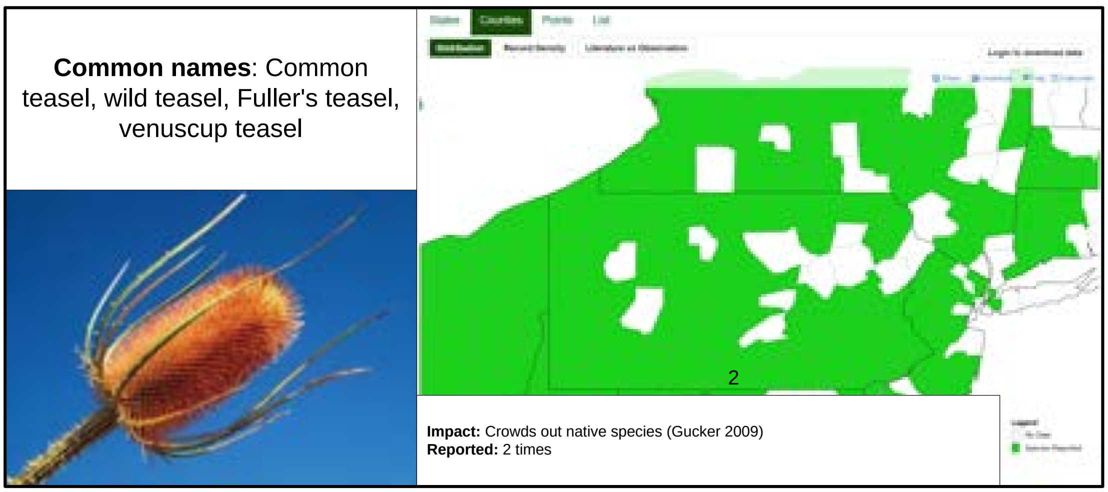


Figure 3.1.10.1.17: Common Teasel

Figure 3.1.10.1.18: Downy Brome

Common names: Fig buttercup, lesser celandine

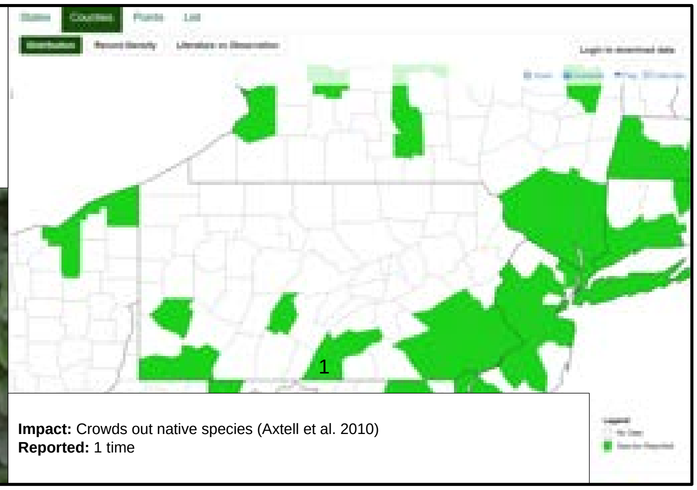


Figure 3.1.10.1.19: Fig Buttercup

Common names: Garlic mustard, hedge garlic, sauce-alone, jack-by-the-hedge, poor man's mustard, jack-in-the-bush, garlic root, garlicwort, mustard root

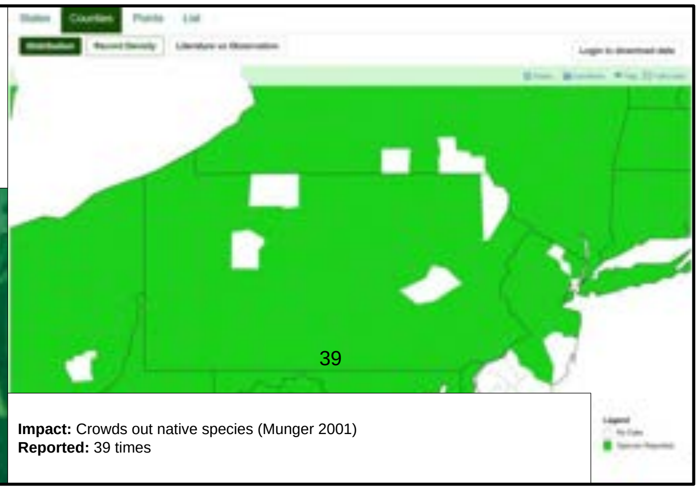


Figure 3.1.10.1.20: Garlic Mustard

Common names: Houndstongue, gypsy flower, rats and mice, dog bur

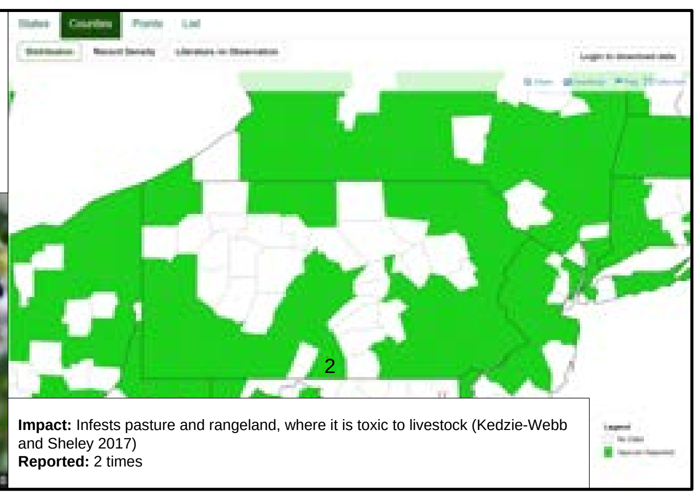


Figure 3.1.10.1.21: Houndstongue

Common names: Japanese barberry

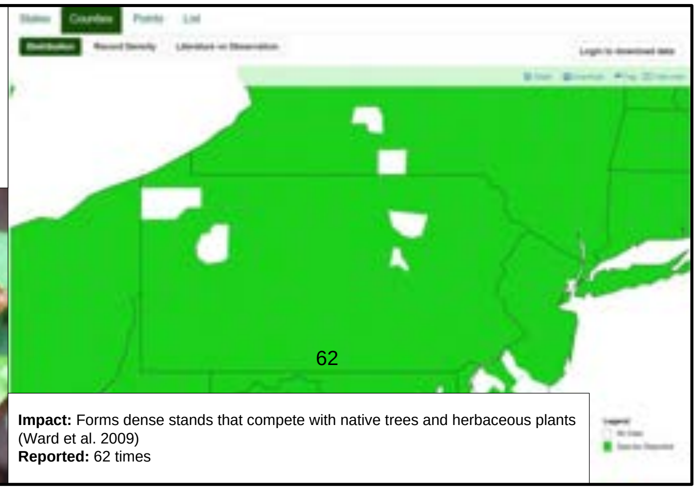


Figure 3.1.10.1.22: Japanese Barberry

Common names: Japanese honeysuckle

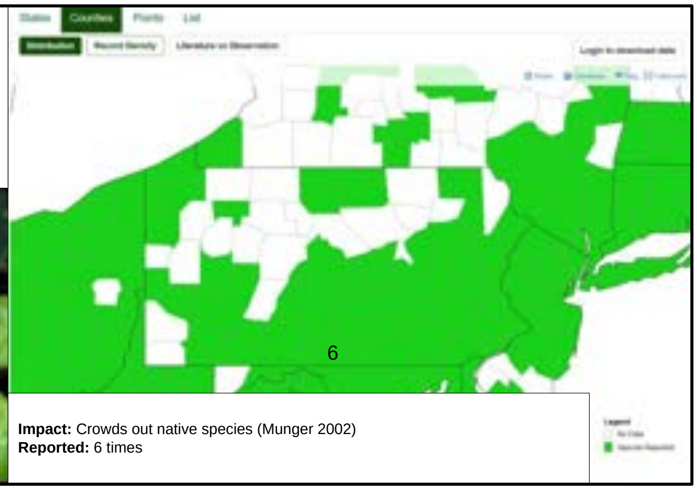


Figure 3.1.10.1.23: Japanese Honeysuckle

Common names: Japanese spiraea, Japanese meadowsweet

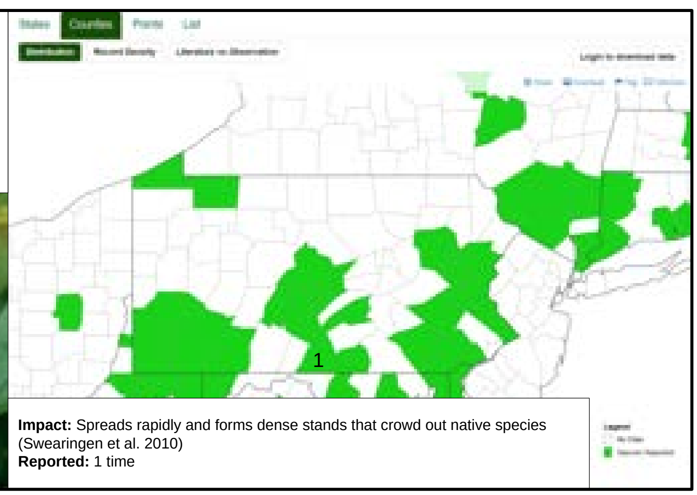
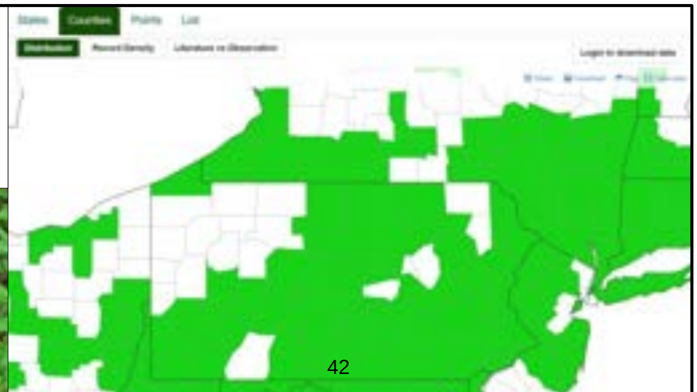


Figure 3.1.10.1.24: Japanese Spiraea

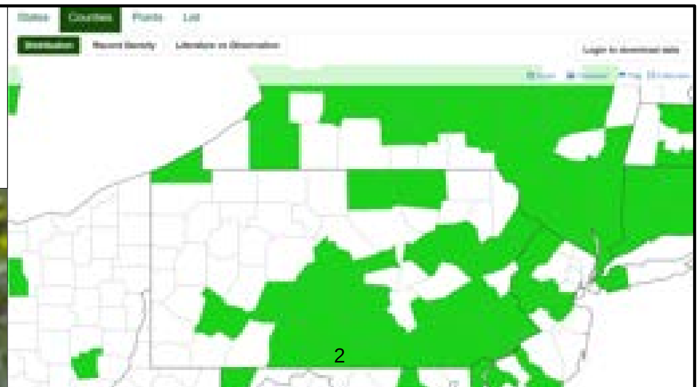
Common names: Japanese stiltgrass, Nepalese browntop, Chinese packing grass, Asian stilt grass, annual jewgrass, bamboograss, Nepal microstegium, eulalia, Mary's grass



Impact: Can grow in a variety of habitats where it forms dense stands and crowds out native species (Fryer 2011)
Reported: 46 times

Figure 3.1.10.1.25: Japanese Stiltgrass

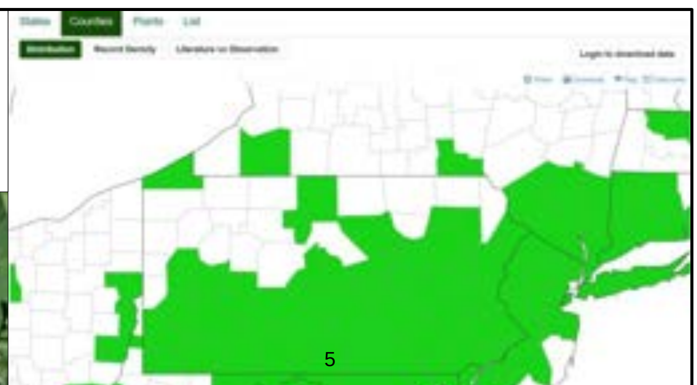
Common names: Leafy spurge, Wolf's Milk



Impact: Crowds out native species (Gucker 2010)
Reported: 2 times

Figure 3.1.10.1.26: Leafy Spurge

Common names: Mile-a-minute weed or vine, Asiastic tearthumb



Impact: Forms dense mats that crowd out native species (Stone 2010)
Reported: 5 times

Figure 3.1.10.1.27: Mile-A-Minute Weed

Figure 3.1.10.1.28: Multiflora Rose

Figure 3.1.10.1.29: Musk Thistle

Figure 3.1.10.1.30: Oriental Bittersweet

Common names: Princess tree, empress tree, royal paulownia

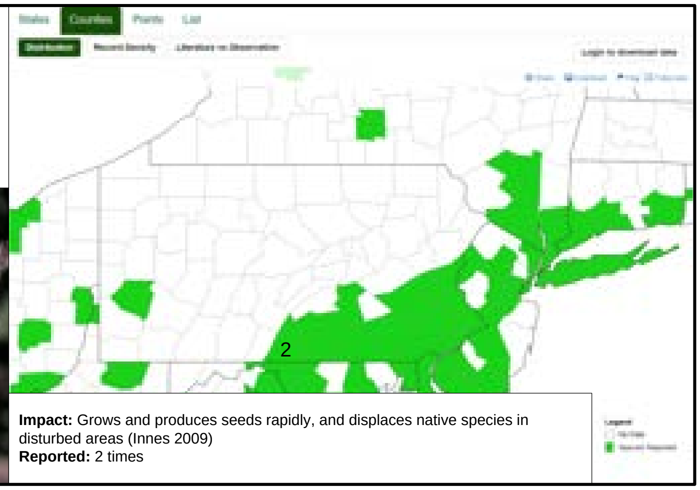


Figure 3.1.10.1.31: Princess Tree

Common names: Quackgrass, medusa's head, Quackgrass rye, Quackgrass grass

Figure 3.1.10.1.32: Quackgrass

Common names: St. Johnswort, St. John's wort, common St. Johnswort, Klamath weed, common goatweed, tipton weed

Figure 3.1.10.1.33: St. Johnswort

Figure 3.1.10.1.34: Spotted Knapweed

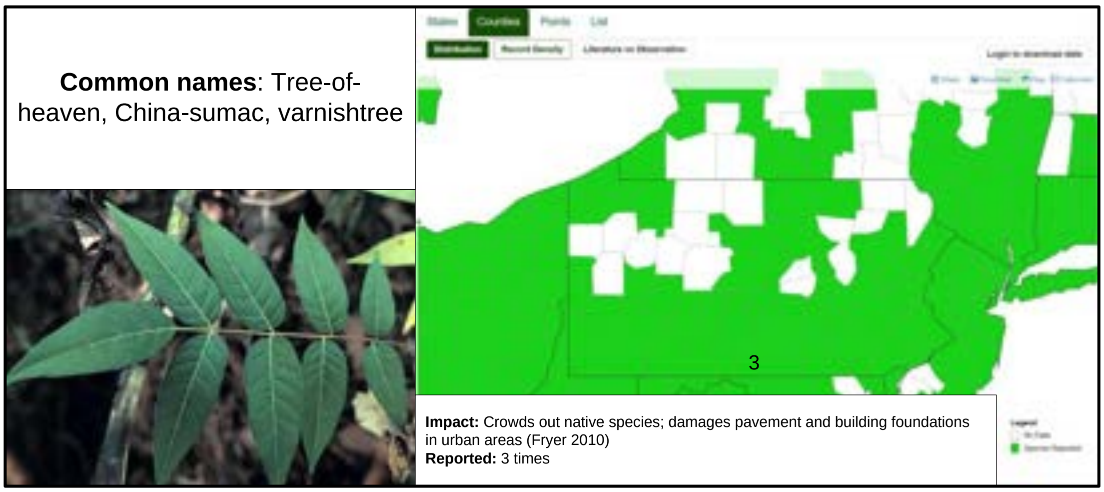


Figure 3.1.10.1.35: Tree-of-Heaven

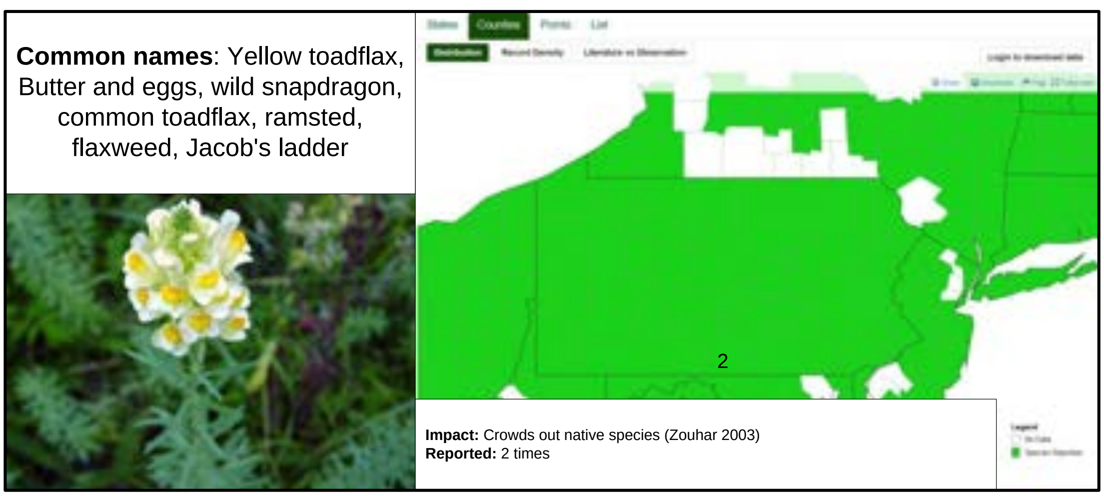


Figure 3.1.10.1.36: Yellow Toadflax

Additionally, the Penn State University Agricultural Extension of Franklin County identified an additional plant that is invasive and dangerous to livestock and humans, Poison Helmock (see **Figure 3.1.10.1.37**). This biennial pant grows along roadsides, fallow areas, fence rows, pastures, and creeks. Poison hemlock is toxic and can be fatal to humans, pets, and all classes of livestock if ingested in relatively small quantities (less than 1% of body weight). Poison Hemlock is aggressively spreading in many regions of Pennsylvania including Franklin County.

Common names: Poison Hemlock, Deadly Hemlock, Poison Parsley, Spotted Hemlock, European Hemlock, California Fern, and Nebraska Fern

Impact: Skin irritant, toxic if ingested by livestock or humans
Reported: Prevalent throughout the US

Figure 3.1.10.1.37: Poison Helmock

It should be noted, the reported number of observations of each of these plants species can seem extremely low, so low as to not raise concern. However, as few as one observed instance of an invasive species in an area is enough to raise concerns, as not all events or observations are reported, partially due to the perceptions of the observers. A person may not see these as foreign species and discount them as simple weeds or wild flowers.

3.1.10.2. Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to a widespread killer. Some invasive species like the Brown Marmorated Stink Bugs are not considered an agricultural pest and do not harm humans. Other invasive species can cause significant changes in the composition of Pennsylvania ecosystems. For example, the Emerald Ash Borer has a 99% mortality rate for any ash tree it infects. Didymo, an aggressive form of algae, can clog waterways and smother native aquatic plants and animals. Still more invasive species can cause widespread illness or death in humans; one species of particular concern with this magnitude is Anthrax, considered by the Centers for Disease Control and Prevention (CDC) to be a Category A agent that may pose a significant widespread threat to public health.

The magnitude of an invasive species threat is generally amplified when the ecosystem or host species is already stressed, such as in times of drought. The already weakened state of the native ecosystem causes it to more easily succumb to an infestation.

3.1.10.3. Past Occurrence

Invasive species have been entering the Commonwealth since the arrival of early European settlers, but not all occurrences have required government action. The first invasive species outbreak requiring state attention occurred in 1862 when legislation was enacted to provide for the destruction of and to prevent the spread of Canada Thistle, Johnson Grass, and Marijuana. Since then, there have been 26 acts and quarantines enacted to prevent the spread of invasive species.

The Pennsylvania Invasive Species Council (PISC) has begun tackling human and animal pathogens, aquatics, insects, mammals, plant pathogens, and vascular plants through management programs between the PA Fish and Boat Commission, the Game Commission, the Department of Agriculture, and DCNR. Notably, the PISC lists management programs for feral swine, kudzu, giant hogweed, mile-a-minute, emerald ash borer, plum pox virus, zebra and quagga mussels, and viral hemorrhagic septicemia under its "completed actions." This does not mean that these threats have been eliminated; rather, it indicates that there is an active management plan in place to reduce future occurrences.

3.1.10.4. Future Occurrence

According to the PISC, the probability of future occurrence for invasive species threats is on the rise because of the growing volume of transported goods, increasing technology, efficiency and speed of transportation, and expanding international trade agreements. Expanded global trade has created opportunities for many organisms to be transported to and establish themselves in new countries and regions. In 2009 alone, Pennsylvania imported over $115 billion in goods from abroad, including agricultural, forestry, and fishery goods that commonly carry unknown pests[82]. Furthermore, climate change is contributing to the introduction of new invasive species. As maximum and minimum seasonal temperatures change, pests are able to establish themselves in previously inhospitable climates. This also gives introduced species an earlier start and increases the magnitude of their growth. This may shift the dominance of ecosystems in the favor of nonnative species.

In order to combat the increase in future occurrences, the PISC, which is a collaboration of state agencies, public organizations, and federal agencies, released the Invasive Species Management Plan in April 2010. This plan outlines the Commonwealth's goals for the management of the spread of nonnative invasive species as well as creates a framework for responding to threats through research, action, and public outreach and communication. More information on the Management Plan can be found online at www.invasivespeciescouncil.com. Individual management plans by PISC member agencies and organizations will also help to reduce the number and/or magnitude of invasive species threats in the future.

An area of great concern is the near exponential rise in confirmed Lyme Disease cases in Franklin County. This rise may be due to better detection and awareness programs or it could be an indication of the proliferation of the Deer Tick that carries the disease. Better education on the host organism and protection measures could help stem this growth, but serious consideration

[82] U.S. Census, 2010

needs to occur on eradication measures for the host or this hazard could reach epidemic proportions.

Because of the plethora of environments that harbor many of the invasive species, Franklin County will continue to be an area of high potential for such incidences. The probability of future Invasive Species incidents is considered ***highly likely***, as defined by the Risk Factor probability criteria (**Section 1.2**).

3.1.10.5. Vulnerability Assessment

Invasive species threats do not generally impact buildings; instead, they impact landscapes, crops, and people (in the case of human-borne pathogens). Because of this wide array of invasive species present in Pennsylvania, most jurisdictions are vulnerable to some kind of invasive species threat.

The spread of pathogens is not a commonly considered an invasive species threat, but there is one pathogen that is raising concerns for the citizens of Franklin County and that is Lyme Disease. Detection and awareness programs are still being developed, but the accurate number of actual cases is believed to be a factor of 10 times more than what is being reported. Until a more accurate detection program can be put in place, it will be hard to implement prevention programs that will be effective to control the spread of this pathogen. The exponential rise in Lyme Disease cases in Franklin County will eventually start to impact the economy by burdening health and medical resources. This will especially be true for those patients that have not been properly diagnosed, but are impacted by the chronic and debilitating symptoms. Add to that the costs of missed work or increased cases of medical disability and you can start to realize the scope of the impact this hazard can bring to the county.

The invasive species on the Pennsylvania Department of Agriculture's list of most significant threats are the ones that attack crops and trees. As a result, the most vulnerable jurisdictions are those with the Commonwealth's highest concentration of agricultural production, as well as the highest concentration of the timber and logging industry. In Pennsylvania, losses will depend from jurisdiction to jurisdiction depending on the aggressiveness of the invasive species of concern. Jurisdictional losses due to invasive species threats stem from three sources: lost revenue from diseased, damaged, or deceased crops, livestock, lumber, etc.; economic losses from the cost of eradication programs; and losses in the form of illness or death of humans. The total value of Pennsylvania's agricultural products is nearly $6 billion. An invasive species that affects agricultural products and production can cause significant losses to the Commonwealth's economy.

According to the 2011 County Business Patterns data collected for Pennsylvania, the agriculture, forestry, fishing, and hunting industry boasts an annual payroll of nearly $86 million across the nearly 500 establishments in Pennsylvania. Franklin County ranks number 4 in the state in total agricultural cash receipts (market value of all agricultural products = $413,806,000). Additionally, statewide, Franklin County ranks number 2 in the production of milk, cattle, melons, and corn for silage and number 3 for fruit and berry production. See **Figure 2.1.8, Section 2,** for a map of Franklin County's Agricultural resources and land breakdown.

Based on all the information available, every community in Franklin County is equally vulnerable to the direct impacts of Invasive Species.

Figure 3.1.10.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Invasive Species hazard. One can see that 10 of 22 municipalities rated this threat as either a Major or Moderate event. This is a Minor threat ranked number 14 overall for Franklin County.

Invasive Species
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	3	20%	1	10%	4	10%	2.3	10.12%	0.2328
Chambersburg Borough	4	30%	1	30%	4	20%	1	10%	4	10%	2.8	14.05%	0.3934
Fannett Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.59%	0.0207
Greencastle Borough	1	30%	2	30%	4	20%	4	10%	4	10%	2.5	2.73%	0.0683
Greene Township	1	30%	1	30%	3	20%	1	10%	4	10%	1.7	11.82%	0.2009
Guilford Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	9.38%	0.1219
Hamilton Township	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	7.29%	0.1604
Letterkenny Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.58%	0.0205
Lurgan Township	1	30%	1	30%	4	20%	1	10%	4	10%	1.9	1.42%	0.0270
Mercersburg Borough	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	0.97%	0.0213
Metal Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.13%	0.0147
Mont Alto Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.01%	0.0131
Montgomery Township	3	30%	1	30%	4	20%	1	10%	4	10%	2.5	3.68%	0.0920
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	2.86%	0.0458
Quincy Township	2	30%	1	30%	3	20%	4	10%	4	10%	2.3	3.41%	0.0784
Shippensburg Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	0.75%	0.0098
Southampton Township	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	5.49%	0.0824
St Thomas Township	3	30%	2	30%	3	20%	2	10%	4	10%	2.7	3.79%	0.1023
Warren Township	2	30%	1	30%	3	20%	3	10%	4	10%	2.2	0.21%	0.0046
Washington Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	9.55%	0.1242
Waynesboro Borough	2	30%	1	30%	4	20%	1	10%	4	10%	2.2	7.02%	0.1544
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.991

Figure 3.1.10.5.1: Municipal Invasive Species Threat Vulnerability Self-Assessment

There is a wide range of environmental impacts caused by invasive species. The aggressive nature of many invasive species can cause significant reductions in biodiversity by crowding out native species. This can affect the health of individual host organisms as well as the overall well-being of the effected ecosystem. Beyond causing human, animal, and plant harm, there are secondary impacts of invasive species that go beyond harm to host species and ecosystems, particular in the case of invasive species that attack forests. Pennsylvania's forests prevent soil degradation and erosion, protect watersheds, stabilize slopes, and absorb carbon dioxide emissions. The key role of forests in the hydrologic system means that if forest land is wiped out, the effects of erosion and flooding will be amplified. There is also an impact on agricultural harvests like honey, potatoes, and stone fruits. As a county with strong agricultural population, invasive species remain a hazard for Franklin County's economic livelihood.

3.1.11. Landslide

A landslide is described in the Commonwealth of Pennsylvania 2013 Standard All-Hazard Mitigation Plan[83] as the downward and outward movement of slope-forming soil, rock, and vegetation reacting to the force of gravity. There are several different types of landslides[84], including:

- **Rock Fall** - Abrupt downward movements of rock or earth, or both, that detach from steep slopes or cliffs. The falling material usually strikes the lower slope at angles less than the angle of fall, causing bouncing. The falling mass may break on impact, may begin rolling on steeper slopes, and may continue until the terrain flattens.

- **Rock Topple** - The forward rotation out of a slope of a mass of soil or rock around a point or axis below the center of gravity of the displaced mass. Toppling is sometimes driven by gravity exerted by the weight of material upslope from the displaced mass. Sometimes toppling is due to water or ice in cracks in the mass. Topples can consist of rock, debris (coarse material), or earth materials (fine-grained material). Topples can be complex and composite.

- **Rotational Landslide** - A landslide on which the surface of rupture is curved upward (spoon-shaped) and the slide movement is more or less rotational about an axis that is parallel to the contour of the slope. The displaced mass may, under certain circumstances, move as a relatively coherent mass along the rupture surface with little internal deformation. The head of the displaced material may move almost vertically downward, and the upper surface of the displaced material may tilt backwards toward the scarp. If the slide is rotational and has several parallel curved planes of movement, it is called a slump.

- **Translational Landslide** - The mass in a translational landslide moves out, or down and outward, along a relatively planar surface with little rotational movement or backward tilting. This type of slide may progress over considerable distances if the surface of

[83] PEMA, 2013
[84] Highland, L. M., and Bobrowsky, 2008

rupture is sufficiently inclined, in contrast to rotational slides, which tend to restore the slide equilibrium. The material in the slide may range from loose, unconsolidated soils to extensive slabs of rock, or both. Translational slides commonly fail along geologic discontinuities such as faults, joints, bedding surfaces, or the contact between rock and soil. In northern environments the slide may also move along the permafrost layer.

- **Lateral Spread** - Lateral spreads usually occur on very gentle slopes or essentially flat terrain, especially where a stronger upper layer of rock or soil undergoes extension and moves above an underlying softer, weaker layer. Such failures commonly are accompanied by some general subsidence into the weaker underlying unit. In rock spreads, solid ground extends and fractures, pulling away slowly from stable ground and moving over the weaker layer without necessarily forming a recognizable surface of rupture. The softer, weaker unit may, under certain conditions, squeeze upward into fractures that divide the extending layer into blocks. In earth spreads, the upper stable layer extends along a weaker underlying unit that has flowed following liquefaction or plastic deformation. If the weaker unit is relatively thick, the overriding fractured blocks may subside into it, translate, rotate, disintegrate, liquefy, or even flow.

- **Debris Flow** - A form of rapid mass movement in which loose soil, rock, and sometimes organic matter combine with water to form a slurry that flows down slope. They have been informally and inappropriately called "mudslides" due to the large quantity of fine material that may be present in the flow. Occasionally, as a rotational or translational slide gains velocity and the internal mass loses cohesion or gains water, it may evolve into a debris flow. Dry flows can sometimes occur in cohesionless sand (sand flows). Debris flows can be deadly as they can be extremely rapid and may occur without any warning.

Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes through construction or erosion, earthquakes, and changes in groundwater levels. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides, and areas recently burned by forest and brush fires[85]. Human activities that contribute to slope failure include altering the natural slope gradient, increasing soil water content, and removing vegetation cover.

3.1.11.1. Location and Extent

According to the 2013 PA HMP, landslides have occurred in many parts of Pennsylvania but are most abundant and troublesome in much of the western and north-central portions of the state[86]. Rock falls and other slope failures can occur in areas of Franklin County with moderate to steep slopes. Areas experiencing erosion, decline in vegetation cover, and earthquakes are also susceptible to landslides. **Figure 3.1.11.1** shows areas of low, moderate, and high landslide susceptibility as identified by PA DCNR[87].

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[85] Delano, H. L., and Wilshusen, 2001
[86] PEMA, 2013
[87] Delano, H. L., and Wilshusen, 2001

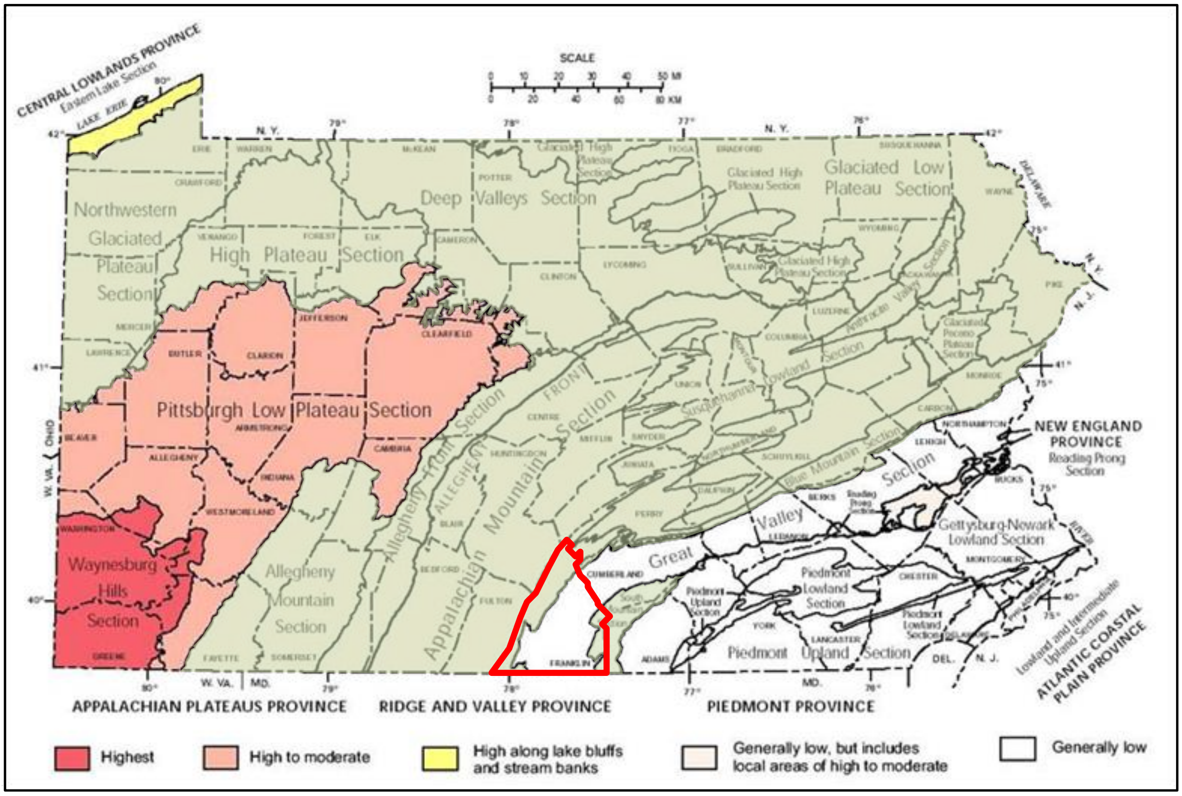

Figure 3.1.11.1: Landslide Susceptibility in Pennsylvania (highlight added)

The particular areas of Franklin County that are susceptible to Landslides are depicted in tan/yellow on **Figure 3.1.11.2** below. As you can see all of Fannett, Metal, and Warren Townships are included as well as parts of Letterkenny, Lurgan, Hamilton, St Thomas, Peters, Montgomery, Southampton, Greene, Guilford, Quincy, and Washington Townships. The risk of Landslides in Franklin County is generally low, but does include areas of high to moderate risk based on the local geology.

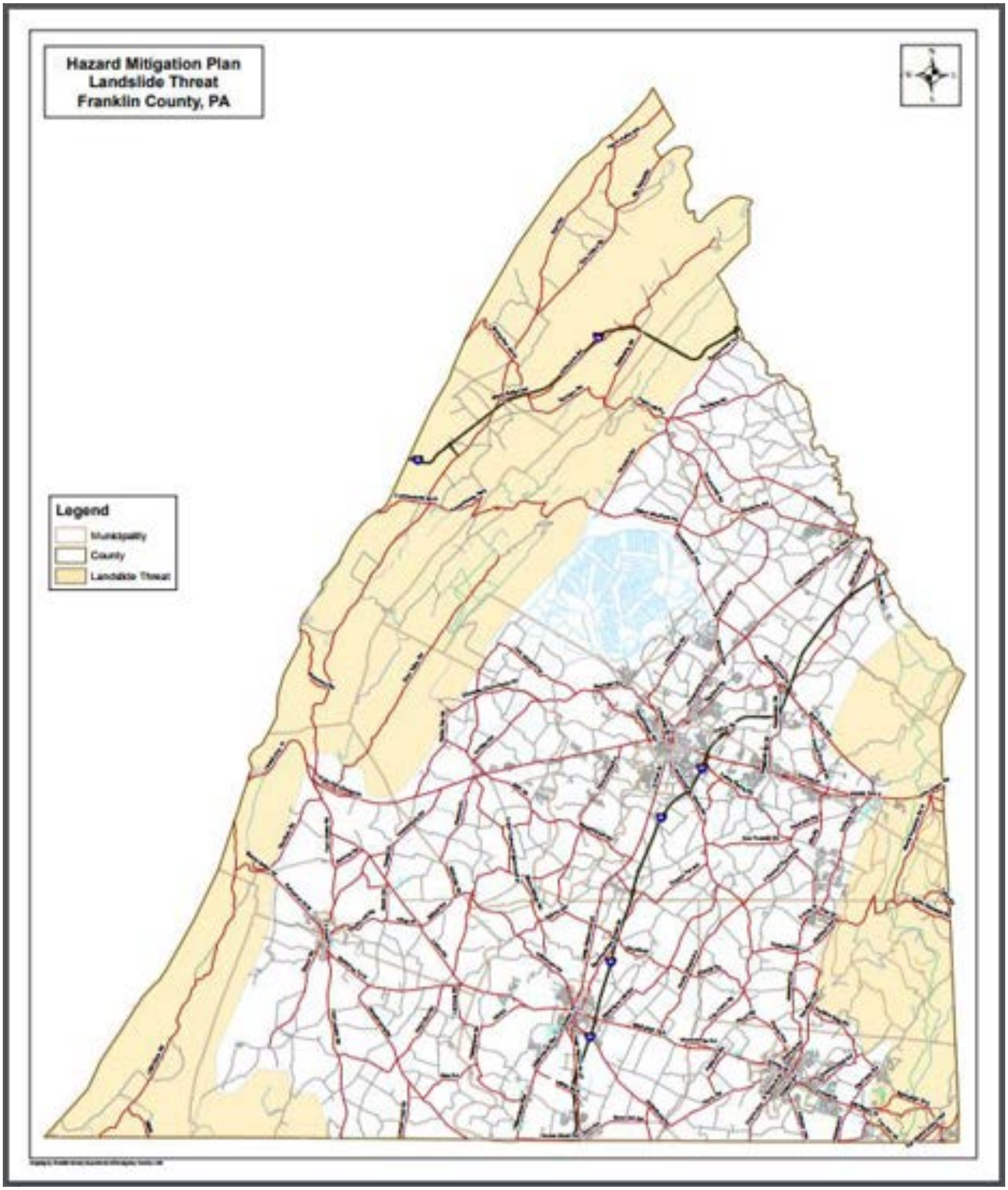

Figure 3.1.11.2: Areas of Landslide Susceptibility of Franklin County

3.1.11.2. Range of Magnitude

Landslides affect manmade structures whether they are directly on or near a landslide. Residential dwellings built on unstable slopes may experience partial damage to complete destruction as landslides destabilize or destroy foundations, walls, surrounding property, and above-ground and underground utilities. Landslides can affect residential areas either on a large regional basis (in which many dwellings are affected) or on an individual site basis (where only one structure or part of a structure is affected). Also, landslide damage to one individual property's lifelines (such as trunk sewer, water, or electrical lines and common-use roads) can affect the lifelines and access routes of other surrounding properties. Commercial structures are affected by landslides in much the same way residential structures are affected. In such a case, consequences may be great if the commercial structure is a common-use structure, such as a food market, which may experience an interruption in business due to landslide damage to the actual structure and/or damage to its access roadways[88].

Fortunately, deaths and injuries caused by landslides are rare in Pennsylvania, and most landslides in the State are moderate to slow moving, damaging things 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 the only other type of landslide likely to cause death and injuries[89]. As residential and recreational development increases on and near steep mountain slopes, the hazards from these events will also increase.

3.1.11.3. Past Occurrence

Pennsylvania has a long history of significant landslide activity, most of which is in the western and north central part of the state. This has resulted from a combination of humid temperature climate, locally steep and rugged topography, and great diversity in the erosion and weathering characteristics of relatively near surface sedimentary rocks. Human activities such as commercial, industrial, and residential developments, transportation, and mining often compound landslide problems.

A comprehensive inventory of landslide events across the entire Commonwealth is not available, and the USGS does not maintain a formal inventory of landslides. Instead, the USGS Landslide Hazards Program collects data as events are reported to the agency.

There has been no significant reporting of landslides within Franklin County within the past 40 years. We have experienced several small rock slides impacting mountain roads, but nothing with any significant damage to life or property.

3.1.11.4. Future Occurrence

Mismanaged intense development in steeply sloped areas could increase the frequency of landslides in Franklin County. Building and road construction are contributing factors to landslides, as they can often undermine or steepen otherwise stable soil.

Increased deforestation and soil disturbances caused by development on sloped areas would further increase these risks. As timbering and development of sloped land continue, the risks of significant landslides increase.

[88] Highland, L. M., and Bobrowsky, 2008
[89] PEMA, 2013

3.1.11.5. Vulnerability Assessment

Communities in Franklin County have not been historically highly vulnerable to landslides. However, transportation roads flanked by high terrain and buildings constructed at the top or bottom of steep slopes should be considered vulnerable to this hazard. **Figure 3.1.11.5.1** below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Landslide hazard.

Landslide
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	1	30%	2	30%	1	20%	4	10%	1	10%	1.6	10.12%	0.1619
Chambersburg Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	14.05%	0.1827
Fannett Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.59%	0.0159
Greencastle Borough	1	30%	2	30%	2	20%	4	10%	1	10%	1.8	2.73%	0.0491
Greene Township	1	30%	1	30%	1	20%	2	10%	1	10%	1.1	11.82%	0.1300
Guilford Township	1	30%	2	30%	1	20%	4	10%	1	10%	1.6	9.38%	0.1501
Hamilton Township	1	30%	1	30%	2	20%	4	10%	1	10%	1.5	7.29%	0.1094
Letterkenny Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	1.58%	0.0205
Lurgan Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	1.42%	0.0185
Mercersburg Borough	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	0.97%	0.0097
Metal Township	1	30%	2	30%	1	20%	4	10%	1	10%	1.6	1.13%	0.0181
Mont Alto Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	1.01%	0.0131
Montgomery Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	3.68%	0.0662
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	0.14%	0.0017
Peters Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	2.86%	0.0372
Quincy Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	3.41%	0.0443
Shippensburg Borough	1	30%	1	30%	1	20%	2	10%	1	10%	1.1	0.75%	0.0083
Southampton Township	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	5.49%	0.0659
St Thomas Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	3.79%	0.0493
Warren Township	2	30%	2	30%	3	20%	3	10%	1	10%	2.2	0.21%	0.0046
Washington Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	9.55%	0.0955
Waynesboro Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	7.02%	0.0913
Municipal Weighted Average Risk Factor (RF)(*Updated 09/03/2021*)													1.343

Figure 3.1.11.5.1: Municipal Landslide Threat Vulnerability Self-Assessment

From the municipal self-assessment and the population at risk, it is obvious that the threat of this hazard is perceived to be very low for Franklin County. That does not mean that the hazard can be discounted, as Critical Facilities and Infrastructure can be impacted by this threat, raising the level of concern.

Table 3.1.11.5.1 illustrates the number of vulnerable critical structures and facilities by jurisdiction in Franklin County located in the "generally low to local areas of high to moderate" landslide susceptibility areas.

Municipality	Total Number of Critical Facilities	Critical Facilities in Risk Areas
Antrim Township	75	0
Chambersburg Borough	97	0
Fannett Township	27	25
Greencastle Borough	24	0
Greene Township	100	12
Guilford Township	85	5
Hamilton Township	47	1
Letterkenny Township	20	3
Lurgan Township	21	7
Mercersburg Borough	10	0
Metal Township	15	14
Mont Alto Borough	6	2
Montgomery Township	12	2
Orrstown Borough	1	0
Peters Township	22	7
Quincy Township	48	16
Shippensburg Borough	5	0
Southampton Township	30	3
St Thomas Township	20	0
Warren Township	2	2
Washington Township	46	16
Waynesboro Borough	45	0
Totals	**758**	**115**

Table 3.1.11.5.1: Critical Facilities within Landslide Local High/Moderate Risk Areas

There are several critical facilities that fall into the Landslide threat areas of Franklin County. Impact to any one of these facilities could result in significant loss for those communities.

However, based on available historical data and the municipal threat assessments (See **Figure 3.1.11.5.1**), the future occurrence of landslides can be considered ***unlikely*** as defined by the Risk Factor Methodology criteria (See **Section 1.2**).

3.1.12. Lightning Strike

A lightning flash is the result of a transfer of significant charge between two charged objects. Lightning discharges can occur inter-cloud, cloud-to-cloud, cloud-to-air and cloud-to-ground (see **Figure 3.1.12.1** below). Generally, cloud-to-ground (CG) lightning has the greatest immediate impact on our lives. A CG stroke can kill, destroy equipment, start fires, and disturb power delivery systems.

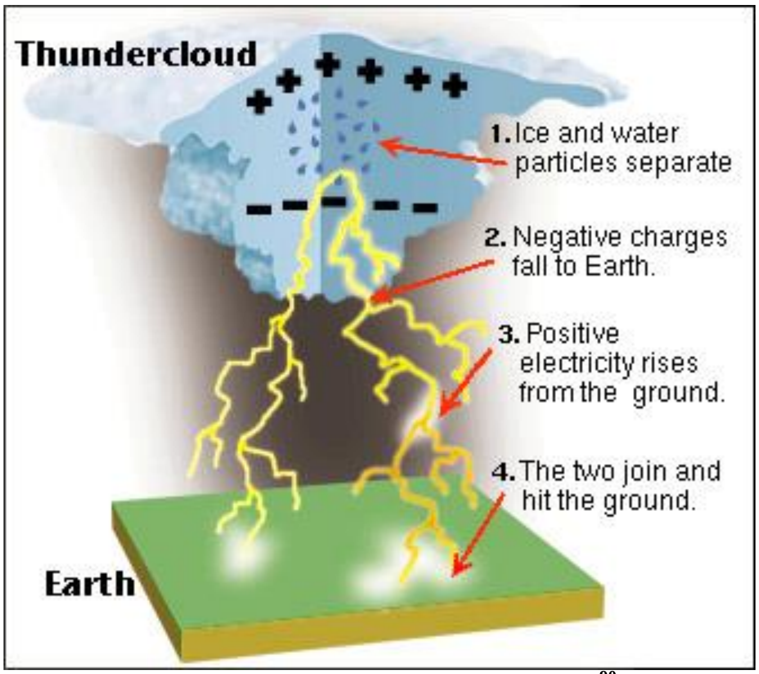

Figure 3.1.12.1: Formation of Lightning[90]

3.1.12.1. Location and Extent

Each year in the United States more than 400 people are struck by lightning. On average, between 55 and 60 people are killed and hundreds of others suffer permanent neurological disabilities[91]. Lightning can occur with all thunderstorms making all of Franklin County susceptible. Different geographic areas experience varying event frequencies, but in all cases lightning strikes and associated fatalities occur primarily during the Summer months (April through September). While the impact of lightning events is highly localized, strong storms can result in numerous widespread events over a broad area.

[90] Buthaina/Wikspaces.com
[91] NOAA/NWS

3.1.12.2. Range of Magnitude

Because lightning damage is largely unreported, statistics vary considerably. However, information gathered by the Weather Channel indicates that Pennsylvania is ranked in the top ten states for lightning related deaths[92] (See **Figure 3.1.12.2.1** below).

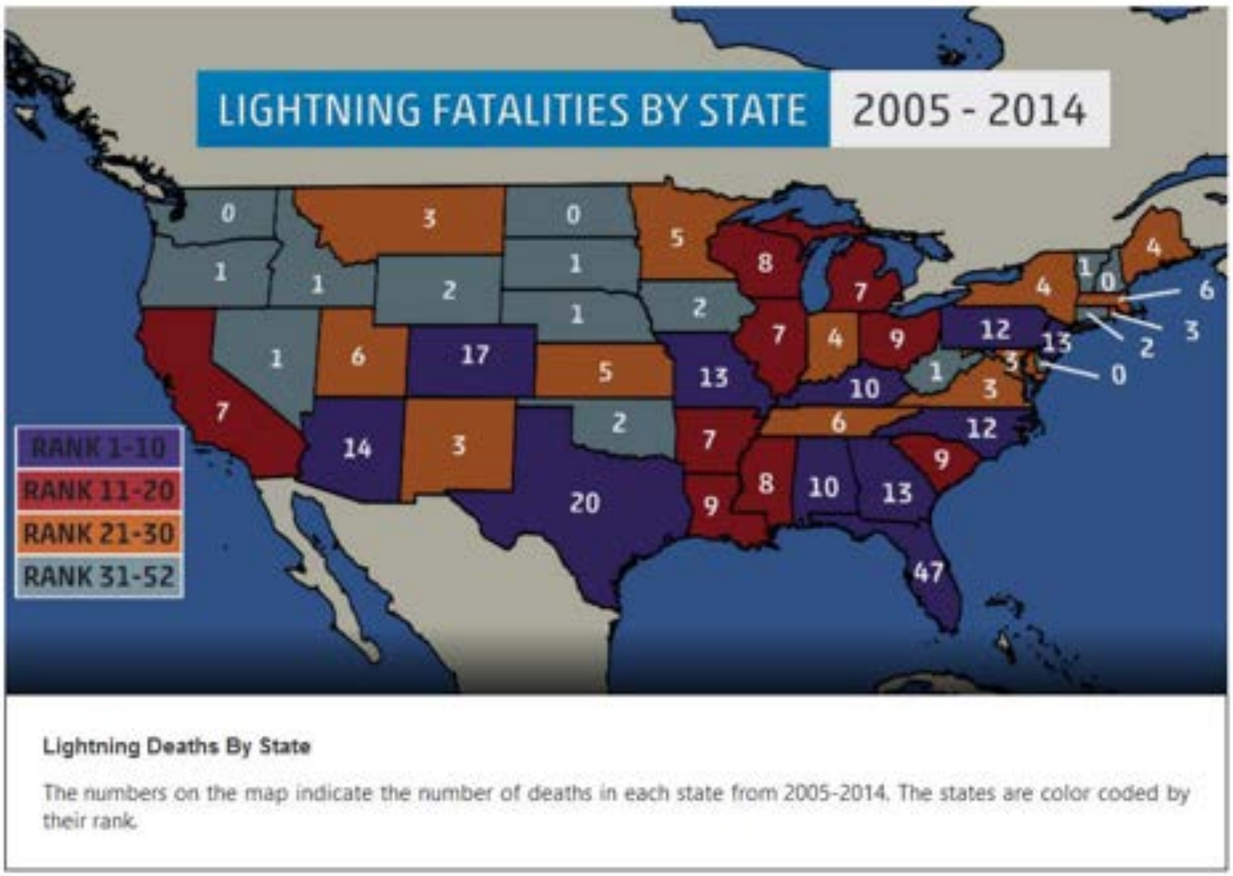

Figure 3.1.12.2.1: Lightning Deaths in the U.S. (2005-2014)

3.1.12.3. Past Occurrence

A search of the National Centers for Environmental Information's (NCEI) Storm Events Database returned no recorded lightning strike events for Franklin County between 1993 and 2017. This does not indicate that lightning has not occurred in our county in that time period, just that there has been no reported damage or fatalities in our county. Therefore, to get a better idea of how often lightning strikes occur in the county, a sampling of data from NOAA's National Environmental Satellite, Data, and Information (ESDI) Service was performed. See **Figure 3.1.12.3.1** below for a data sample.

[92] The Weather Channel, 2015

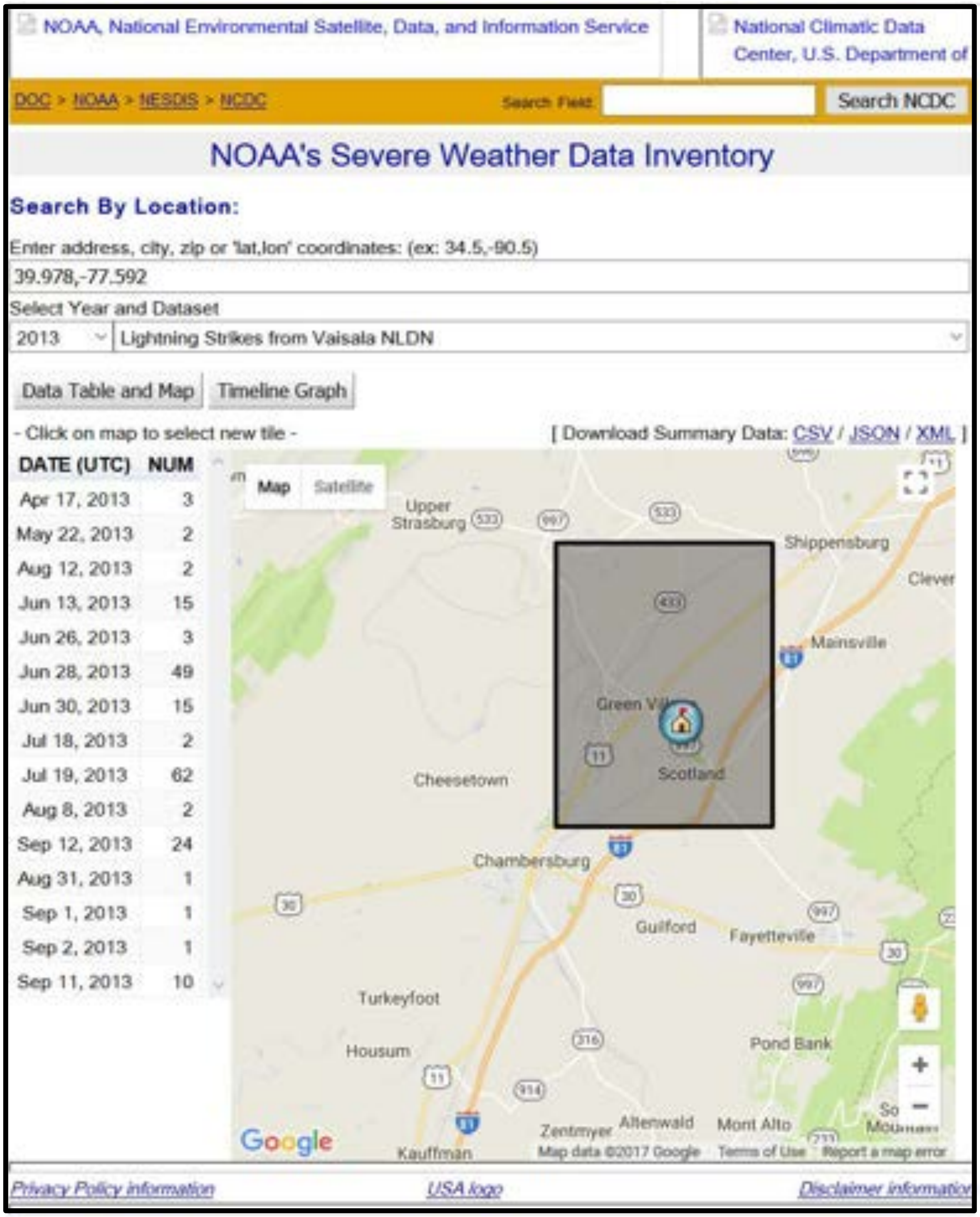

Figure 3.1.12.3.1: Sample Data from NOAA, National Environmental Satellite Data, and Information (ESDI) Service

This data set is extremely large. In order to get a sense of the number of lightning occurrences in our county, we only sampled a relatively small portion of the county from the ESDI data. **Figure 3.1.12.3.2** below illustrates the quadrants sampled.

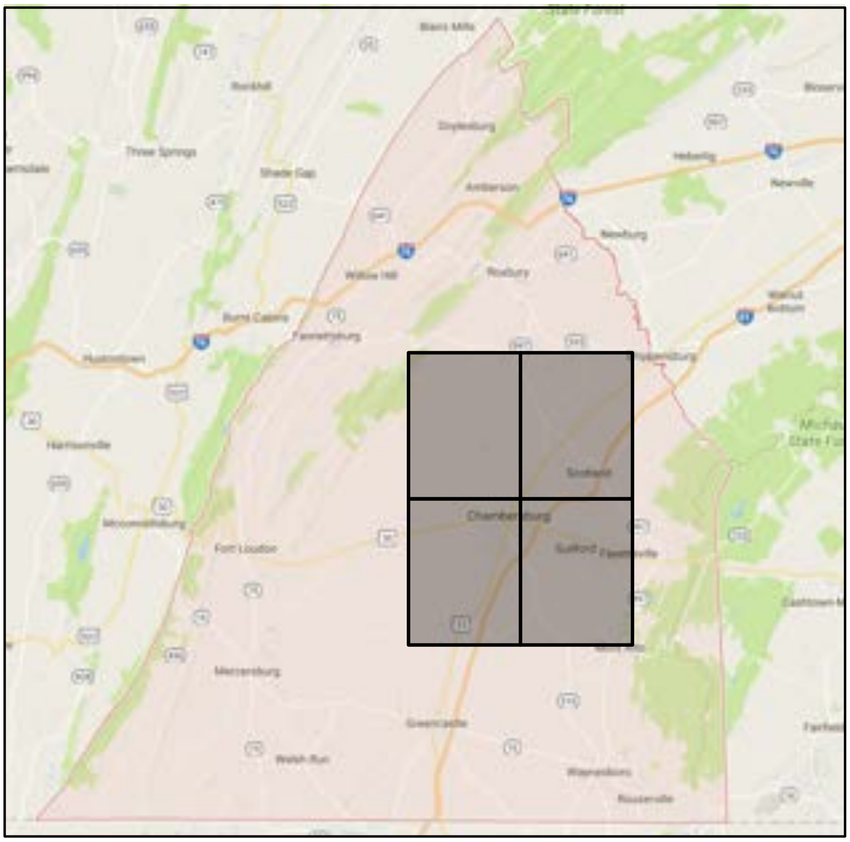

Figure 3.1.12.3.2: Sample Set of ESDI Data for Franklin County

The data was collected for 2007 to 2017 from the 4 shaded quadrants in **Figure 3.1.12.3.2**. The data was not easily extracted from the ESDI database, which is why we selected the smaller data set to give us a representative example of the lightning threat in Franklin County. **Table 3.1.12.3.1** below reflects the total number of lightning strikes observed via satellite per month for the sampled area.

Month	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	0	1	0	0	0	0	0	0	0	0	0
February	2	1	1	0	8	0	0	0	0	7	2
March	14	0	2	0	4	35	0	0	0	0	14
April	34	374	0	13	35	9	5	14	48	0	34
May	7	13	81	102	360	152	29	139	28	0	7
June	96	155	268	235	119	53	219	109	291	57	96
July	79	163	293	127	70	495	480	402	155	193	79
August	429	292	78	137	60	190	11	65	31	291	429
September	49	63	4	36	588	78	141	30	37	17	49
October	0	0	0	11	1	8	0	6	30	4	0
November	0	0	0	10	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0
Annual Totals	**710**	**1062**	**727**	**671**	**1245**	**1020**	**885**	**765**	**620**	**569**	**710**

Table 3.1.12.3.1: Lightning Strikes in the Franklin County Sample Area (2007-2017)

It is easily seen from the data above that Franklin County gets an abundant amount of lightning strikes per year. It is also clear that the heavy threat months are April through September, the Summer months.

3.1.12.4. Future Occurrence

Lightning can be expected with any severe storm event. While injuries or fatalities have not been documented in Franklin County, it is still a very real threat to our communities. The future occurrence of lightning strikes can be considered ***likely*** as defined by the Risk Factor Methodology Probability criteria (**Section 1.2**).

3.1.12.5. Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable to the identified hazard area. For Lightning Strike events, all of Franklin County has been identified as the hazard area. Therefore, all critical facilities, population, and infrastructure as outlined in **Section 2, Tables 2.4.5 and 2.4.6** are vulnerable.

Figure 3.1.12.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Lightning Strike hazard. One can see that 5 of 22 municipalities rated this threat as either a Catastrophic or Major event. Additionally, 9 of the remaining 17 municipalities rated this as a Moderate threat. This was ranked as the number 8 threat in Franklin County and is considered a Moderate threat.

Lightning Strike
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	3	30%	2	30%	2	20%	4	10%	1	10%	2.4	10.12%	0.2429
Chambersburg Borough	4	30%	1	30%	1	20%	4	10%	1	10%	2.2	14.05%	0.3091
Fannett Township	2	30%	2	30%	4	20%	4	10%	1	10%	2.5	1.59%	0.0398
Greencastle Borough	3	30%	2	30%	1	20%	4	10%	1	10%	2.2	2.73%	0.0601
Greene Township	4	30%	1	30%	1	20%	4	10%	1	10%	2.2	11.82%	0.2600
Guilford Township	2	30%	1	30%	2	20%	3	10%	1	10%	1.7	9.38%	0.1595
Hamilton Township	2	30%	1	30%	4	20%	4	10%	1	10%	2.2	7.29%	0.1604
Letterkenny Township	3	30%	1	30%	3	20%	4	10%	1	10%	2.3	1.58%	0.0363
Lurgan Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	1.42%	0.0227
Mercersburg Borough	3	30%	1	30%	4	20%	4	10%	1	10%	2.5	0.97%	0.0243
Metal Township	2	30%	2	30%	2	20%	2	10%	1	10%	1.9	1.13%	0.0215
Mont Alto Borough	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	1.01%	0.0162
Montgomery Township	4	30%	2	30%	4	20%	4	10%	1	10%	3.1	3.68%	0.1141
Orrstown Borough	2	30%	1	30%	1	20%	3	10%	1	10%	1.5	0.14%	0.0021
Peters Township	2	30%	1	30%	1	20%	2	10%	1	10%	1.4	2.86%	0.0400
Quincy Township	3	30%	2	30%	1	20%	4	10%	1	10%	2.2	3.41%	0.0750
Shippensburg Borough	2	30%	1	30%	1	20%	2	10%	1	10%	1.4	0.75%	0.0105
Southampton Township	3	30%	2	30%	3	20%	4	10%	1	10%	2.6	5.49%	0.1427
St Thomas Township	4	30%	1	30%	1	20%	4	10%	1	10%	2.2	3.79%	0.0834
Warren Township	2	30%	2	30%	3	20%	4	10%	1	10%	2.3	0.21%	0.0048
Washington Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	9.55%	0.1719
Waynesboro Borough	3	30%	2	30%	4	20%	4	10%	1	10%	2.8	7.02%	0.1966
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.194

Figure 3.1.12.5.1: Municipal Lightning Strike Threat Vulnerability Self-Assessment

Even though there is little to no historical data on casualties or damage due to Lightning Strike events in Franklin County, the sheer number of lightning strikes recorded in the ESDI data indicates that it is only a matter of time before one of these events results in fatalities and/or critical facility damage.

3.1.13. Mass Food and Animal Feed Contamination

Mass food or animal feed contamination hazards occur when food or food sources are contaminated with pathogenic bacteria, viruses, or parasites, as well as chemical or natural toxins. They may lead to food borne illnesses and/or interruptions in the food supply. Contamination may occur due to natural food borne illnesses and chemical, biological, radiological, or nuclear exposure.

Also according to the CDC, some pathogens are frequently transmitted by food contaminated by infected persons. The presence of any one of the following signs or symptoms in persons who handle food may indicate infection by a pathogen that could be transmitted to others through handling the food supply:

- diarrhea
- vomiting
- open skin sores
- boils
- fever
- dark urine
- jaundice

The failure of food-handlers to wash hands in certain situations (such as after using the toilet, handling raw meat, cleaning spills, or carrying garbage), wear clean disposable gloves, or use clean utensils is responsible for the food borne transmission of these pathogens. Non-food borne routes of transmission, such as from one person to another, are also major contributors in the spread of these pathogens. Some pathogens usually cause disease when food is intrinsically contaminated or cross contaminated during production, processing or transportation, but may also be contaminated when prepared by infected persons. Bacterial pathogens in this category often cause disease after bacteria have multiplied in food after it has been kept at improper temperatures permitting their multiplication to an infectious dose. Preventing food contact by persons who have an acute diarrheal illness will decrease the risk of transmitting these pathogens. The following list represents the types of pathogens that may be transmitted by an infected food handler:

- Astroviruses
- Bacillus cereus
- Campylobacter jejuni
- Clostridium perfringens
- Cryptosporidium species
- Entamoeba histolytica
- Enterohemorrhagic E coli

- Enterotoxigenic E coli
- Giardia intestinalis
- Hepatitis A virus
- Nontyphoidal Salmonella
- Noroviruses
- Rotaviruses
- Salmonella Typhi
- Sapoviruses
- Shigella species
- Staphylococcus aureus
- Streptococcus pyogenes
- Taenia solium - cysticercosis
- Vibrio cholera
- Yersinia enterocolitica

The FDA Food Safety Modernization Act (FSMA) final rule is aimed at preventing intentional adulteration from acts intended to cause wide-scale harm to public health, including acts of terrorism targeting the food supply. Such acts, while not likely to occur, could cause illness, death, economic disruption of the food supply absent mitigation strategies. Acts of intentional adulteration may take many forms, including acts of disgruntled employees or economically motivated adulteration. The goal of this rule is to prevent acts intended to cause wide-scale harm. Economic adulteration is addressed in the final preventive controls rules for human and animal foods[93].

Animal feed, pet food, and specialty pet food are all considered Commercial Feed under the Pennsylvania Commercial Feed Act, and are regulated through the inspection of Pennsylvania manufacturing and distribution (retail and wholesale) establishments for compliance with labeling, licensing and Current Good Manufacturing Practices (CGMPs). Samples of animal feed are collected and analyzed to ensure feed is not adulterated and meets label guarantees.

3.1.13.1. Location and Extent

Contamination occurrences can happen at any time and in any place in Pennsylvania and are sometimes regional or even national events. Franklin County ranks number 4 in the state in total agricultural cash receipts (market value of all agricultural products = $413,806,000). Additionally, statewide Franklin County ranks number 2 in the production of milk, cattle, melons, and corn for silage and number 3 for fruit and berry production. Because of our high agriculture production, an incident of contamination must be considered. **Figure 2.1.8, Section 2,** shows a map of Franklin County's Agricultural Resources and land breakdown. **Figure 3.1.13.1.1** illustrates the diversity of livestock and **Figure 3.1.13.1.2** shows the value of livestock and food production of Franklin County that would be impacted by a mass food contamination scenario.

[93] USDHHS/FDA, 2017

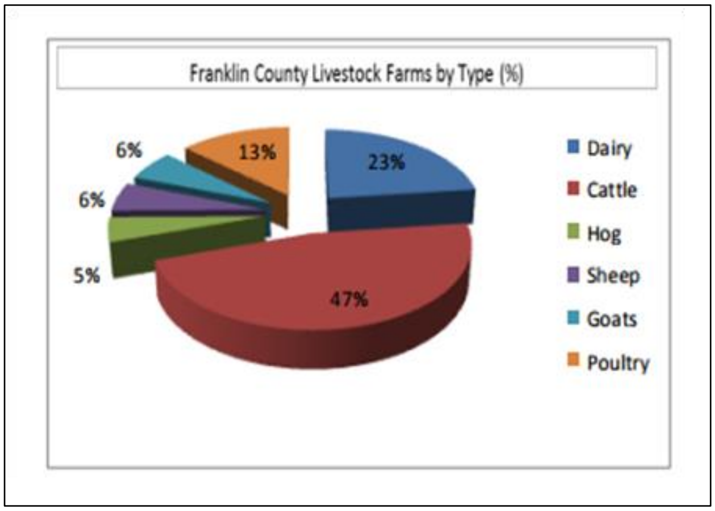

Figure 3.1.13.1.1: Diversity of Livestock in Franklin County (2012)

Franklin County Farm Commodity Values

Milk Cows and Production:	$ 159,263,000
Cattle and Calves:	$ 29,530,000
Apples and Peaches:	$ 8,918,360
Corn for Silage:	$ 17,579,100
Barley:	$ 1,212,780
Corn for Grain:	$ 17,521,800
Hay (all types):	$ 24,037,800
Layers and Eggs:	$ 52,564,000
Total - Cash Receipts	$ 304,450,000

Figure 3.1.13.1.2: Monetary Value of Livestock and Food Production in Franklin County (2012)

In addition, a major concern of mass food and animal feed contamination hazards is that, in general, places only have a 3-day supply of food. The food supply chain is very vulnerable to interruption, whether or not the product comes from Pennsylvania. An interruption in the food supply would be a major vulnerability for the health and survival of Pennsylvania communities.

3.1.13.2. Range of Magnitude

Like Invasive Species (**Section 3.1.10**), mass food and animal feed contamination hazards can vastly vary based on the type of contamination, the method of contamination, and the origin of contamination. Different pathogens and chemicals that can contaminate human food and animal feed have varying degrees of aggressiveness that can range from an upset stomach to serious illness, hospitalization, and even death. For example, according to the CDC's 2011 food borne illness estimates, Norovirus is responsible for over 5 million illnesses each year but the number of deaths it causes is significantly lower (149 in 2011). A possible worst case scenario would be if there was large-scale campylobacter or salmonella outbreak found in Pennsylvania's poultry farms. An event like this would cause human suffering but would also have a crippling effect on the state's poultry production and farm-based economy.

According to the most recent census for Franklin County conducted by the USDA, **Table 3.1.13.2.1** shows the market values for crops and livestock sold in Franklin County[94].

Ranked items among the 67 state counties and 3,079 U.S. counties, 2012

Item	Quantity	State Rank
MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD ($1,000)		
Total value of agricultural products sold	413,806	4
Value of crops including nursery and greenhouse	89,217	6
Value of livestock, poultry, and their products	324,589	2
VALUE OF SALES BY COMMODITY GROUP ($1,000)		
Grains, oilseeds, dry beans, and dry peas	55,816	4
Tobacco	-	-
Cotton and cottonseed	-	-
Vegetables, melons, potatoes, and sweet potatoes	7,627	2
Fruits, tree nuts, and berries	9,418	3
Nursery, greenhouse, floriculture, and sod	2,627	29
Cut Christmas trees and short rotation woody crops	241	18
Other crops and hay	13,487	2
Poultry and eggs	71,114	5
Cattle and calves	47,670	2
Milk from cows	177,871	2
Hogs and pigs	25,362	4
Sheep, goats, wool, mohair, and milk	500	8
Horses, ponies, mules, burros, and donkeys	(D)	(D)
Aquaculture	(D)	10
Other animals and other animal products	904	10
TOP CROP ITEMS (acres)		
Forage-land used for all hay and haylage, grass silage, and greenchop	68,366	3
Corn for grain	42,378	4
Corn for silage	38,373	2
Soybeans for beans	21,101	5
Wheat for grain, all	9,632	4
TOP LIVESTOCK INVENTORY ITEMS (number)		
Layers	1,879,710	4
Broilers and other meat-type chickens	446,062	13
Pullets for laying flock replacement	440,941	4
Turkeys	331,081	3
Cattle and calves	126,421	2

Table 3.1.13.2.1: Total Agricultural Economic Value for Franklin County (2012)

3.1.13.3. Past Occurrence

According to representatives from the Department of Agriculture, mass food and animal feed contamination events are difficult to capture as they occur because of the lapse in time between infection and manifestation of an illness. Usually, they are isolated events. However, in recent years, Pennsylvania has been involved in the following outbreak events:

[94] USDA, 2012

- 2013 - Live Poultry-Salmonella
- 2013 - Ground Beef-Salmonella
- 2012 - Live Poultry-Salmonella
- 2012 - Dry Dog Food-Salmonella
- 2012 - Raw Clover Sprouts at Jimmy John's Restaurants-E. coli
- 2011 - Kosher Broiled Chicken Livers-Salmonella
- 2011 - Turkish Pine Nuts-Salmonella 471 Pennsylvania
- 2011 - Ground Turkey-Salmonella
- 2011 – Papaya-Salmonella
- 2011 - Lebanon Bologna-E. coli
- 2010 - Alfalfa Sprouts-Salmonella
- 2010 - Romaine Lettuce-E. coli

This is not an exhaustive list of past occurrences but illustrates that Pennsylvanians have been sickened by contaminations in other states.

Since 2006, Pennsylvania has had at least 7 disease outbreaks linked to raw milk consumption, involving almost 200 persons. The outbreaks have been caused most commonly by campylobacter bacteria, with the remainder caused by salmonella.

In 2012, the largest food borne outbreak related to raw milk in the state occurred in Franklin County. The Pennsylvania Department of Health confirmed 78 cases of campylobacter bacteria were connected to unpasteurized milk sold in mid-January. Of the cases, 68 people were sickened in Pennsylvania, 5 in Maryland, 2 in New Jersey and 3 in West Virginia. At least 9 people were hospitalized[95].

3.1.13.4. Future Occurrence

The CDC estimates that 1 in 6 people gets sick from contaminated food each year, but those events are expected to be individualized and small in scope. The focus of this as a hazard is on large-scale contamination and illness. With the aggressive testing and food safety outreach the Department of Agriculture conducts, the overall probability of a mass food or animal feed contamination event is considered ***possible*** as defined in **Section 1.2**.

Food safety depends on strong partnerships. The CDC, the U.S. Food and Drug Administration (FDA), and USDA's Food Safety and Inspection Service collaborate at the federal level to promote food safety. State and local health departments and food industries also play critical roles in all aspects of food safety. CDC provides the vital link between illness in people and the food safety systems of government agencies and food producers. The CDC takes action by:

- Tracking the occurrence of food borne illnesses.
- Managing the DNA fingerprinting network (PulseNet) for food borne illness-causing bacteria in all states to detect outbreaks.
- Facilitating and leading outbreak investigations.

[95] Gleiter, Sue, 2012

- Monitoring antibiotic-resistant infections.
- Collaborating with state and local health departments to develop new and better methods to detect, investigate, respond to, and control outbreaks.
- Defining the public health burden of food borne illness.
- Attributing illnesses to specific foods and settings.
- Targeting prevention measures to meet food safety goals.
- Providing data and analyses to inform food safety action and policy.

3.1.13.5. Vulnerability Assessment

Communities with large populations of the elderly and the very young are more vulnerable to this kind of an event as they are usually the most susceptible to food borne illnesses. The cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms. The CDC estimates that infections of Salmonella alone create $365 million in direct medical costs annually, some of which would certainly be experienced in Pennsylvania.

The physical plant and facilities of the Commonwealth are not likely to be damaged by a mass food or animal feed contamination event. However, high rates of absenteeism associated with a pandemic or an infectious disease will likely lead to significant economic costs in lost productivity and increased medical costs in nearly all state agencies. Additionally, the 106 agricultural critical facilities would face lost revenues depending on the type and magnitude of the contamination event.

As of November 2017, according to the PA Department of Agriculture, there are 15 licensed animal feed plants in Franklin County.

Figure 3.1.13.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Mass Food and Animal Feed Contamination hazard. One can see that only 2 of 22 municipalities rated this threat as either a Catastrophic or Major event. Additionally, only 3 of the remaining 20 municipalities rated this as a Moderate threat. This was ranked as the number 23 threat in Franklin County and is considered a Minor threat.

Mass Food/Animal Feed Contamination Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	1	30%	2	30%	2	20%	1	10%	2	10%	1.6	10.12%	0.1619
Chambersburg Borough	2	30%	1	30%	1	20%	4	10%	2	10%	1.7	14.05%	0.2389
Fannett Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.59%	0.0175
Greencastle Borough	1	30%	3	30%	1	20%	1	10%	2	10%	1.7	2.73%	0.0464
Greene Township	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	11.82%	0.1537
Guilford Township	1	30%	3	30%	2	20%	1	10%	2	10%	1.9	9.38%	0.1782
Hamilton Township	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	7.29%	0.1166
Letterkenny Township	1	30%	1	30%	2	20%	1	10%	2	10%	1.3	1.58%	0.0205
Lurgan Township	1	30%	1	30%	3	20%	4	10%	2	10%	1.8	1.42%	0.0256
Mercersburg Borough	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	0.97%	0.0107
Metal Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.13%	0.0124
Mont Alto Borough	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	1.01%	0.0162
Montgomery Township	3	30%	3	30%	4	20%	2	10%	2	10%	3.0	3.68%	0.1104
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	0.14%	0.0018
Peters Township	1	30%	1	30%	1	20%	2	10%	2	10%	1.2	2.86%	0.0343
Quincy Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	3.41%	0.0750
Shippensburg Borough	1	30%	1	30%	4	20%	4	10%	2	10%	2.0	0.75%	0.0150
Southampton Township	1	30%	2	30%	1	20%	3	10%	2	10%	1.6	5.49%	0.0878
St Thomas Township	3	30%	2	30%	2	20%	3	10%	2	10%	2.4	3.79%	0.0910
Warren Township	2	30%	3	30%	3	20%	3	10%	2	10%	2.6	0.21%	0.0055
Washington Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	9.55%	0.1051
Waynesboro Borough	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	7.02%	0.0772
Municipal Weighted Average Risk Factor (RF)(*Updated 09/03/2021*)													1.602

Figure 3.1.13.5.1: Municipal Mass Food/Animal Feed Contamination Threat Vulnerability Self-Assessment

The major identified environmental impact of mass food and animal feed contamination is, if there were to be a mass killing of animals, how to deal with the waste disposal of what could be a significant number of animals. If this waste disposal is not planned for, rotting carcasses could cause environmental degradation in the form of water pollution. They might also have a role in spreading infections disease. Additionally, there are primary impacts to public health and to the agricultural economy in Pennsylvania. Should there be a mass food or animal feed contamination event, even if the event is not focused in Pennsylvania, the potential losses from fear-based cancellation of food orders could be devastating. This would also cause a surplus of animals on Pennsylvania farms that agricultural producers cannot feed but also cannot sell.

3.1.14. Nuclear Incident

Nuclear accidents themselves are classified into 3 categories:

- **Criticality accidents:** Involves loss of control of nuclear assemblies or power reactors.

- **Loss-of-coolant accidents:** Occurs whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system.

- **Loss-of-containment accidents:** Involves the release of radioactivity from materials such as tritium, fission products, plutonium, and natural, depleted, or enriched uranium. Points of release have been containment vessels at fixed facilities or damaged packages during transportation accidents.

Nuclear facilities must notify the appropriate authorities in the event of an accident. The Nuclear Regulatory Commission (NRC) uses 4 classification levels for nuclear incidents[96]:

- **Unusual Event:** Under this category, events are in process or have occurred which indicate potential degradation in the level of safety of the plant. No release of radioactive material requiring offsite response or monitoring is expected unless further degradation occurs.

- **Alert:** If an alert is declared, events are in process or have occurred which involve an actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the EPA Protective Action Guides (PAGs).

- **Site Area Emergency:** A site area emergency involves events in process or which have occurred that result in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed the EPA PAGs except near the site boundary.

[96] Nuclear Regulatory Commission

- **<u>General Emergency</u>:** A general emergency involves actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the EPA PAGs for more than the immediate site area.

The accident at the Three Mile Island Generating Station in March 1979 remains the nation's only nuclear incident at the *General Emergency level* and remains the worst nuclear incident on record in the Commonwealth and the nation. During this incident, equipment malfunctions, design-related problems, and worker errors led to a partial meltdown of the TMI Unit 2 reactor core.

3.1.14.1. Location and Extent

Through a Memorandum of Understanding (MOU), the Nuclear Regulatory Commission (NRC) and FEMA share federal oversight for nuclear/radiological emergency response planning matters for licensed nuclear power plants. Their mutual efforts will be directed toward more effective plans and related preparedness measures at and in the vicinity of nuclear reactors and fuel cycle facilities. The MOU between the agencies was signed on January 14, 1980, in response to the president's decision of December 7, 1979, stating that FEMA will coordinate all federal planning for the off-site impact of nuclear/radiological emergencies; take the lead for assessing off-site nuclear/radiological emergency response plans and preparedness; make findings and determinations as to the adequacy and capability of implementing off-site plans; and communicate those findings and determinations to the NRC. The NRC reviews those FEMA findings and determinations, in conjunction with the NRC's on-site findings, to determine the overall state of emergency preparedness.

A separate MOU, dated October 22, 1980, deals with NRC and FEMA cooperation and responsibilities in response to an actual or potential nuclear/radiological emergency. Operations response procedures have been developed that implement the provisions of the Incident Response MOU. These documents are intended to be consistent with the Federal Radiological Emergency Response Plan, which describes the relationships, roles, and responsibilities of federal agencies for responding to accidents involving peacetime nuclear/radiological emergencies.

Portions of Franklin County are within the Ingestion Exposure Pathway Emergency Planning Zone (EPZ) (within 50 miles) of the TMI facility in Dauphin County. The other 4 nuclear plants in Pennsylvania are more than 50 miles away from Franklin County; this distance exceeds the Plume-Exposure and Ingestion Exposure Pathway EPZs for nuclear emergencies, so these other facilities are considered a minimal threat to the county. **Figure 3.1.14.1.1** illustrates the location of the nuclear facilities in the Commonwealth and their associated ingestion areas.

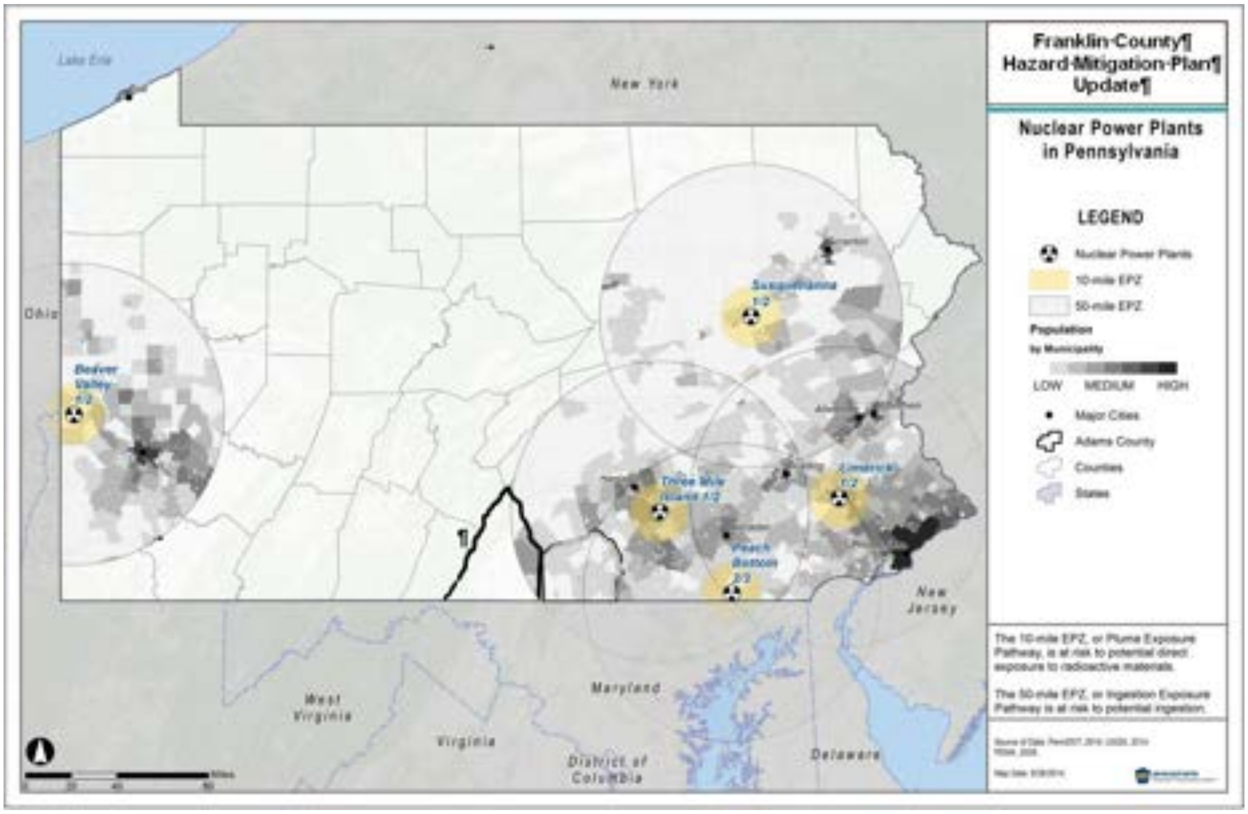

Figure 3.1.14.1.1: Pennsylvania Nuclear Power Plant Locations

The NRC encourages the use of Probabilistic Risk Assessments (PRAs) to estimate quantitatively the potential risk to public health and safety when considering the design, operations, and maintenance practices at nuclear power plants. PRAs typically focus on accidents that can severely damage the core and that may challenge containment. FEMA, PEMA, and county governments have formulated Radiological Emergency Response Plans (RERPs) to prepare for nuclear/radiological emergencies at the 5 nuclear power-generating facilities in the Commonwealth of Pennsylvania. These plans include the following:

- A Plume Exposure Pathway EPZ within a radius of 10 miles from each power plant.
- An Ingestion Exposure Pathway EPZ within a radius of 50 miles from each plant.

Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from the plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation.

The County RERPs, which are part of the County Emergency Operations Plan, also include the following:

- Preventive and emergency protective actions.
- Response levels and associated protective action guides (PAGs) for food.

- Recommended PAGs within an Ingestion Exposure Pathway EPZ.
- Information for farmers to assist in protection of their livestock and crops from radioactive contamination.

Nuclear facilities must notify the appropriate authorities in the event of an accident. The federally recognized classification levels are Unusual Event, Alert, Site Area Emergency, and General Emergency. After a nuclear/radiological incident, the main concern is the effect on the health of the population near the incident. External radiation, inhalation, and ingestion of radioactive isotopes can cause acute health effects (death, severe health impairment), chronic health effects (cancers), and psychological effects that can affect health. Additional considerations include the long-term effects to the environment and agriculture.

3.1.14.2. Range of Magnitude

TMI is the closest nuclear power plant to Franklin County; Portions of the County lie within the Ingestion Exposure Pathway EPZ designated for nuclear/radiological emergencies. The magnitude of a nuclear incident differs for those within the Plume Exposure Pathway EPZ and those within the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from a radioactive plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation.

The worst-case radiological release event would be a major release of radioactive material from the Three Mile Island Nuclear Generating Station. This event would cause a great deal of fear for residents of south central Pennsylvania. In addition, as a support county, Franklin County would be impacted by large numbers of evacuees clogging the county’s transportation networks. Finally, there is the potential for radioactive contamination to reach Franklin County, possibly necessitating the evacuation of portions of the county. Specific impacts depend on the extent of the spread of the contamination.

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EALs). The EALs provide the framework and guidance to observe, address, and classify the severity of site-specific events and conditions that are communicated to off-site emergency response organizations[97]. There are additional EALs that specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or facility attack. These EALs ensure that appropriate notifications for the security threat are made in a timely manner. Each facility is also equipped with a public alerting system, which includes a number of sirens to alert the public located in the Plume Ingestion Pathway EPZ. This alerting system is activated by the counties of each specific EPZ. Emergency notifications and instructions are communicated to the public via the Emergency Alert System as activated by the PEMA Commonwealth Response Coordination Center (CRCC). State officials also have the capability to send emergency messages as text messages to mobile devices.

[97] Nuclear Regulatory Commission

3.1.14.3. Past Occurrence

Nuclear incidents rarely occur, but the incident at Three Mile Island is the worst fixed-nuclear facility accident in U.S. history. The resulting contamination and state of the reactor core led to the development of a 14-year cleanup and scientific effort. Additionally, the *President's Commission on the Accident at Three Mile Island* examined the costs of the accident, concluding, "The accident at Three Mile Island on March 28, 1979, generated considerable economic disturbance. Some of the impacts were short term, occurring during the first days of the accident. Many of the impacts were experienced by the local community; others will be felt at the regional and national levels." The report concluded: "It appears clear that the major costs of the TMI Unit 2 accident are associated with the emergency management replacement power and the plant refurbishment or replacement. The minimum cost estimate of nearly $1 billion supports the argument that considerable additional resources can be cost effective if spent to guard against future accidents."

Despite the severity of the damage, no injuries due to radiation exposure occurred. However, numerous studies were conducted to determine the measurable health effects related to radiation and/or stress. More than a dozen epidemiological and stress related studies conducted to date have found no discernible direct health effects to the population in the vicinity of the plant. However, one study conducted by the DOH's Three Mile Island Health Research Program did find evidence of psychological stress[98].

The accident at Three Mile Island had a profound effect on the residents, emergency management community, government officials, and nuclear industry, not only in Pennsylvania, but nationwide. There were minimal requirements for off-site emergency planning for nuclear power stations prior to this accident. Afterwards, comprehensive, coordinated, and exercised plans were developed for the state, counties, school districts, special facilities (hospitals, nursing homes and detention facilities), and municipalities to assure the safety of the population. Costs associated with an event at one of the Commonwealth's nuclear facilities, be it real or perceived, are significant. The mitigation efforts put in place immediately following the 1979 Three Mile Island accident continue until today. The Commonwealth Nuclear/Radiological plan which is a successor of the original "Annex E" is a result of the Commonwealth's efforts to address the many components of mitigation planning. The comprehensive planning involved with the 5 nuclear facilities is an ongoing effort. Plans are reviewed and amended on an annual basis. Recent amendments to various planning documents and station procedures include the efforts to enhance station security measures and the means to bolster communications and response in the event of terrorist activities.

There have been no significant nuclear incidents at Three Mile Island since the last plan update.

3.1.14.4. Future Occurrence

Pennsylvania is home to the only nuclear power plant *General Emergency* in the nation. Since the Three Mile Island incident, nuclear power has become significantly safer and is one of the most heavily regulated industries in the nation. Despite the knowledge gained since then, there

[98] National Energy Institute, 2014

is still the potential for a similar accident to occur again at one of the 5 nuclear generating facilities in the Commonwealth. The Nuclear Energy Agency of the Organization for Economic Co-Operation and Development notes that studies estimate the chance of protective barriers failing in a modern nuclear facility at less than one in 100,000 per year[99]. Nuclear incident occurrences may also occur as a result of intentional actions; these acts are addressed under **Section 3.1.18**: Terrorism.

The probability of future nuclear incidents is ***unlikely***, as defined by the Risk Factor probability criteria (**Section 1.2**). However, if an event were to occur, Franklin County would likely host displaced persons and the agricultural yield could be compromised because the county is at least partially in the 50-mile Ingestion EPZ.

3.1.14.5. Vulnerability Assessment

Figure 3.1.14.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Nuclear Incident hazard. One can see that 5 of 22 municipalities rated this threat as either a Catastrophic or Major event. Of the remaining 17 municipalities, only 1 rated Nuclear Incident as a Moderate threat. This was ranked as the number 20 threat in Franklin County and is considered overall to be a Minor threat.

[99] World Nuclear Association, 2016

Nuclear Incident
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	3	30%	3	20%	4	10%	4	10%	2.9	10.12%	0.2935
Chambersburg Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	14.05%	0.2108
Fannett Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.59%	0.0207
Greencastle Borough	1	30%	2	30%	4	20%	4	10%	4	10%	2.5	2.73%	0.0683
Greene Township	1	30%	1	30%	2	20%	4	10%	4	10%	1.8	11.82%	0.2128
Guilford Township	1	30%	2	30%	1	20%	4	10%	4	10%	1.9	9.38%	0.1782
Hamilton Township	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	7.29%	0.1166
Letterkenny Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.58%	0.0205
Lurgan Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.42%	0.0185
Mercersburg Borough	1	30%	4	30%	1	20%	4	10%	4	10%	2.5	0.97%	0.0243
Metal Township	1	30%	2	30%	1	20%	1	10%	4	10%	1.6	1.13%	0.0181
Mont Alto Borough	1	30%	1	30%	1	20%	2	10%	4	10%	1.4	1.01%	0.0141
Montgomery Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	3.68%	0.0478
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	4	20%	1	10%	4	10%	1.9	2.86%	0.0543
Quincy Township	1	30%	2	30%	4	20%	1	10%	4	10%	2.2	3.41%	0.0750
Shippensburg Borough	1	30%	2	30%	4	20%	4	10%	4	10%	2.5	0.75%	0.0188
Southampton Township	1	30%	2	30%	1	20%	4	10%	4	10%	1.9	5.49%	0.1043
St Thomas Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	3.79%	0.0493
Warren Township	2	30%	3	30%	4	20%	4	10%	4	10%	3.1	0.21%	0.0065
Washington Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	9.55%	0.1242
Waynesboro Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	7.02%	0.0913
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.770

Figure 3.1.14.5.1: Municipal Nuclear Incident Threat Vulnerability Self-Assessment

The effects and impacts of a nuclear/radiological threat depend on the type of radiation released, the duration of the release, the volume of the release, and the existing weather conditions, such as wind speed and direction.

The County's primary vulnerability to nuclear incidents comes in the form of food, soil, and water contamination. In terms of vulnerable land, the 242,634 acres of farmland held in Franklin County's 1,596 farms are vulnerable to radiological contamination in a nuclear incident[100]. In 2012, the market value of all agricultural products of these farms exceeded $413 million. While unlikely that all agricultural products would be lost in the event of a nuclear incident, the county could expect some portion of that $413 million to be lost. Time of year also impacts the vulnerability and losses estimated for a nuclear incident; an incident that occurs during the prime growing and harvesting season will have a larger impact on the county. For example, the incident at Three Mile Island occurred in the off-season; as a result, the Pennsylvania Department of Agriculture estimated that agricultural losses for the entire Commonwealth were not more than $1 million.

Water contamination is also a concern in nuclear incidents. There are 9 large water systems in the county such as Chambersburg, Guilford, Bear Valley and so forth. There are approximately 30 community systems in the county; many of these serve mobile home parks, villages, and small developments in rural areas. Approximately 65 % of the household are on public water with 35% on private wells or cisterns. They are all vulnerable to the effects of a nuclear incident.

3.1.15. Pandemic and Infectious Disease

A pandemic is the sudden outbreak of a new infectious disease that spreads easily from one person to another and attacks the population of an extensive region, including several countries and/or continents. There have been 4 flu pandemics during the last century; the Spanish Flu, the Asian Flu, the Hong Kong Flu, and most recently, the Swine Flu.

Generally, pandemic diseases cause sudden, pervasive illness in all age groups on a global scale. Pandemic events cover a wide geographic area and can affect large populations, depending on the disease. The exact size and extent of an infected population is depending upon how easily the illness is spread, the mode of transmission, and the amount of contact between infected and non-infected persons.

3.1.15.1. Location and Extent

Franklin County is primarily concerned with the possibility of pandemic outbreaks of various forms of influenza, West Nile Virus, or the Zika virus. Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. H5N1 did not reach pandemic proportions in the United States, but the county began actively planning for an occurrence of an influenza pandemic. As stated in the Pennsylvania Department of Health Influenza Pandemic Response Plan, "an

[100] USDA, 2012

influenza pandemic is inevitable and will probably give little warning"[101]. Influenza, also known as "the flu", is a contagious disease that is caused by the influenza virus and most commonly attacks the respiratory tract in humans. Influenza is considered to have pandemic potential if it is novel (meaning that people have no immunity to it), virulent (meaning that it causes deaths in normally healthy individuals), and easily transmittable from person-to-person.

Listed below are basic descriptions of identified diseases with identified pandemic potential and their expected impact:

- The Bird Flu is a disease of wild, domesticated, and farm birds. The newer type of bird flu referred to as highly pathogenic avian influenza (HPAI) H5N1 is of concern. HPAI has the potential to spread to humans who have had direct or close contact with sick or dead poultry that were infected with the virus. Human infections are considered to be rare, but 60% of those infected have died. Most cases of human transmission have occurred in other countries; however, the first case of human infection in the Americas was reported in Canada in January 2014.

- The West Nile Virus is carried by mosquitoes and can infect birds, animals and people. Most species of mosquitoes found in Pennsylvania do not carry the virus. In some cases, the virus could cause encephalitis in humans, which is an infection of the brain. The peak season is usually April through October.

- Influenza continues to remain a concern in Pennsylvania due to the potential to spread quickly. During the 2016/2017 flu season, there were 994 confirmed cases of influenza in Franklin County[102]. It is estimated that the numbers are much higher because most do not seek treatment for this virus. According to the Pennsylvania Department of Health, it is estimated that 5 to 20 percent of Pennsylvanians contract the flu each year, and 120 to 2,000 die from complications associated with influenza.

- The Zika virus is a mosquito-borne flavivirus that is transmitted primarily by Aedes mosquitoes. According to the World Health Organization, it is of particular concern because it is believed to cause microcephaly and Guillani-Barre syndrome. It has also been linked to other neurological complications.

- COVID-19 is a novel coronavirus that started in Wuhan, China in December of 2019. It was declared a pandemic by the CDC & WHO on 3/11/2020. Community transmission of this novel virus is occurring, and Franklin County has had substantial increases in cases. Vaccines were approved in December 2020.

3.1.15.2. Range of Magnitude

The magnitude of a pandemic in Franklin County will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza is a

[101] DOH, 2005
[102] DOH, 2017

fairly easily transmitted from person-to-person compared to West Nile, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined. The 1918 Spanish Flu pandemic remains the worst-case pandemic event on record. Nearly 24,000 Pennsylvanians died during the first month of the disease. It is estimated that 350,000 Pennsylvanians had been struck with the flu, about 150,000 of whom were from Philadelphia alone.[103].

In contrast, the severity of illness from recent influenza viruses has varied, with the gravest cases occurring mainly among those considered at high risk. High risk populations considered more vulnerable include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. Most people infected with H1N1 (swine flu) in 2009 and 2010 outbreak recovered without needing medical treatment. This strain of the flu has continued to circulate in the United States. The 2014 season was the first since 2009 that H1N1 had been so predominant in the United States.

The magnitude of a pandemic may be exacerbated by the fact that pandemics occur over large areas and will cause outbreaks across the United States, thus limiting the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventative and therapeutic measures, including vaccines and other medication, will likely be in short supply or will not be available.

There are no true environmental impacts in pandemic disease outbreaks, but there may be significant economic and social costs beyond the possibility of deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism occur within the business community, and these contribute to social and economic disruption. Social and economic disruptions could be temporary but may be amplified in today's closely interrelated and interdependent systems of trade and commerce. Social disruption may be greatest when rates of absenteeism impair essential services, such as power, transportation, and communications.

3.1.15.3. Past Occurrence

The first cases of the West Nile virus in humans in Pennsylvania occurred in 2001[104]. West Nile Virus has been found in Franklin County. In 2017 alone, there have been 45 positive mosquito samples in Franklin County and 3 cases confirmed in animals seen by veterinarians (in this case all horses). However, it has yet to affect any humans in Franklin County.

As of Dec 2017, there were 385 CDC confirmed cases of Zika virus in the United States, of which 6 were from Pennsylvania. **Figure 3.1.15.3.1** below illustrates the distribution of Zika cases throughout the United States.

[103] FluTracker.com
[104] DOH, 2001

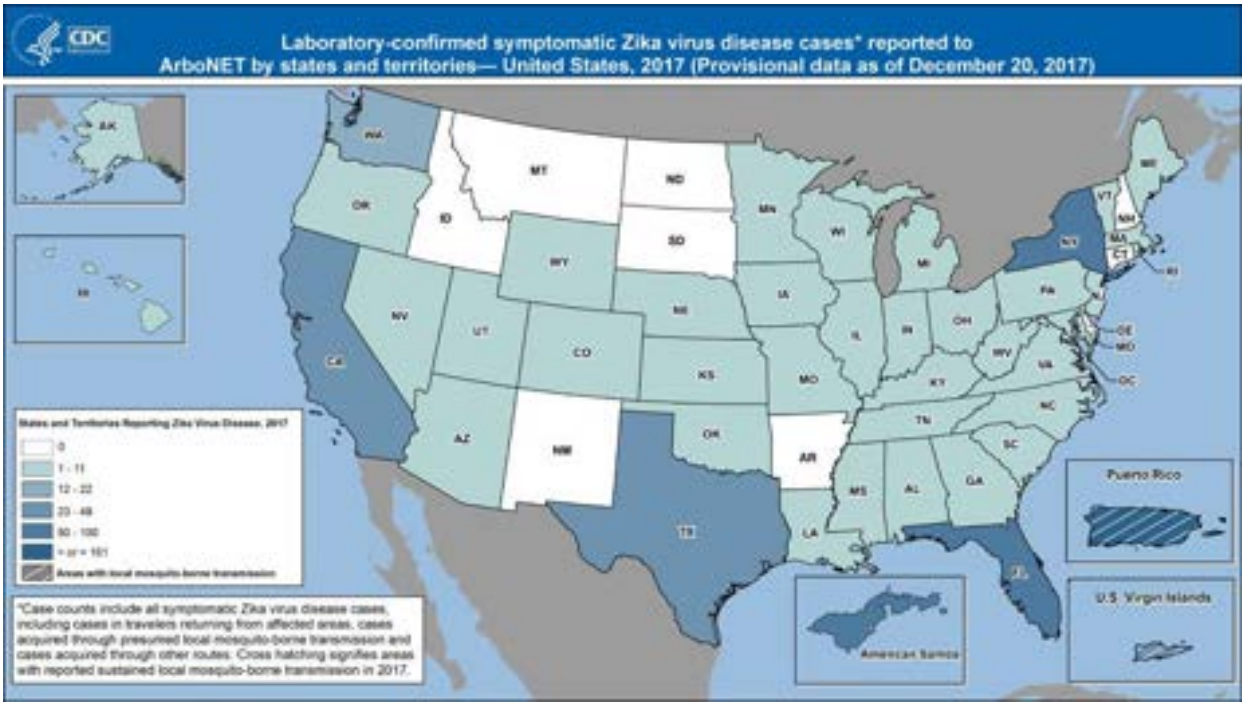

Figure 3.1.15.3.1: Confirmed Cases of Zika Virus in the United States (2017)[105]

There have been several pandemic influenza outbreaks which have occurred over the past 100 years. A list of events worldwide is shown in **Table 3.1.15.3.1**.

Years	Name	Subtype	Extent of Outbreak
2020-Present	COVID-19	Novel Coronavirus	Ongoing Pandemic
2009-Present	Swine Flu	H1N1	Ongoing Pandemic
1968-1969	Hong Kong Flu	H3N2	Estimated Deaths: USA: 34,000 World-wide: 700,000
1957-1958	Asian Flu	H2N2	Estimated Deaths: USA: 70,000 World-wide: 1-2 million
1918-1919	Spanish Flu	H1N1	Estimated Deaths: USA: 675,000 World-wide: 50 million

Table 3.1.15.3.1: Influenza Outbreaks in Past 100 Years (1917-2021)

[105] CDC, 2017

Deaths occurred in the United States as a result of the Spanish Flu, Asian flu, and Hong Kong Flu outbreaks. The Spanish Flu claimed 675,000 lives in the United States, and there were 350,000 cases in Pennsylvania. This outbreak affected healthy adults between 20-50 years old. Most deaths resulting from the Asian Flu occurred between September, 1957 and March, 1958; there were about 70,000 deaths in the United Sates and approximately 15% of the population of Pennsylvania was affected. The Asian Flu affected both the very young and the very old.

The first cases of the Hong Kong Flu in the U.S. were detected in September of 1968 with deaths peaking between December, 1968 and January, 1969[106]. Those most affected by this flu were the very old and those with underlying medical conditions.

Franklin County mirrors the rest of the world with Influenza being the most prevalent and most likely disease to reach pandemic proportions. **Table 3.1.15.3.2** shows the total number of confirmed cases of Influenza in the county since 2008. The figures for the 2017/2018 season are only partial, but it can be seen that we are already near the total numbers for the 2016/2017 season and we still have 7 months to go.

Flu Season	Inclusive Dates	Influenza Type			Total
		A	B	Unidentified	
2017/2018*	10/1/2017 – 2/10/2018*	712	193	0	905*
2016/2017	10/2/2016 – 9/30/2017	709	285	0	994
2015/2016	10/4/2015 – 10/1/2016	371	194	0	565
2014/2015	9/28/2014 – 10/3/2015	797	113	1	911
2013/2014	9/29/2013 – 9/27/2014	413	36	1	450
2012/2013	10/10/2012 – 4/13/2013	--	--	--	709
2011/2012	--	--	--	--	28
2010/2011	--	--	--	--	366
2009/2010	--	--	--	--	321
2008/2009	--	--	--	--	163
* Indicates incomplete data for the 2017/2018 flu season					

Table 3.1.15.3.2: Franklin County Influenza Cases (2008-2018)[107]

3.1.15.4. Future Occurrence

The precise timing of pandemic influenza is uncertain, but occurrences are most likely when the influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or

[106] GlobalSecurity.org
[107] DOH, 2018

“novel” virus to which the population has no immunity. This emergence of a novel virus is the first step toward a pandemic[108].

West Nile Virus could potentially impact Franklin County in the future as it is carried and spread by mosquitoes. The probability of the virus infecting animals or humans in the county is low, because most species of mosquitoes found in Pennsylvania don’t carry the virus, and the state as a whole has taken precautions to avoid the spread of the virus such as killing mosquito larvae and by monitoring birds, mosquitoes, people, and horses.

Influenza is already a problem in the county and with the strain that has hit in the 2017/2018 flu season, it is set to be the worst season in at least a decade. This strain will not reach pandemic levels, but it is an indication that as the virus mutates and inherits resistance to antibiotics, a pandemic is a distinct possibility in the near future.

The whole country is in the midst of the COVID-19 pandemic. Vaccines were approved in December 2020 for front-line workers, and the vaccine is widely available now to most of the population.

On the whole, the future probability of the pandemic event in Franklin County can be considered ***possible*** as defined by the Risk Factor ranking probability criteria (see **Section 1.2**).

3.1.15.5. Vulnerability Assessment

Figure 3.1.15.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Pandemic and Infectious Disease hazard. One can see that 7 of 22 municipalities rated this threat as either a Catastrophic or Major event. Additionally, 6 of the remaining 15 municipalities rated this as a Moderate threat. This ranked as the number 10 threat in Franklin County and is considered a Moderate threat.

[108] CDC

Pandemic/Infectious Disease Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	2	20%	1	10%	4	10%	2.1	10.12%	0.2125
Chambersburg Borough	1	30%	1	30%	4	20%	1	10%	4	10%	1.9	14.05%	0.2670
Fannett Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.59%	0.0207
Greencastle Borough	1	30%	2	30%	4	20%	4	10%	4	10%	2.5	2.73%	0.0683
Greene Township	2	30%	3	30%	4	20%	1	10%	4	10%	2.8	11.82%	0.3310
Guilford Township	1	30%	3	30%	3	20%	1	10%	4	10%	2.3	9.38%	0.2157
Hamilton Township	1	30%	1	30%	3	20%	2	10%	4	10%	1.8	7.29%	0.1312
Letterkenny Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.58%	0.0205
Lurgan Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.42%	0.0185
Mercersburg Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	0.97%	0.0126
Metal Township	3	30%	3	30%	2	20%	3	10%	4	10%	2.9	1.13%	0.0328
Mont Alto Borough	2	30%	1	30%	2	20%	4	10%	4	10%	2.1	1.01%	0.0212
Montgomery Township	2	30%	4	30%	3	20%	4	10%	4	10%	3.2	3.68%	0.1178
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	1	20%	2	10%	4	10%	1.4	2.86%	0.0400
Quincy Township	2	30%	3	30%	4	20%	1	10%	4	10%	2.8	3.41%	0.0955
Shippensburg Borough	1	30%	2	30%	4	20%	1	10%	4	10%	2.2	0.75%	0.0165
Southampton Township	2	30%	2	30%	2	20%	4	10%	4	10%	2.4	5.49%	0.1318
St Thomas Township	3	30%	2	30%	3	20%	2	10%	4	10%	2.7	3.79%	0.1023
Warren Township	3	30%	1	30%	3	20%	3	10%	4	10%	2.5	0.21%	0.0053
Washington Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	9.55%	0.1242
Waynesboro Borough	1	30%	3	30%	3	20%	1	10%	4	10%	2.3	7.02%	0.1615
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.149

Figure: 3.1.15.5.1: Municipal Pandemic and Infectious Disease Threat Vulnerability Self-Assessment

Certain population groups are at higher risk of pandemic flu infection. This population group includes people 65 years and older, children younger than 5 years old, pregnant women, and people of any age with certain chronic medical conditions. Such conditions include but are not limited to diabetes, heart disease, asthma, and kidney disease[109]. Schools, convalescent centers, and other institutions serving those younger than 5 years old and older than 65 years old, are locations conducive to faster transmission of pandemic influences since populations identified as being at high risk are concentrated at these facilities. Due to these possibilities, we may need to take precautions like social distancing or the use of dust masks (similar to those used in some Asian countries) to stem the spread of these viruses as a mitigation action in the future.

3.1.16. Radon Exposure

Radon is a cancer-causing natural radioactive gas that you can't see, smell, or taste. It is a large component of the natural radiation that humans are exposed to 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), Radon is estimated to cause approximately 21,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer[110]. An estimated 40% of the homes in Pennsylvania are believed to have elevated Radon levels[111]. This section provides a profile and vulnerability assessment for the Radon exposure hazard.

3.1.16.1. 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. It was not until the 1980s that the wide geographic distribution of elevated values in houses and the possibility of extremely high Radon values in houses were recognized. In 1984, routine monitoring of employees leaving the Limerick nuclear power plant near Reading, PA, showed that readings on Mr. Stanley Watras frequently exceeded expected radiation levels, yet only natural, nonfission-product radioactivity was detected on him. Radon levels in his home were detected around 2,500 pico Curies per Liter (pCi/L), much higher than the 4 pCi/L guideline of the EPA or even the 67 pCi/L limit for uranium miners. As a result of this event, the Reading Prong section of Pennsylvania where Mr. Watras lived became the focus of the first large-scale Radon scare in the world.

Radon (i.e. 222Rn), which has a half-life of 3.8 days, is a widespread hazard. The distribution of Radon is correlated with the distribution of Radium (i.e. 226Ra), its immediate radioactive parent, and with Uranium, its original ancestor. Due to the short half-life of Radon, the distance that Radon atoms can travel from their parent before decay is generally limited to distances of feet or tens of feet. Three (3) sources of Radon in houses are now recognized:

- Radon in soil air that flows into the house;

[109] CDC
[110] EPA
[111] DEP, 2016

- Radon dissolved in water from private wells and exsolved during water usage (this is rarely a problem in Pennsylvania); and
- Radon emanating from Uranium-rich building materials (e.g. concrete blocks or gypsum wallboard)(this also is not known to be a problem in Pennsylvania[112]).

Figure 3.1.16.1.1 illustrates radon entry points into a home.

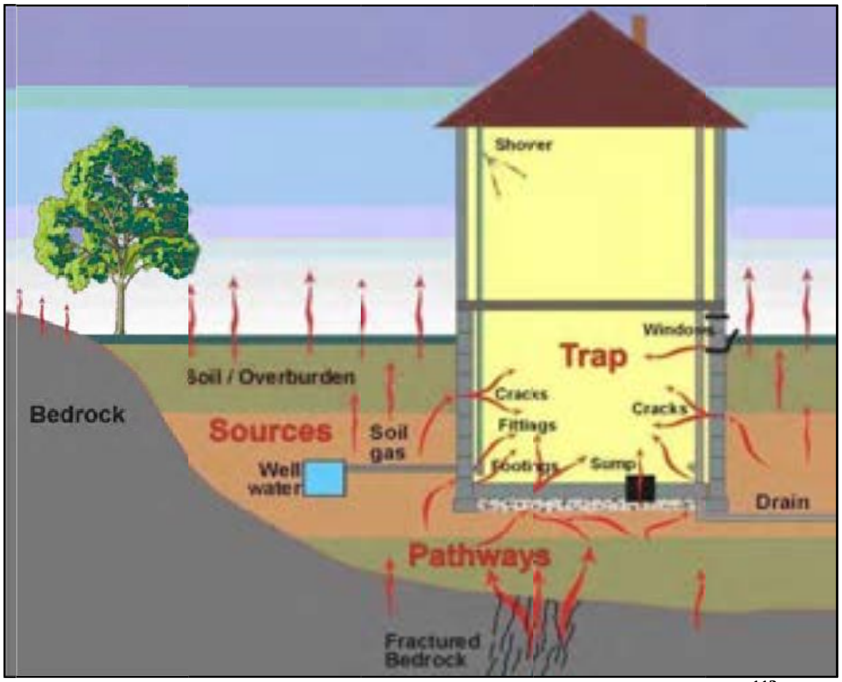

Figure 3.1.16.1.1: Sketch of Radon Entry Points into a House[113]

Each county in Pennsylvania is classified as having a low, moderate, or high Radon hazard potential. A majority of counties across the Commonwealth, particularly counties in eastern Pennsylvania, have a high hazard potential. The average indoor Radon screening level for these counties is greater than 4 pCi/L. Franklin County is located in Zone 1 – High Radon Potential as noted in **Figure 3.1.16.1.2** below.

[112] EPA, 1983
[113] Arizona Geological Survey, 2012

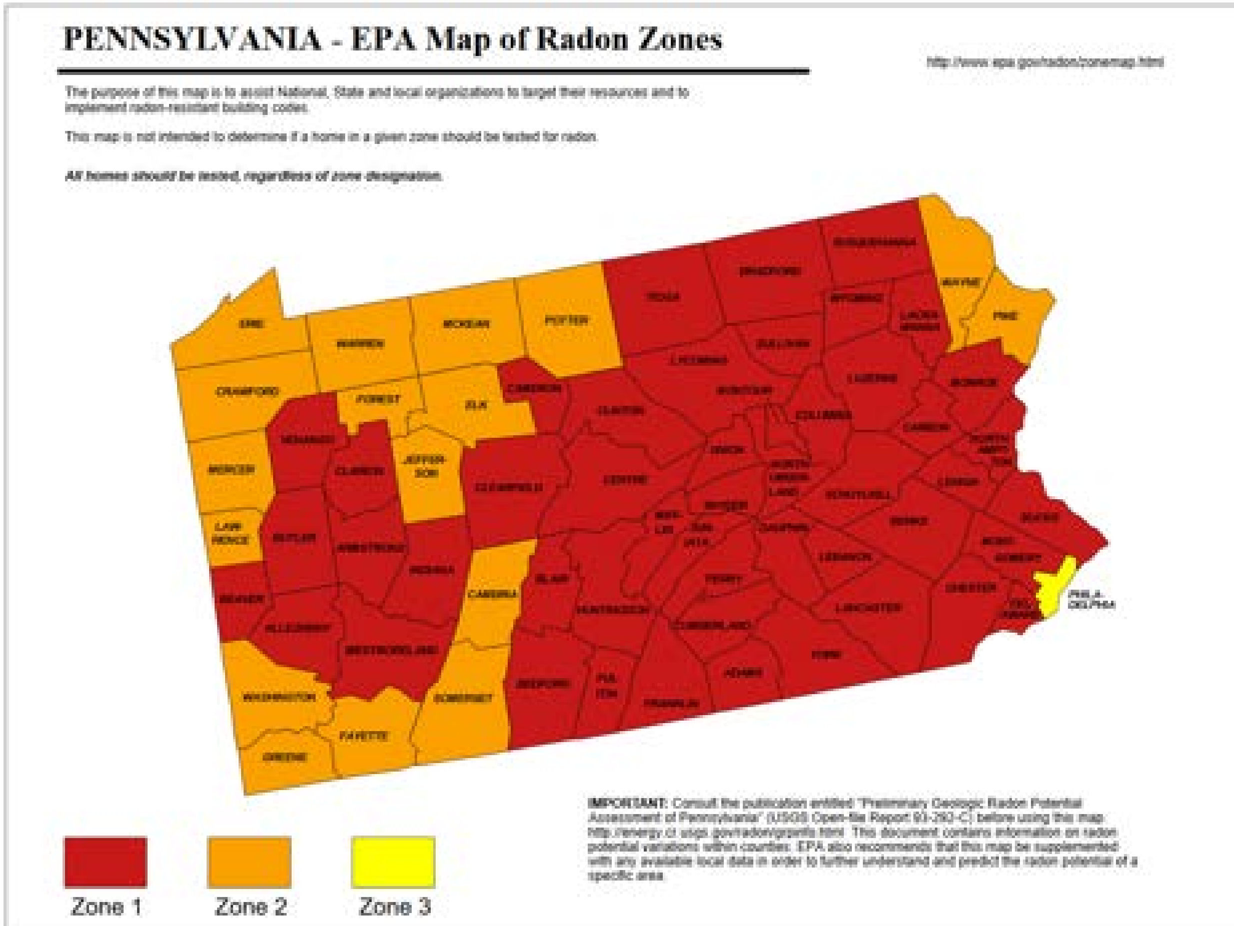

Figure 3.1.16.1.2: Radon Hazard Zones in Pennsylvania (2014)[114]

High Radon levels were initially thought to be exacerbated in houses that are tightly sealed, but it is now recognized that rates of air flow into and out of houses, plus the location of air inflow and the radon content of air in the surrounding soil, are key factors in Radon concentrations. Outflows of air from a house, caused by a furnace, fan, thermal "chimney" effect, or wind effects require that air be drawn into the house to compensate. If the upper part of the house is tight enough to impede influx of outdoor air (Radon concentration generally <0.1 pCi/L), then 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.

The Radon concentration of soil gas depends upon a number of soil properties; the importance of which is still being evaluated. In general, 10 to 50% 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

[114] EPA, 2014

the Radon can easily escape. The amount of pore space in the soil and its permeability for air flow, including cracks and channels, are important factors determining Radon concentration in soil gas and its rate of flow into a house. Soil depth, moisture content, mineral host, form of Radium, and other soil properties may also be critical factors. For houses built on bedrock, fractured zones may supply air having Radon concentrations similar to those in deep soil.

Areas where houses have high levels of Radon can be divided into 3 groups in terms of uranium content in rock and soil:

- Areas of very elevated Uranium content (>50 parts per million [ppm]) around Uranium deposits and prospects: Although very high levels of Radon can occur in such areas, the hazard normally is restricted to within a few hundred feet of the deposit. In Pennsylvania, such localities occupy an insignificant area.

- Areas of common rocks having higher than average Uranium content (5 to 50 ppm): In Pennsylvania, such rock types include granitic and felsic alkali igneous rocks and black shales. In the Reading Prong, high Uranium values in rock or soil and high Radon levels in houses are associated with Precambrian granitic gneisses commonly containing 10 to 20 ppm Uranium, but locally containing more than 500 ppm Uranium. In Pennsylvania, elevated Uranium occurs in black shales of the Devonian Marcellus Formation and possibly the Ordovician Martinsburg Formation. 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 incompletely understood at present. Relatively high soil permeability can lead to high Radon, the clearest example being houses built on glacial eskers. Limestone-dolomite soils also appear to be predisposed for high Radon levels in houses, perhaps because of the deep clay-rich residuum in which 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 the fact that Radon contents in 93% of a sample of houses built on limestone-dolomite soils near State College (Centre County) exceeded 4 pCi/L, and 21 percent exceeded 20 pCi/L, even though the Uranium values in the underlying bedrock are all in the normal range of 0.5 to 5 ppm Uranium[115].

According to the state 2013 HMP, Radon tends to exist as a gas or as a dissolved atomic component in groundwater. In Pennsylvania, the most problematic source of Radon in houses is Radon in 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 plan indicates that current data on the abundance and distribution of Radon in Pennsylvania homes is incomplete and biased, but the plan identifies general patterns. Values exceeding the Environmental Protection Agency's guidelines occur in all regions of the state. The highest proportion of elevated values includes South Central PA and Franklin County[116].

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[115] PEMA, 2013
[116] PEMA, 2013

3.1.16.2. Range of Magnitude

Exposure to Radon is the second leading cause of lung cancer after smoking. It is the number one cause of lung cancer among non-smokers. As stated earlier, Radon is responsible for about 21,000 lung cancer deaths every year; approximately 2,900 of which occur among people who have never smoked. Lung cancer is the only known effect on human health from exposure to Radon in air and thus far, there is no evidence that children are at greater risk of lung cancer than are adults[117]. The main hazard is actually from the Radon daughter products (218Po, 214Pb, 214Bi), which may become attached to lung tissue and induce lung cancer by their radioactive decay. **Table 3.1.16.2.1** shows the relationship between various Radon levels, probability of lung cancer, comparable risks from other hazards, and action thresholds.

Years	If 1,000 people were exposed to this level over a lifetime …*	Risk of cancer from Radon exposure compares to …**	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 od dying in a home fire	Fix Structure
8	About 120 people could get lung cancer	30 times the risk of dying in a fall	Fix Structure
4	About 62 people could get lung cancer	5 times the risk of dying in a car crash	Fix Structure
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing 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	Fix Structure
8	About 15 people could get lung cancer	4 times the risk of dying in a fall	Fix Structure
4	About 7 people could get lung cancer	The risk of dying in a car crash	Fix Structure
2	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing between 2 and 4 pCi/L
1.3	About 2 people could get lung cancer	(Average indoor Radon level)	Reducing Radon levels below 2 pCi/L is difficult
0.4		(Average outdoor Radon level)	

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 Preorts.

Table 3.1.16.2.1: Radon Risk for Smokers and Non-Smokers[118]

[117] EPA, 2016
[118] EPA, 2016

According to the EPA, the average Radon concentration in the indoor air of U.S. homes is about 1.3 pCi/L. The EPA recommends homes be fixed/mitigated if the radon level is 4 pCi/L or more. However, because there are no known safe levels of exposure to Radon, the EPA also recommends that Americans consider fixing/mitigating their home for Radon levels between 2 pCi/L and 4 pCi/L. As shown in **Table 3.1.16.2.1**, a smoker exposed to Radon has a much higher risk of lung cancer.

The worst-case scenario for Radon exposure would be that a large area of tightly sealed homes providing residents high levels of exposure over a prolonged period of time without the residents being aware[119].

3.1.16.3. Past Occurrence

Current data on abundance and distribution of Radon in Pennsylvania houses is considered incomplete and potentially biased, but some general patterns exist. **Figure 3.1.16.3.1** below shows the reported percentage of homes in Franklin County with higher than normal Radon levels.

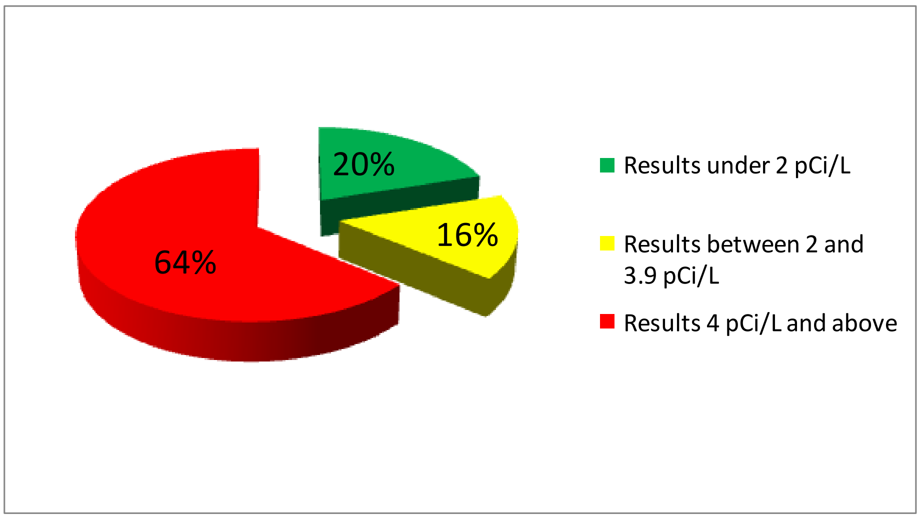

Figure 3.1.16.3.1: Percentage of Franklin County Homes and Radon Levels (2017)[120]

Values exceeding the EPA guideline of 4 pCi/L occur in all regions of the Commonwealth. The highest proportion of elevated Radon values in the Commonwealth exist is in a zone extending from central Pennsylvania to southeastern Pennsylvania. High values in the latter area are attributed to known Uranium-rich granitic gneisses, accentuated by local factors such as shear zones, and include a surprising number of extremely high Radon values (>200 pCi/L). Information average Radon levels by zip code in Pennsylvania can be obtained from the DEP at: http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/Radon/RadonZip[121].

[119] PEMA, 2013
[120] Bureau of Radiation Protection
[121] DEP

3.1.16.4. Future Occurrence

Radon exposure is inevitable given present soil, geologic, and geomorphic factors across Pennsylvania. Development in areas where previous Radon levels have been 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 with proper testing for both past and future development and appropriate mitigation measures[122].

3.1.16.5. Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable to the identified hazard area. For Radon Exposure, all of Franklin County has been identified as the hazard area. Therefore, all critical facilities, houses, population, and infrastructure as outlined in **Tables 2.4.5 and 2.4.6, Section 2** are vulnerable.

Figure 3.1.16.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Radon Exposure hazard. One can see that 5 of 22 municipalities rated this threat as either a Major or Moderate event. This was ranked as the number 21 threat in Franklin County and is considered a Minor threat.

[122] PEMA, 2013

Radon Exposure
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	1	30%	3	20%	1	10%	4	10%	2.0	10.12%	0.2024
Chambersburg Borough	4	30%	1	30%	3	20%	1	10%	4	10%	2.6	14.05%	0.3653
Fannett Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.59%	0.0207
Greencastle Borough	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	2.73%	0.0437
Greene Township	1	30%	1	30%	1	20%	2	10%	4	10%	1.4	11.82%	0.1655
Guilford Township	1	30%	1	30%	1	20%	2	10%	4	10%	1.4	9.38%	0.1313
Hamilton Township	1	30%	1	30%	2	20%	4	10%	4	10%	1.8	7.29%	0.1312
Letterkenny Township	3	30%	1	30%	4	20%	1	10%	4	10%	2.5	1.58%	0.0395
Lurgan Township	2	30%	1	30%	1	20%	1	10%	4	10%	1.6	1.42%	0.0227
Mercersburg Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	0.97%	0.0126
Metal Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	1.13%	0.0147
Mont Alto Borough	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	1.01%	0.0162
Montgomery Township	2	30%	1	30%	3	20%	4	10%	4	10%	2.3	3.68%	0.0846
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	0.14%	0.0021
Peters Township	1	30%	1	30%	1	20%	4	10%	4	10%	1.6	2.86%	0.0458
Quincy Township	2	30%	2	30%	2	20%	4	10%	4	10%	2.4	3.41%	0.0818
Shippensburg Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	0.75%	0.0098
Southampton Township	1	30%	1	30%	1	20%	3	10%	4	10%	1.5	5.49%	0.0824
St Thomas Township	2	30%	1	30%	1	20%	1	10%	4	10%	1.6	3.79%	0.0606
Warren Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	0.21%	0.0027
Washington Township	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	9.55%	0.1242
Waynesboro Borough	1	30%	1	30%	1	20%	1	10%	4	10%	1.3	7.02%	0.0913
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.751

Figure 3.1.16.5.1: Municipal Radon Exposure Threat Vulnerability Self-Assessment

3.1.17. Subsidence, Sinkhole

Subsidence is the downward movement of earth surface material. It involves little or no horizontal movement.

A sinkhole is a basin-like, funnel shaped, or vertical sided depression in the land surface. In general, sinkholes form by the subsidence of unconsolidated materials or soils into voids created by dissolution of the underlying soluble bedrock.

There are three general types of sinkholes: collapse, subsidence, and solution. These different types of sinkholes generally correspond to the thickness of the sediments overlying limestone. The sediments and water contained in the unsaturated zone, surficial aquifer system, and the confining layer are collectively referred to as overburden. Collapse sinkholes are most common in areas where overburden is thick, but the confining layer is breached or absent. Subsidence sinkholes form where the overburden is thin and only a veneer of sediments is present overlaying the limestone (See **Figure 3.1.17.1** below). Solution sinkholes form where the overburden is absent and the limestone is exposed at the land surface.

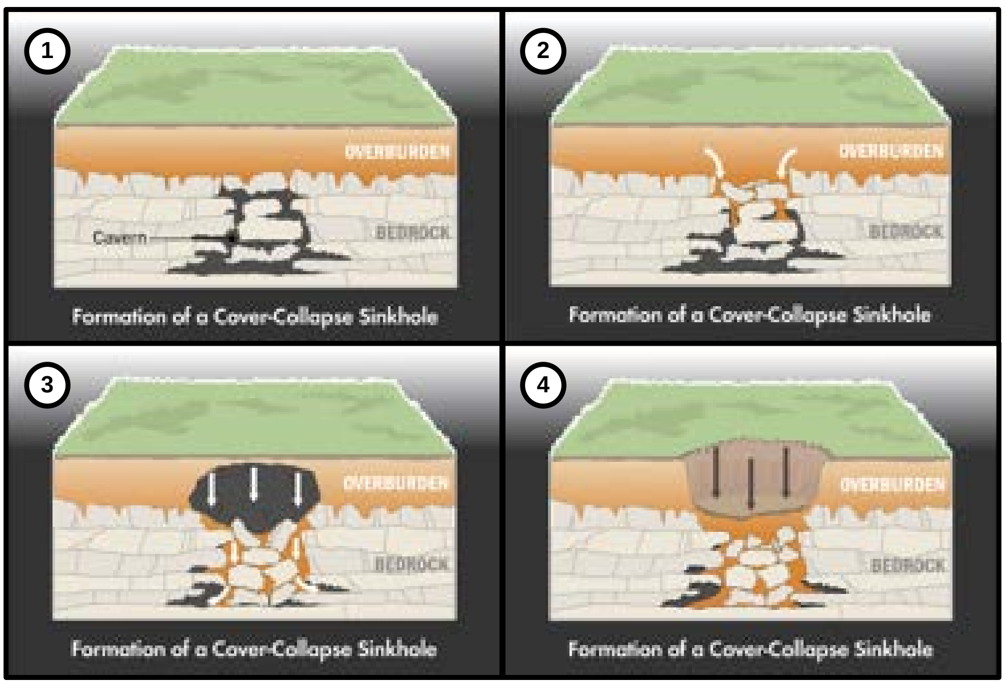

Figure 3.1.17.1: Formation of a Collapse Sinkhole[123]

3.1.17.1. Location and Extent

Subsidence occurs naturally due to the physical and chemical weathering of certain types of bedrock (solid rock that underlies soil or other unconsolidated surface material). Subsidence can also occur as a result of underground mining, excessive pumping of groundwater, or subsurface

[123] Silverman, Jacob

erosion due to the failure of existing utility lines. All of these can produce surface features that appear similar, but not all are naturally occurring. Some are solely the result of human activities[124].

Figure 3.1.17.1.1 below shows a map of Pennsylvania indicating areas of sinkholes and surface depressions consistence with subsidence events. As one can see from this map, Franklin County has a significant portion (approximately 40%) of our land area susceptible to subsidence events. Almost every municipality has areas covered by the susceptible regions except for Lurgan Township and Orrstown Borough.

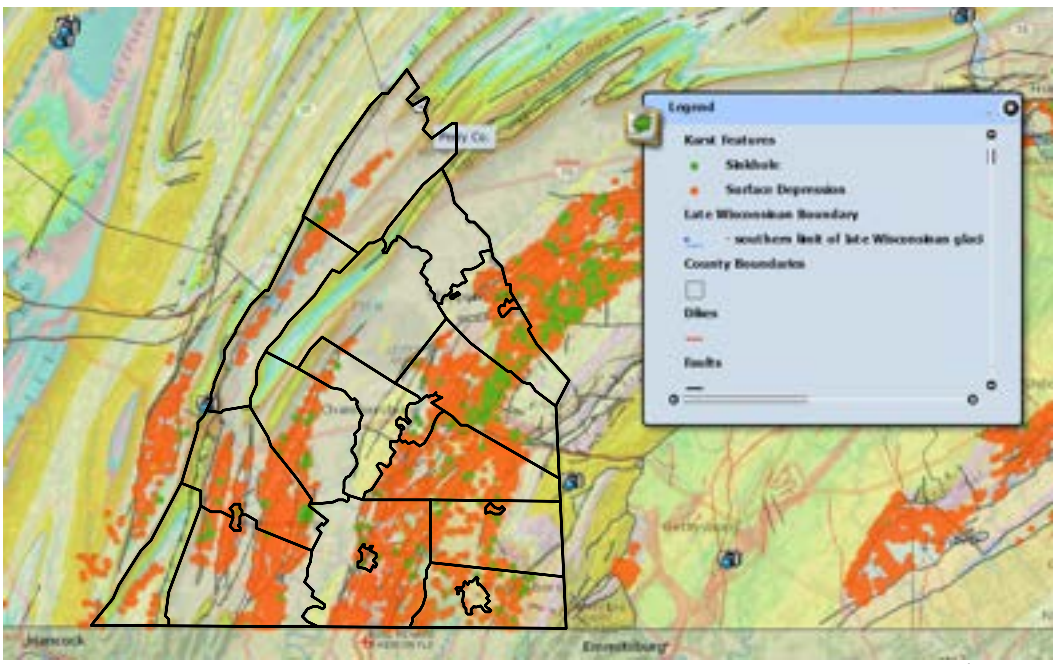

Figure 3.1.17.1.1: Areas of Franklin County Susceptible to Subsidence (2017)[125]

3.1.17.2. Range of Magnitude

Franklin County currently has no significant mining industry, but we were able to identify areas of the county impacted by surface mines in the past. Additionally, Franklin County does have considerable deposits of limestone that is utilized in several quarry operations. It is estimated that 32% of the land is considered limestone. 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. Therefore, we should be aware of the potential hazard of sinkholes.

There have been several incidences of sinkholes throughout the county. These incidents were for the most part minor and resulted in no loss of property or lives. **Figure 3.1.17.2.1** shows the geological make-up of Pennsylvania (highlight added for Franklin County). As can be seen from

[124] DCNR, 2015
[125] DCNR Interactive Map of Pennsylvania

this map, Franklin County has rock formations from several Geologic Eras with distinct rock compositions (sandstone and limestone) which provide the right conditions for subsidence (See **Table 3.1.17.2.1** below).

Geologic Era	Age	Rock Formations
Devonian	365-405 Million yrs	Red **sandstone**, gray shale, black shale, **limestone**, and chert.
Ordovician	430-500 Million yrs	Shale, **limestone**, dolomite, and **sandstone**.
Cambrain	500-570 Million yrs	**Limestone**, dolomite, **sandstone**, shale, quartzite, and phyllite.
Precambrian	>570 Million yrs	Gneiss, granite, anorthosite, metabasalt, metarhyolite, and marble.

Table 3.1.17.2.1: Geologic Composition of Franklin County

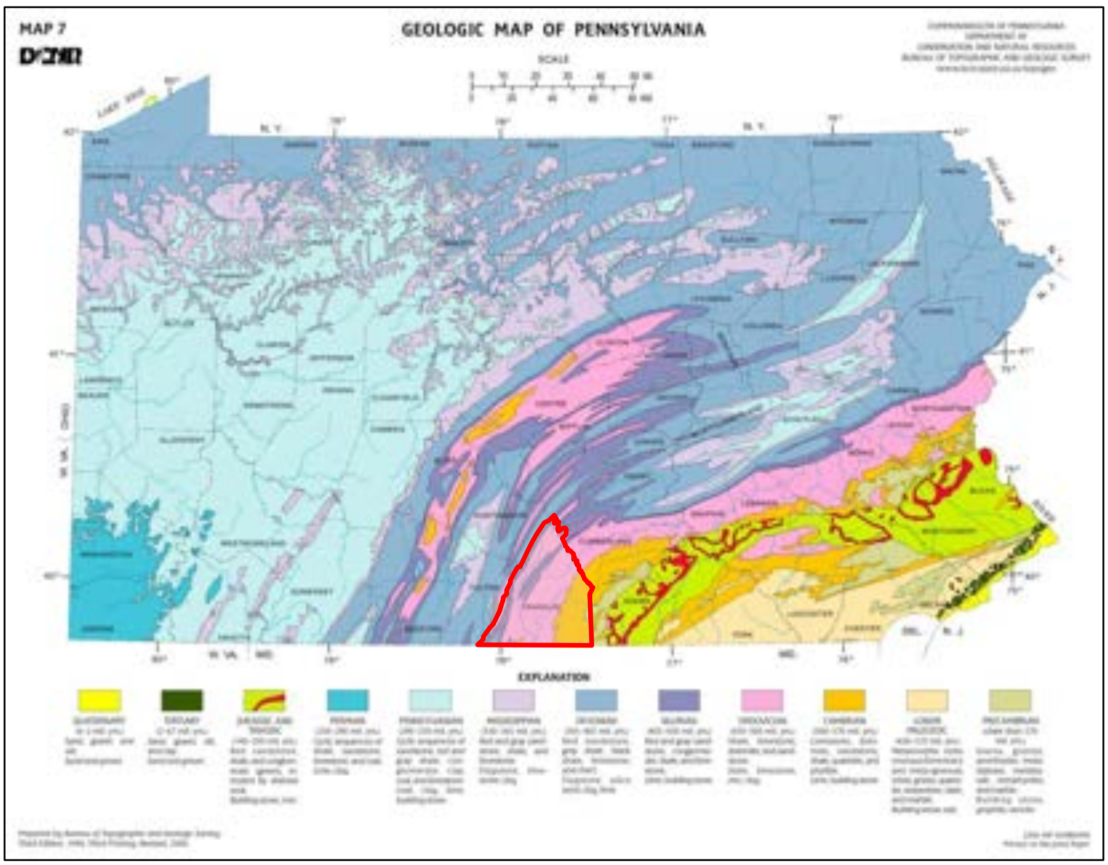

Figure 3.1.17.2.1: Geologic Map of Pennsylvania (2000)[126]

3.1.17.3. Past Occurrence

We were able to get a data pull from the PA DCNR, Bureau of Topographic and Geologic Survey for Franklin County. This data contains the current recorded subsidence events for Franklin County to include mines, caves, sinkholes, and surface depressions. We specifically did

[126] DCNR, Bureau of Topographic and Geologic Survey, 2000

not try to analyze all of the data related to surface depressions as the total number recorded in Franklin County was in excess of 10,000. We did analyze the number and locations of surface mines (See **Figure 3.1.17.3.1**), caves (See **Figure 3.1.17.3.1**), and sinkholes (See **Figure 3.1.17.3.1**). These numbers and totals of subsidence events/features per municipality are listed in **Table 3.1.17.3.1** below.

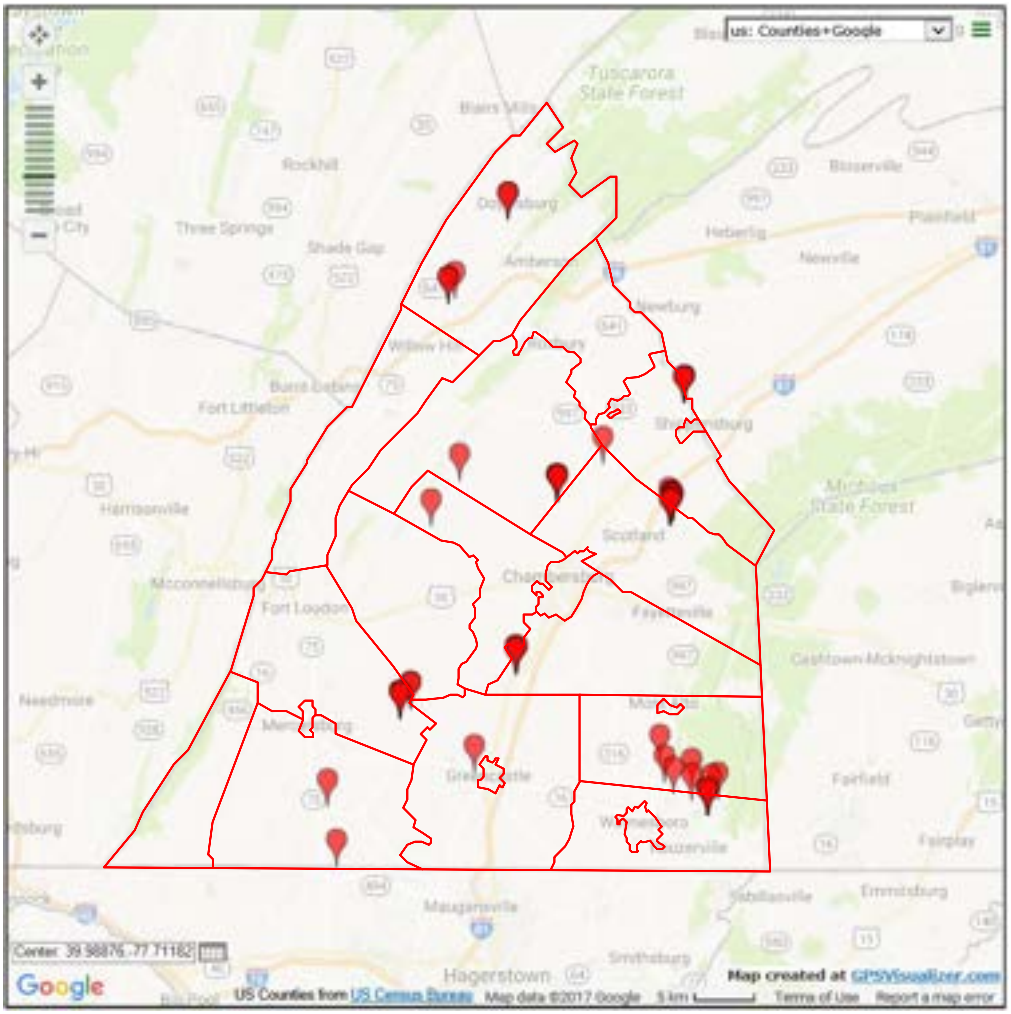

Figure 3.1.17.3.1: Location of Surface Mines in Franklin County (2017)[127]

[127] DCNR, Bureau of Topographic and Geologic Survey, 2017

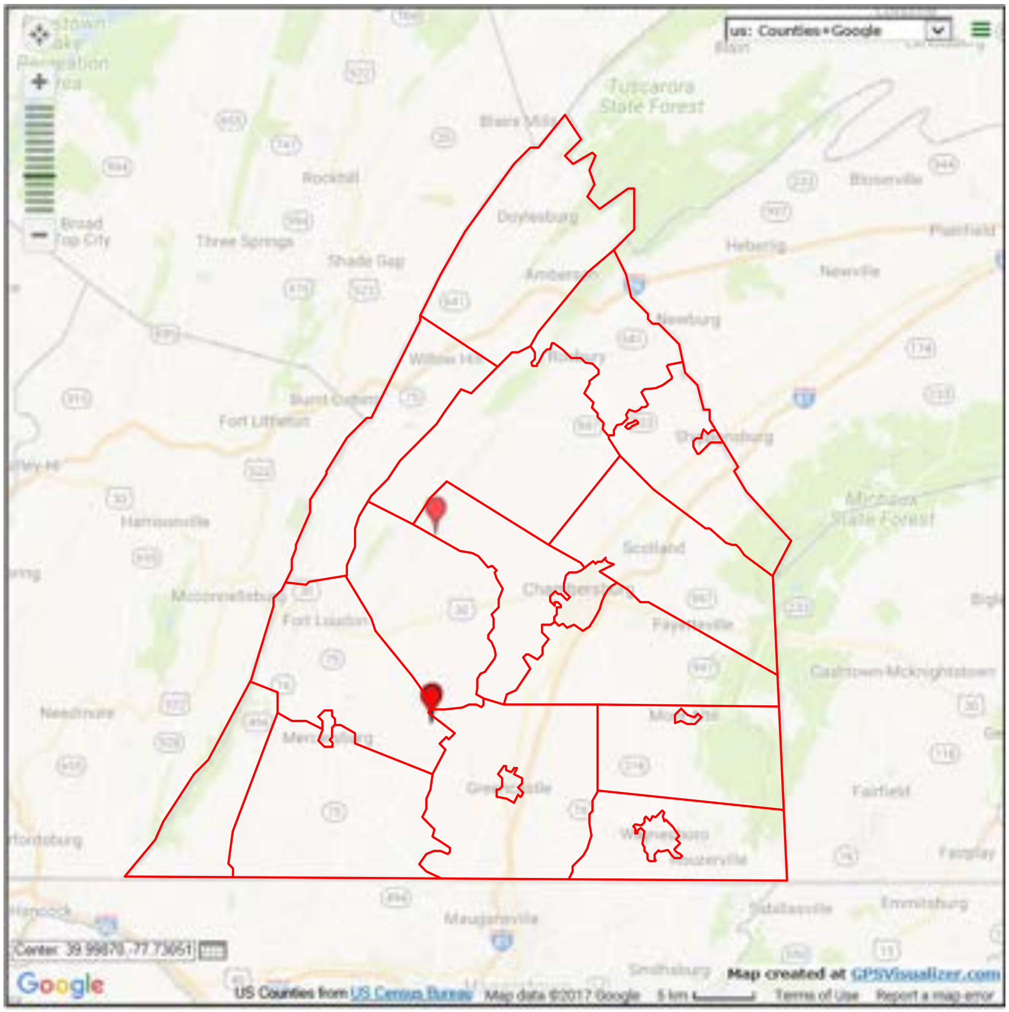

Figure 3.1.17.3.2: Location of Caves in Franklin County (2017)[128]

[128] DCNR, Bureau of Topographic and Geologic Survey, 2017

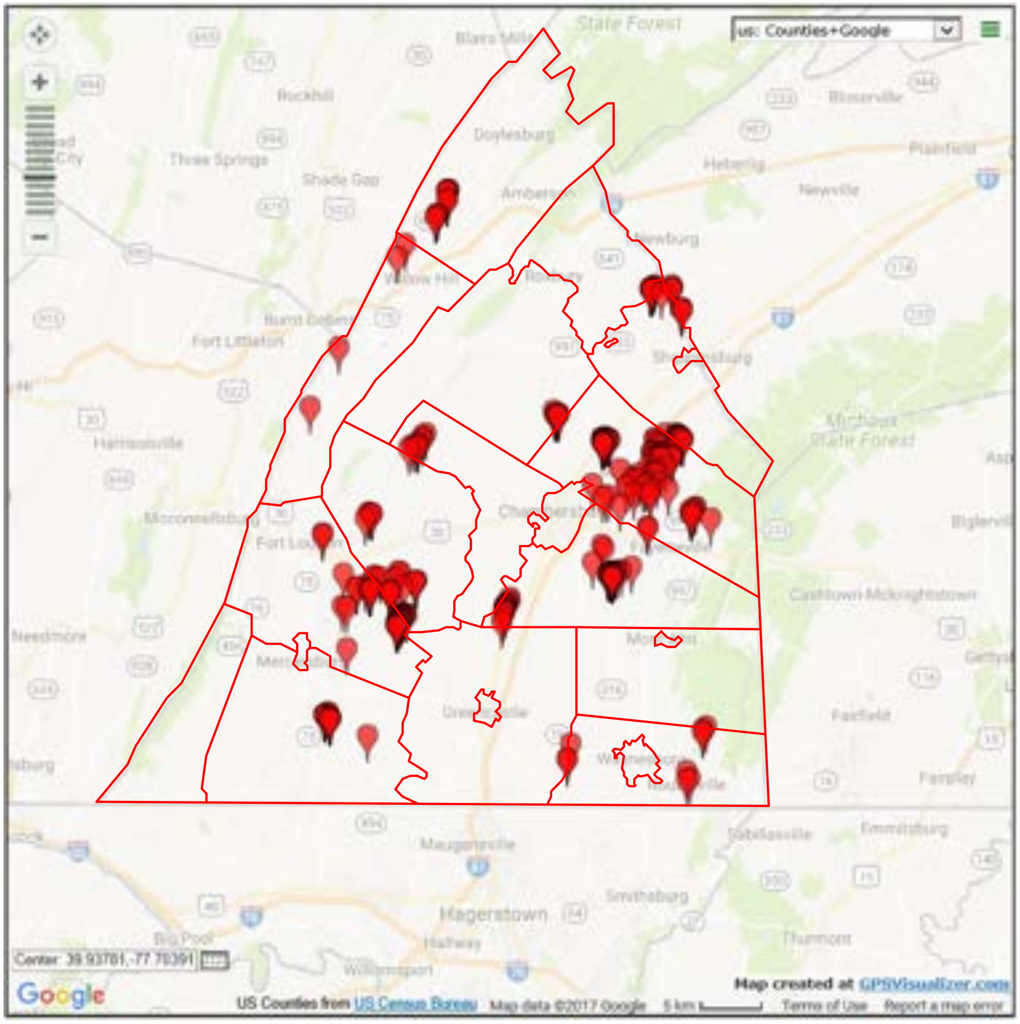

Figure 3.1.17.3.3: Location of Sinkholes in Franklin County (2017)[129]

[129] DCNR, Bureau of Topographic and Geologic Survey, 2017

Municipality	Sinkholes	Surface Mines	Caves	Totals
Antrim Township	9	1	0	**10**
Chambersburg Borough	0	0	0	**0**
Fannett Township	12	5	0	**17**
Greencastle Borough	0	0	0	**0**
Greene Township	94	9	0	**103**
Guilford Township	36	3	0	**39**
Hamilton Township	2	1	1	**4**
Letterkenny Township	0	5	0	**5**
Lurgan Township	0	0	0	**0**
Mercersburg Borough	0	0	0	**0**
Metal Township	4	0	0	**4**
Mont Alto Borough	0	0	0	**0**
Montgomery Township	12	2	0	**14**
Orrstown Borough	0	0	0	**0**
Peters Township	47	0	3	**50**
Quincy Township	0	3	0	**3**
Shippensburg Borough	0	0	0	**0**
Southampton Township	15	3	0	**18**
St Thomas Township	20	5	0	**25**
Warren Township	0	0	0	**0**
Washington Township	9	7	0	**16**
Waynesboro Borough	0	0	0	**0**
Totals	**260**	**44**	**4**	**308**

Table 3.1.17.3.1: Subsidence Events/Features Recorded in Franklin County (2017)[130]

The data presented above illustrates the susceptibility of certain regions of our county to subsidence. Even though all municipalities do not show an event, it only means that events were not reported. These events often go unnoticed or unreported if there is no significant property damage.

3.1.17.4. Future Occurrence

Sinkhole occurrence is a continuing phenomenon and is fairly common in the carbonate areas of the Cumberland Valley, but the impact is relatively low based on past occurrences. However, as the rural areas of the County become increasingly developed due to more people moving out of

[130] DCNR, Dept of Conservation and Natural Resources, 2017

the Boroughs and into the Townships, the strain on underground aquifers will increase. This will pose an even greater threat for sinkholes in those areas resulting from groundwater depletion.

Based on geological conditions, subsidence events are likely to continue to occur in the future for the areas of the Cumberland Valley underlain by carbonate bedrock (See **Figure 3.1.17.2.1** above) and experiencing increased development.

It is difficult to calculate financial losses for all existing buildings, critical facilities and infrastructure from potential sinkhole formations in the County. However, we have plotted the susceptibility area in our GIS mapping system to determine the number of critical facilities and infrastructure in each municipality that are at risk to this threat (See **Figure 3.1.17.4.1** and **Table 3.1.17.4.1** below).

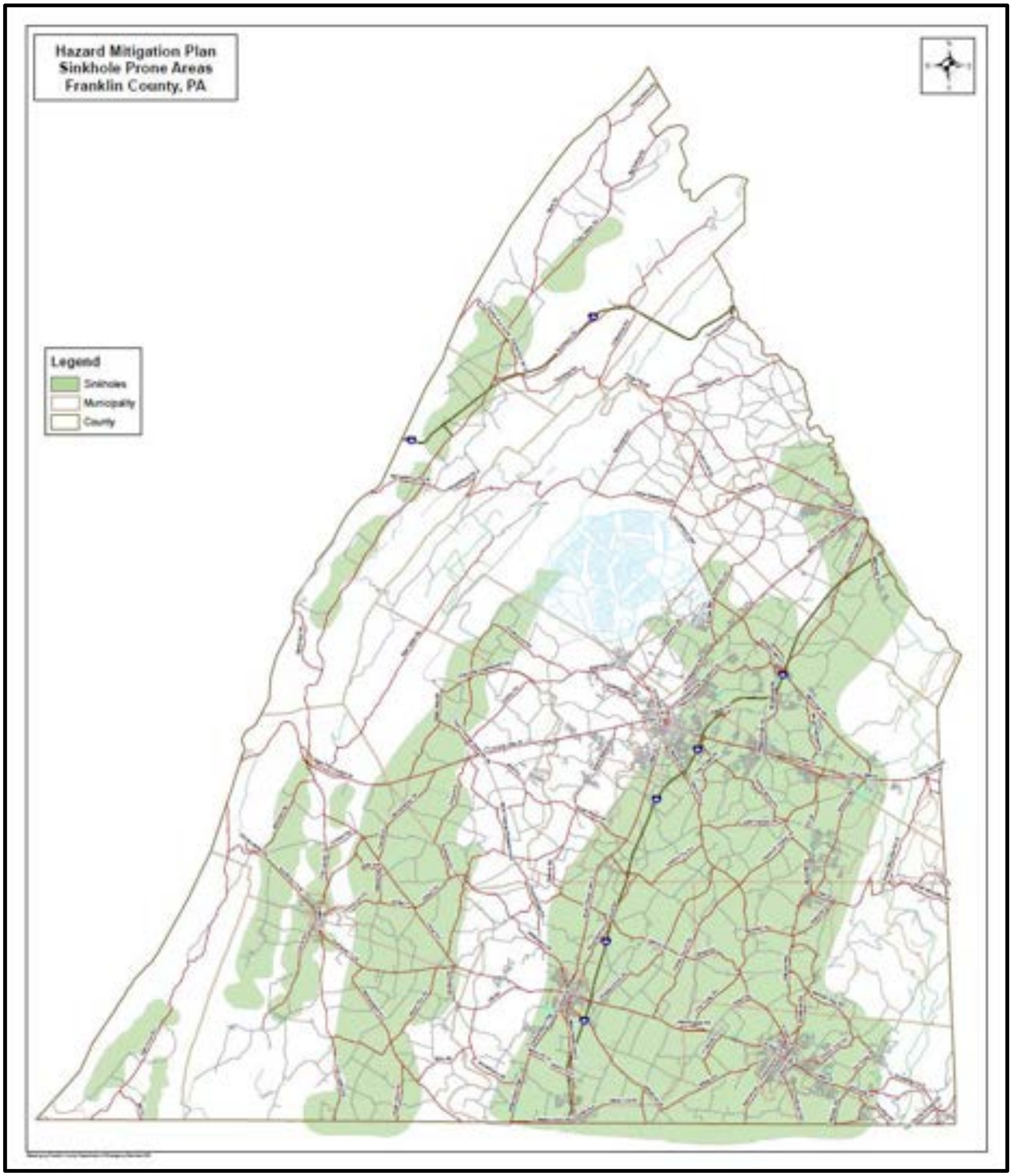

Figure 3.1.17.4.1: Areas of Susceptibility to Sinkholes in Franklin County

Municipality	Total Number of Critical Facilities	Critical Facilities in Risk Areas
Antrim Township	75	65
Chambersburg Borough	97	51
Fannett Township	27	7
Greencastle Borough	24	25
Greene Township	100	83
Guilford Township	85	82
Hamilton Township	47	4
Letterkenny Township	20	0
Lurgan Township	21	0
Mercersburg Borough	10	5
Metal Township	15	5
Mont Alto Borough	6	6
Montgomery Township	12	6
Orrstown Borough	1	0
Peters Township	22	9
Quincy Township	48	31
Shippensburg Borough	5	5
Southampton Township	30	18
St Thomas Township	20	6
Warren Township	2	0
Washington Township	46	34
Waynesboro Borough	45	47
Totals	**758**	**489**

Table 3.1.17.4.1: Critical Facilities in Sinkhole Susceptible Areas by Municipality

From the information above, it is easily seen that the susceptibility area amounts to approximately 40% of the land area of Franklin County (See **Figure 3.1.17.1.1** above). Additionally, it is evident that we have several critical facilities and infrastructure in these susceptible areas that cause concern for this threat. Therefore, the future occurrence of subsidence and sinkholes is considered ***possible*** as defined by the Risk Factor Methodology probability criteria (refer to **Section 1.2**).

3.1.17.5. Vulnerability Assessment

Figure 3.1.17.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Subsidence/Sinkhole hazard. One can see that only 5 of 22 municipalities rated this threat as either a Major or Moderate event. This was ranked as the number 17 threat in Franklin County and is considered a Minor threat.

Subsidence/Sinkhole Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	3	30%	2	30%	1	20%	4	10%	1	10%	2.2	10.12%	0.2226
Chambersburg Borough	4	30%	1	30%	1	20%	4	10%	1	10%	2.2	14.05%	0.3091
Fannett Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.59%	0.0159
Greencastle Borough	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	2.73%	0.0437
Greene Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	11.82%	0.1891
Guilford Township	4	30%	2	30%	2	20%	4	10%	1	10%	2.7	9.38%	0.2533
Hamilton Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	7.29%	0.0948
Letterkenny Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	1.58%	0.0284
Lurgan Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	1.42%	0.0185
Mercersburg Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	0.97%	0.0126
Metal Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	1.13%	0.0147
Mont Alto Borough	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.01%	0.0101
Montgomery Township	3	30%	2	30%	4	20%	4	10%	1	10%	2.8	3.68%	0.1030
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	0.14%	0.0017
Peters Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	2.86%	0.0372
Quincy Township	3	30%	1	30%	1	20%	4	10%	1	10%	1.9	3.41%	0.0648
Shippensburg Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	0.75%	0.0098
Southampton Township	3	30%	2	30%	3	20%	4	10%	1	10%	2.6	5.49%	0.1427
St Thomas Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	3.79%	0.0606
Warren Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	0.21%	0.0027
Washington Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	9.55%	0.0955
Waynesboro Borough	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	7.02%	0.1123
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.843

Figure 3.1.17.5.1: Municipal Subsidence/Sinkhole Threat Vulnerability Self-Assessment

From the information above, it can be said that the majority of communities in Franklin County are vulnerable on some level to the Subsidence/Sinkhole threat. However, the impact to lives and level of property damage for this threat has been negligible to date.

3.1.18. Terrorism

The term "terrorism" refers to intentional, criminal, malicious acts, but the functional definition of terrorism can be interpreted in many ways. Officially, 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" (28 CFR §0.85). Terrorists use threats to create fear, to try to convince citizens of the powerlessness of their government, and/or to get publicity for their cause.

<u>International terrorism</u>: Perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored). For example, the December 2, 2015 shooting in San Bernardino, CA, that killed 14 people and wounded 22 which involved a married couple who radicalized for some time prior to the attack and were inspired by multiple extremist ideologies and foreign terrorist organizations.

<u>Domestic terrorism</u>: Perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature. For example, the June 8, 2014 Las Vegas shooting, during which two police officers inside a restaurant were killed in an ambush-style attack, which was committed by a married couple who held anti-government views and who intended to use the shooting to start a revolution[131].

3.1.18.1. Location and Extent

Terrorism is a threat everywhere, but there are a number of important considerations in evaluating terrorism hazards, such as the existence of facilities, landmarks, or other buildings of international, national, regional, or local importance. High-risk targets for acts of terrorism include military and civilian government facilities, international airports, large cities, high-profile landmarks. Terrorists might also target large public gatherings and events indoor or outdoor, water and food supplies, utilities, and corporate centers. Furthermore, terrorists are capable of spreading fear by sending explosives or chemical and biological agents through the mail (FEMA, April 2009). Nonetheless, terrorism can take many forms and terrorists have a wide range of personal, political, religious or cultural agendas. Therefore, **<u>all locations</u>** are a potential terrorist target.

Of particular concern are the critical facilities in Franklin County. Police stations, hospitals, fire stations, schools, wastewater treatment plants, and a military installation (Letterkenny Army Depot) along with critical infrastructure such as bridges, tunnels, electric generation/distribution facilities, public water supplies, and government buildings may be potential terrorist targets.

[131] FBI

Damage to these facilities and infrastructure could cripple transportation routes and commerce. Additionally, there are 139 Superfund Amendments and Reauthorization Act (SARA) Title III facilities as well as many transportation routes vital to the entire Commonwealth traversing Franklin County, making intentional hazard material releases a potential threat to citizens and the environment.[132] For Terrorism, all of Franklin County has been identified as the hazard area. Therefore, all critical facilities, houses, population, and infrastructure as outlined in **Tables 2.4.5 and 2.4.6, Section 2** are vulnerable.

3.1.18.2. Range of Magnitude

Terrorist attacks can take many forms, including agro-terrorism, arson/incendiary attack, armed attack, assassination, biological agent, chemical agent, cyber-terrorism, conventional bomb, hijackings, intentional hazardous material release, kidnapping, nuclear bomb and radiological agent (FEMA April 2009). Explosives have been the traditional method of conducting terrorism, but intelligence suggests that the possibility of biological or chemical terrorism is increasing. The severity of terrorist incidents depends upon the method of attack, the proximity of the attack to people, animals, or other assets and the duration of exposure to the incident or attack device. For example, chemical agents are poisonous gases, liquids, or solids that have toxic effects on people, animals, or plants. Many chemical agents can cause serious injuries or death. In this case, severity of injuries depends on the type and amount of the chemical agent used and the duration of exposure.

Biological agents are organisms or toxins that have illness-producing effects on people, livestock, and crops. Some biological agents cannot be easily detected and may take time to develop. Therefore, it can be difficult to know that a biological attack has occurred until victims display symptoms. In other cases, the effects are immediate. Those affected by a biological agent require the immediate attention of professional medical personnel. Some agents are contagious which may result in the need for victims to be quarantined.

In recent years, cyber-terrorism has become a larger threat than in years past. Cyber-terrorism can be defined as activities intended to damage, disrupt, or exploit vital computer systems. These acts can range from taking control of a host website to using networked resources to directly cause destruction and harm. Protection of databases and infrastructure appear to be the main goals at this point in time. Cyber-terrorists can be difficult to identify because the internet provides a meeting place for individuals from various parts of the world. Individuals or groups planning a cyber-attack are not organized in a traditional manner, as they are able to effectively communicate over long distances without delay. The largest threat to institutions from cyber-terrorism comes from any processes that are networked and controlled via computer. Any vulnerability that could allow access to sensitive data or processes should be addressed and any possible measures taken to harden those resources to attack.

Active assailant, as defined by the US Department of Homeland Security, is an individual actively engaged in killing or attempting to kill people in a confined area; in most cases, active assailants use firearm(s) and there is no pattern or method to their selection of victims. Recent high-profile incidents involving active assailants include: the Sandy Hook Elementary school

[132] PEMA, 2013

shootings in Newtown, Connecticut; the shooting in the Aurora, Colorado movie theater; Pulse Nightclub mass shooting in Orlando, Florida; the deadliest mass shooting incident in U.S. history in Las Vegas, Nevada at the Mandalay Bay Resort and Casino; and the most recent mass shooting at the First Baptist Church in Sutherland Springs, Texas. Historical active assailant events include the 1982 Wilkes-Barre, Pennsylvania mass shootings, the Nickel Mines Pennsylvania hostage taking and shootings, the Virginia Tech shootings, the Columbine High School shootings, and the University of Texas (Austin) shootings. No substantive research has yet been compiled to address the potential vulnerability to an active assailant incident. As a very open, public society, these incidents are easier to accomplish for those bent on doing harm. Some of these incidents have occurred in public places and some in places that are considered more restricted, like elementary schools and high schools. There is no discernible pattern to the location chosen by the assailant.

Instances of terrorism in Franklin County have thankfully thus far been minimal. A worst-case scenario for a terrorism event in Franklin County would be if a "dirty bomb" combining radioactive material with conventional explosives were to be detonated at a large gathering of people at a large athletic event or a heavily attended school or community function. On the given day and specific location, a significant number of individuals would be exposed to the bomb's radiation both at the time of detonation and after the fact as the radiation spreads. The explosive device could damage or even topple buildings, spark utility outages area-wide, and/or ignite large-scale fires. Another potential lethal and injurious situation for terrorism in Franklin County is where a "known or lone wolf" individual rents or uses some type of vehicle and drives into a crowd or a group of people along a street or at some type of event. An incident of this depiction occurred on October 31, 2017 in Manhattan, New York City, where an individual drove a rental truck on a bike path and killed at least eight people while injuring 11 or more. Another harmful scenario for Franklin County would be if the water or food supply is intentionally contaminated in an act of agro-terrorism. Franklin County ranks second in the state in many valuable agricultural commodities. Not only would this act of terrorism endanger the lives of people and livestock in the county, it would adversely affect the local economy[133].

3.1.18.3. Past Occurrence

There has been a high consciousness of terrorist activity in the press with few catastrophic events. The most significant terrorist attack on US soil occurred on September 11, 2001. Flight 93, the fourth hijacked aircraft in the attack, crashed in Somerset County, Pennsylvania. Another significant recent terrorist event was the detonation of a pair of homemade pressure cooker bombs at the finish line of the Boston Marathon. This event killed 3 people and injured a further 264 people[134].

Franklin County experienced a case of domestic terrorism between September 10 and 24, 2008. During this time frame there were 10 pipe bombing incidents in St. Thomas Township. Through a joint investigation conducted by the Pennsylvania State Police; the Bureau of Alcohol, Tobacco and Firearms; and the U.S. Postal Service Inspector Division, three local high school students were arrested and charged as juveniles with Possessing Weapons of Mass Destruction, Causing

133 PEMA, 2013
134 PEMA, 2013

or Risking a Catastrophe, Recklessly Endangering Another Person, and Possession of Instruments of Crime from statutes found in the Pennsylvania Crimes Code. Fortunately, no one was seriously injured during this crime spree[135]. **Table 3.1.18.3.1** illustrates the previously recorded events in Franklin County that can be categorized as Terrorist Activity.

Threat/Suspected Terrorist Activity Type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Totals
Bomb Threat	0	0	0	0	0	0	4	2	2	0	**8**
Suspicious Activity	261	240	183	215	338	258	322	349	404	348	**2,918**
Suspicious Package	11	8	3	10	11	8	11	11	17	13	**103**
Terrorist Activity	14	10	4	3	1	0	1	2	2	0	**37**
Threats – Non-Specified	180	153	178	177	228	208	202	212	258	235	**2,031**
Totals	**446**	**411**	**368**	**405**	**578**	**474**	**540**	**576**	**683**	**596**	**5,097**

Table 3.1.18.3.1: Threat/Suspected Terrorist Activity Events Reported in Franklin County (2007-2016)[136]

3.1.18.4. Future Occurrence

Based on historical events, Franklin County and Pennsylvania can expect to experience terrorist incidents and suspicious activities sometime in the near future. Note that this estimate is based on the occurrence of past events over a short period of time and is not the result of detailed statistical sampling. Although previous events 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. Prediction of terrorist attacks is almost impossible because terrorism is a result of human factors. As long as fringe groups maintain radically different ideas than that of the government or general population, terrorism is a possibility[137].

3.1.18.5. Vulnerability Assessment

Figure 3.2.18.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Terrorism hazard. One can see that 4 of 22 municipalities rated this threat as either a Catastrophic or Major event. Of the remaining 18 municipalities, only 6 ranked this as a Moderate threat. This was ranked as the number 16 threat in Franklin County and is considered a Minor threat.

[135] The Herald Mail, 2008
[136] Franklin County CAD System, 2007-2017
[137] PEMA, 2013

Terrorism
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	1	30%	2	20%	4	10%	2	10%	1.9	10.12%	0.1923
Chambersburg Borough	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	14.05%	0.1967
Fannett Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.59%	0.0175
Greencastle Borough	2	30%	4	30%	3	20%	4	10%	2	10%	3.0	2.73%	0.0819
Greene Township	1	30%	2	30%	1	20%	4	10%	2	10%	1.7	11.82%	0.2009
Guilford Township	1	30%	3	30%	2	20%	4	10%	2	10%	2.2	9.38%	0.2064
Hamilton Township	1	30%	1	30%	3	20%	4	10%	2	10%	1.8	7.29%	0.1312
Letterkenny Township	3	30%	4	30%	4	20%	4	10%	2	10%	3.5	1.58%	0.0553
Lurgan Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.42%	0.0156
Mercersburg Borough	1	30%	4	30%	4	20%	4	10%	2	10%	2.9	0.97%	0.0281
Metal Township	2	30%	2	30%	2	20%	3	10%	2	10%	2.1	1.13%	0.0237
Mont Alto Borough	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	1.01%	0.0141
Montgomery Township	3	30%	3	30%	3	20%	4	10%	2	10%	3.0	3.68%	0.1104
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	0.14%	0.0018
Peters Township	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	2.86%	0.0400
Quincy Township	2	30%	2	30%	4	20%	1	10%	2	10%	2.3	3.41%	0.0784
Shippensburg Borough	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	0.75%	0.0120
Southampton Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	5.49%	0.1208
St Thomas Township	2	30%	2	30%	1	20%	4	10%	2	10%	2.0	3.79%	0.0758
Warren Township	1	30%	2	30%	1	20%	4	10%	2	10%	1.7	0.21%	0.0036
Washington Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	9.55%	0.1051
Waynesboro Borough	2	30%	2	30%	1	20%	4	10%	2	10%	2.0	7.02%	0.1404
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.852

Figure 3.1.18.5.1: Municipal Terrorism Threat Vulnerability Self-Assessment

All communities in Franklin County are vulnerable on some level, directly or indirectly, to a terrorist attack. However, communities where the previously mentioned potential targets are located should be considered more vulnerable. Larger populated areas are the most vulnerable to terrorist attacks due to the sheer size of these areas, density of the population, and concentration of critical infrastructure located there.

3.1.19. Tornado, Windstorm

A tornado is a violently rotating column of air extending from the base of a thunderstorm down to the ground. Tornadoes are capable of completely destroying well-made structures, uprooting trees, and hurling objects through the air like deadly missiles. Tornadoes can occur at any time of day or night and at any time of the year. Although tornadoes are most common in the Central Plains and the southeastern United States, they have been reported in all 50 states[138]. Wind speeds in tornadoes can range from 65 to over 200 mph. Although tornadoes occur in many parts of the world, these destructive forces of nature are found most frequently in the United States east of the Rocky Mountains during the Spring and Summer seasons. Tornadoes are most frequent during late afternoon into early evening, the warmest hours of the day.

Straight-line winds and windstorms are experienced on a more region-wide scale. While such winds usually accompany tornadoes, straight-line winds are caused by the movement of air from areas of higher pressure to areas of low 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.

3.1.19.1. Location and Extent

Both tornado and windstorm events can occur throughout Pennsylvania. Tornado events are usually localized. However, severe thunderstorms may result in conditions favorable to the formation of numerous or long-lived tornadoes. 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. Most tornadoes have wind speeds of 110 mph or less, are approximately 250 feet across, and travel a few miles before dissipating. Some attain wind speeds of more than 300 mph, stretch more than a mile across, and stay on the ground for dozens of miles. Some tornadoes never touch the ground and are short-lived, while others may touch the ground several times.

Wind events can vary in spatial size from small micro-scale events which take place over only a few hundred meters to large-scale synoptic wind events often associated with warm or cold fronts.

[138] NOAA/NWS

3.1.19.2. Range of Magnitude

Tornadoes cause an average of 70 fatalities and 1,500 injuries in the United States each year[139]. There are regions of the United States that have a higher level of tornado activity, such as Tornado Alley in the Mid-West, but all areas of the country are susceptible to them, including Franklin County.

Tornadoes vary in size and severity and were measured by the Fujita Scale until February 2007. At that time, the scale was retooled to allow for a better indicator of damage from the storms. This new scale is called the Enhanced Fujita Scale. **Figure 3.1.19.2.1** shows both scales. The Fujita scale is included because the historical tornado events for Franklin County can be reported using either scale, depending on when they occurred.

Fujita Scale		Enhanced Fujita Scale* (* In use since 2007)	
F–0	40–72 mph winds	EF–0	65–85 mph winds
F–1	73–112 mph	EF–1	86–110 mph
F–2	113–157 mph	EF–2	111–135 mph
F–3	158–206 mph	EF–3	136–165 mph
F–4	207–260 mph	EF–4	166–200 mph
F–5	261–318 mph	EF–5	>200 mph

Figure 3.1.19.2.1: Fujita and Enhanced Fujita Scales

There are two types of alerts for tornado activity, they are defined below:

- Tornado Watch: Tornadoes are possible, be prepared. Weather conditions favor thunderstorms capable of producing tornadoes in and near the defined watch area.

- Tornado Warning: Tornadoes are expected, seek shelter. A tornado is occurring or will shortly develop in or near the defined watch area.

Pennsylvania averages 12 tornadoes per year, resulting in an average of 1 fatality. Counties in a high risk tornado area include York County, Lancaster County, and Dauphin County (all part of the South Central Task Force Region that includes Franklin County). The largest tornado on record in this region occurred on 05/31/1985, measuring an F4 on the Fujita scale[140].

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[139] Missouri Storm Aware
[140] Homefacts

3.1.19.3. Past Occurrence

Franklin County has experienced 13 recorded tornado events on 10 separate days since 1950[141]. **Figure 3.1.19.3.1** shows a map of these tornado events in Franklin County since 1950.

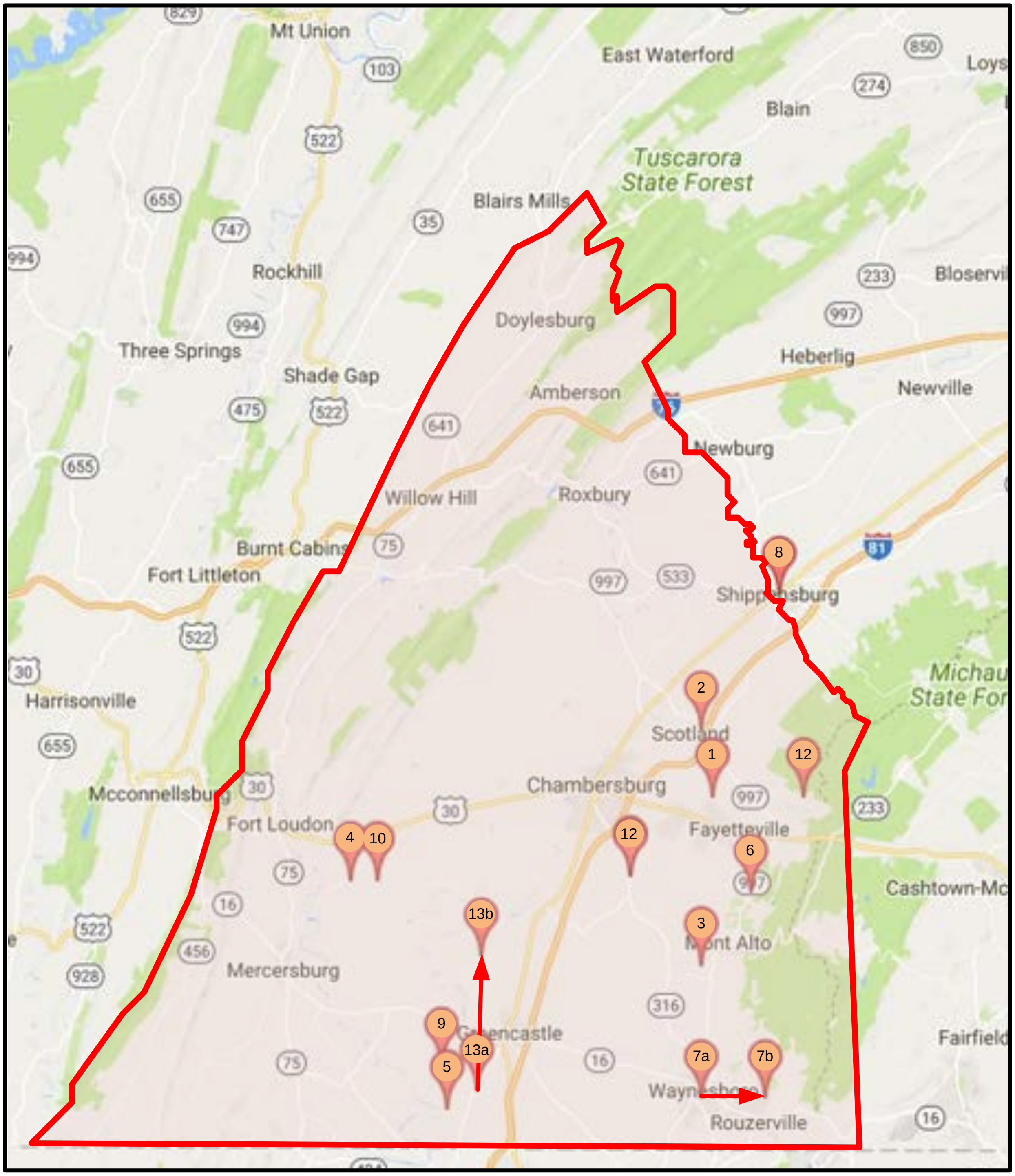

Figure 3.1.19.3.1: Tornado Events in Franklin County (1950-2018)

[141] NOAA/NCEI

Table 3.1.19.3.1 below lists these events with the deaths, injuries, and property damage assessed for each storm.

#	Location	Municipality	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
1	Milnor	Antrim Township	8/26/2012	1256	EF0	0	0	$10K	$1.5K
2	Zumbro	Guilford Township	5/26/2011	1710	EF1	0	0	$10K	$0
3	Chambersburg	Greene Township	9/17/2004	1918	F1	0	0	$0	$0
4	St Thomas	Peters Township	9/17/2004	1828	F1	0	0	$0	$0
5	Greencastle	Antrim Township	9/17/2004	1814	F1	0	0	$0	$0
6	Shippensburg	Shippensburg Borough	7/30/1996	1830	F1	0	0	$0	$0
7	Waynesboro	Waynesboro Borough	7/19/1996	1330	F1	0	0	$0	$0
8	Pond Bank	Guilford Township	4/30/1994	2010	F2	0	2	$500K	$0
9	Greencastle	Antrim Township	4/30/1994	2000	F1	0	0	$50K	$0
10	Lemasters	Peters Township	6/19/1992	1120	F0	0	0	$25K	$0
11	Mont Alto	Quincy Township	6/20/1989	1756	F1	0	0	$25K	$0
12	Scotland	Greene Township	3/21/1976	1050	F0	0	0	$2.5K	$0
13	Fayetteville	Greene Township	7/29/1974	1900	F1	0	0	$25K	$0
Totals						**0**	**2**	**$647.5K**	**$1.5K**

Table 3.1.19.3.1: List of Tornado Events in Franklin County (1950-2018)

Franklin County has experienced 252 recorded High Wind/Thunderstorm Wind events on 188 separate days since 1950[142]. **Table 3.1.19.3.2** shows the municipalities where these events occurred in Franklin County since 1950.

[142] NOAA/NCEI

Municipality	# of Events	Deaths	Injuries	Property Damage	Crop Damage
Antrim Township	19	0	0	$71,000	$0
Chambersburg Borough	22	0	1	$55,500	$0
Fannett Township	11	0	0	$26,000	$0
Greencastle Borough	12	0	0	$19,500	$0
Greene Township	13	0	0	$510,500	$0
Guilford Township	24	0	0	$39,000	$0
Hamilton Township	37	0	0	$69,500	$0
Letterkenny Township	9	0	0	$51,000	$0
Lurgan Township	4	0	0	$10,000	$0
Mercersburg Borough	20	0	0	$31,500	$0
Metal Township	3	0	0	$5,000	$0
Mont Alto Borough	0	0	0	$0	$0
Montgomery Township	3	0	0	$10,000	$0
Orrstown Borough	0	0	0	$0	$0
Peters Township	1	0	0	$12,000	$0
Quincy Township	10	0	0	$6,000	$0
Shippensburg Borough	4	0	0	$12,000	$0
Southampton Township	2	0	0	$0	$0
St Thomas Township	7	0	0	$32,500	$0
Warren Township	2	0	0	$5,000	$0
Washington Township	13	0	0	$27,500	$0
Waynesboro Borough	24	0	0	$25,000	$0
Countywide Events	12	1	0	$58,450	$4,000
Totals	**252**	**1**	**1**	**$1,076,950**	**$4,000**

Table 3.1.19.3.2: Roll-up of Thunderstorm Wind and High Wind Events in Franklin County (1950-2018)[143]

Appendix E contains a complete list of all recorded Windstorm events with the deaths, injuries, and property damage assessed for each occurrence.

[143] NOAA/NCEI

3.1.19.4. Future Occurrence

While the chance of being hit by a tornado is small, the damage that results when the tornado arrives is devastating. An EF4 tornado can have 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. Unlike some hazards, tornadoes are not specific to select parts of the county. Rather, a tornado could strike any part of the county, and at any time, and could cause as much or as little damage as possible for the given magnitude event.

Based on tornado activity in Pennsylvania between 1950 and 2002, most of Franklin County lays within the area of 10-20 events (See **Figure 3.1.19.4.1** below), all in the F0/EF0, F1/EF1, and F2/EF2 ranges (See **Figure 3.1.19.3.2 above**). This equates to roughly 1 tornado every 4 years.

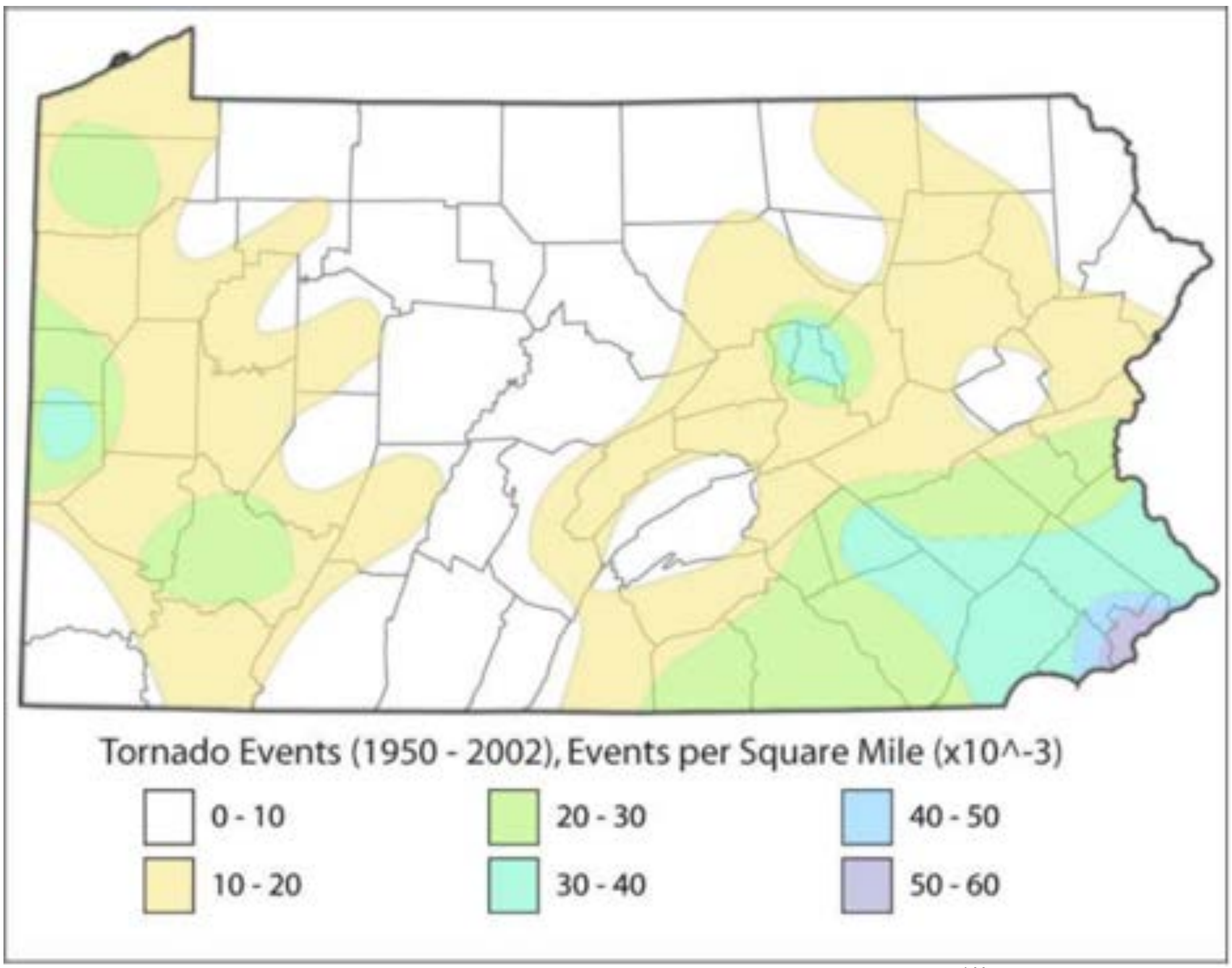

Figure 3.1.19.4.1: Tornado Events for Pennsylvania (1950-2002)[144]

Based on the Tornado and Windstorm event history of Franklin County, the future occurrences of tornadoes and/or windstorms should be considered ***highly likely*** as defined by the Risk Factor ranking probability criteria (See **Section 1.2**).

[144] PEMA, 2013

3.1.19.5. Vulnerability Assessment

Based on all the information available, every community in Franklin County is equally vulnerable to the direct impacts of Tornadoes and Windstorms. For Tornadoes and Windstorms, all of Franklin County has been identified as the hazard area. Therefore, all critical facilities, houses, population, and infrastructure as outlined in **Tables 2.4.5 and 2.4.6, Section 2** are vulnerable.

Figure 3.1.19.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Tornado and Windstorm hazard. One can see that 10 of 22 municipalities rated this threat as either a Catastrophic or Major event. Furthermore, 7 of the remaining 12 municipalities have it ranked as a Moderate threat. This is a Moderate threat ranked number 3 highest for Franklin County.

Tornado/Windstorm Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	4	30%	3	30%	3	20%	2	10%	1	10%	3.0	10.12%	0.3036
Chambersburg Borough	2	30%	3	30%	2	20%	4	10%	1	10%	2.4	14.05%	0.3372
Fannett Township	2	30%	2	30%	4	20%	4	10%	1	10%	2.5	1.59%	0.0398
Greencastle Borough	2	30%	4	30%	4	20%	4	10%	1	10%	3.1	2.73%	0.0846
Greene Township	3	30%	1	30%	2	20%	4	10%	1	10%	2.1	11.82%	0.2482
Guilford Township	3	30%	2	30%	4	20%	4	10%	1	10%	2.8	9.38%	0.2626
Hamilton Township	2	30%	2	30%	4	20%	4	10%	1	10%	2.5	7.29%	0.1823
Letterkenny Township	3	30%	1	30%	3	20%	4	10%	1	10%	2.3	1.58%	0.0363
Lurgan Township	2	30%	2	30%	3	20%	4	10%	1	10%	2.3	1.42%	0.0327
Mercersburg Borough	2	30%	3	30%	4	20%	4	10%	1	10%	2.8	0.97%	0.0272
Metal Township	2	30%	2	30%	1	20%	1	10%	1	10%	1.6	1.13%	0.0181
Mont Alto Borough	2	30%	1	30%	3	20%	3	10%	1	10%	1.9	1.01%	0.0192
Montgomery Township	3	30%	3	30%	4	20%	4	10%	1	10%	3.1	3.68%	0.1141
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	0.14%	0.0017
Peters Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	2.86%	0.0372
Quincy Township	3	30%	2	30%	4	20%	1	10%	1	10%	2.5	3.41%	0.0853
Shippensburg Borough	2	30%	3	30%	2	20%	2	10%	1	10%	2.2	0.75%	0.0165
Southampton Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	5.49%	0.1153
St Thomas Township	4	30%	2	30%	2	20%	4	10%	1	10%	2.7	3.79%	0.1023
Warren Township	2	30%	2	30%	3	20%	4	10%	1	10%	2.3	0.21%	0.0048
Washington Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	9.55%	0.1719
Waynesboro Borough	3	30%	2	30%	4	20%	4	10%	1	10%	2.8	7.02%	0.1966
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.437

Figure 3.1.19.5.1: Municipal Tornado/Windstorm Threat Vulnerability Self-Assessment

Windstorm events related to Thunderstorms and High Winds are more common in Franklin County than are tornadoes, but the impacts to life and property of these events tends to be much smaller and localized. Combined there have been 265 Tornado and Windstorm events in Franklin County since 1950. Fortunately, the impacts to life have been relatively small with only 1 death and 3 injuries. On the other hand, property and crop damages have been significant, with $1,724,450 in property damages and $5,500 in crop damages.

Tornadoes and Windstorms will occur again in Franklin County and mitigation plans will have to be crafted to reduce the threat to life and property of our citizens.

3.1.20. Transportation Accident

Transportation hazards can include, but are not limited to: hazardous materials in transit, vehicular accidents, aviation accidents, at-grade railroad crossings, and roadways vulnerable to floods. For the purposes of this plan, transportation accidents are defined as incidents involving highway, rail, and air travel.

3.1.20.1. Location and Extent

Within Franklin County, there are over 1,700 miles of roads and streets, over 400 bridges, 2 intermodal terminals, 1 airport, and about 149 miles of railways. Primary key routes move traffic and goods in and out of Franklin County. The following routes are considered primary key routes: I-81, I-76, US Route 30, US Route 11, and PA 16. Secondary key routes typically move traffic and goods within Franklin County. The following routes are considered secondary key routes: PA 997, PA 316, PA 75, PA 416, PA 433, PA 696, PA 641 and PA 533. **Figure 3.1.20.1.1** below identifies where these key secondary routes intersect. **Figure 3.1.20.1.2** shows where these intersections are in the county that can be high accident areas or choke points for evacuations.

SR	997	641	533	433	416	316	233	75	30	16	11
11	X		X	X		X			X	X	
16	X					X		X			
30	X				X		X	X			
75		X	X		X						
233	X										
316											
416											
433			X								
533	X										
641	X										
997											

Figure 3.1.20.1.1: Secondary Route Intersections in Franklin County

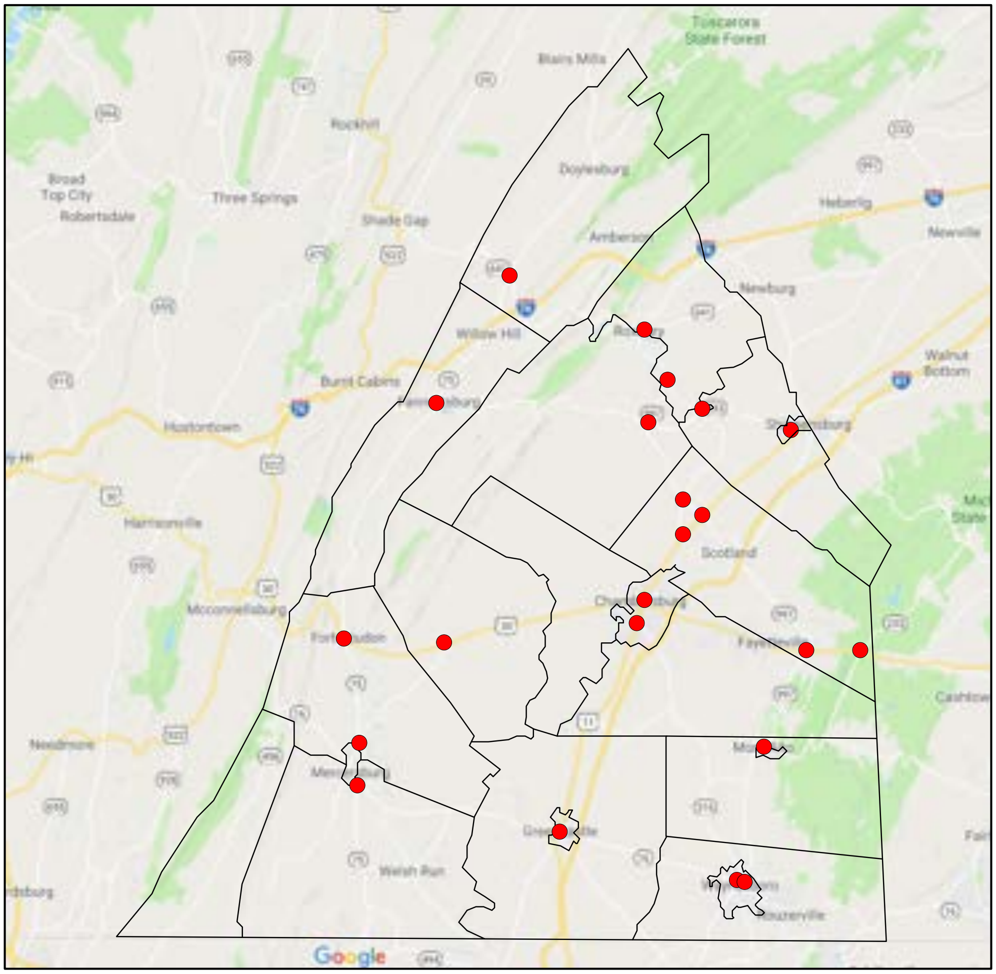

Figure 3.1.20.1.2: Locations of Key Secondary Route Intersections

<u>Railroad Lines:</u>

The county has two main railroad lines within its borders: Norfolk Southern Railroad Line and CSX Railroad Line. The Norfolk Southern Railroad line runs along the center of Franklin County paralleling US Route 11 and I-81. The Norfolk Southern Railroad transverses through the following municipalities: Shippensburg Borough, Southampton Township, Greene Township, Chambersburg Borough, Guilford Township, Antrim Township, and Greencastle Borough. This railroad line utilizes a combination of at-grade crossing, and above and under grade road/street crossings. Out of the two aforementioned railroad lines, Norfolk Southern Railroad Line is the one built through densely populated areas in Franklin County. **Figure 3.1.20.1.3** depicts our railroad system.

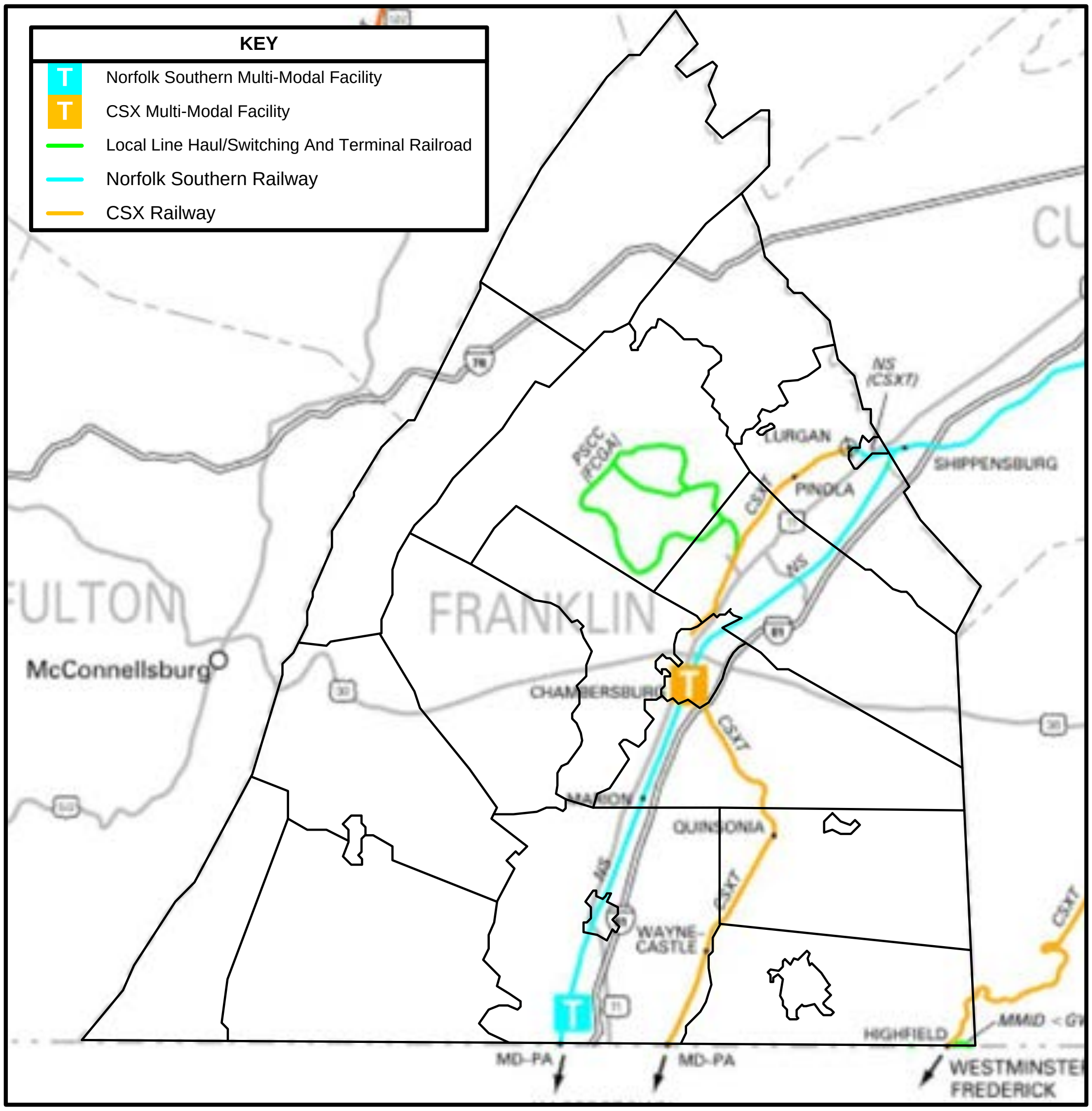

Figure 3.1.20.1.3: Railroad and Intermodal Terminals in Franklin County[145]

Rail <u>accidents</u> generally fit into 1 of 3 categories[146]:

- Derailment – the train leaves the rails
- Collision – a train strikes another train, or vehicle, or person
- Other – including objects on the rails, fires, or explosions

<u>Intermodal Terminals:</u>
The county has 2 intermodal (railroad) terminals. One owned by Norfolk Southern in Antrim Township and the second owned by CSX in Guilford Township. Millions of goods enter or exit these 2 terminals by railcar or truck/tractor trailer thus creating additional usage on the route system and railroad line system (see **Figure 3.1.20.1.4** below for usage of these track systems in PA).

[145] PennDOT, 2017
[146] PEMA, 2013

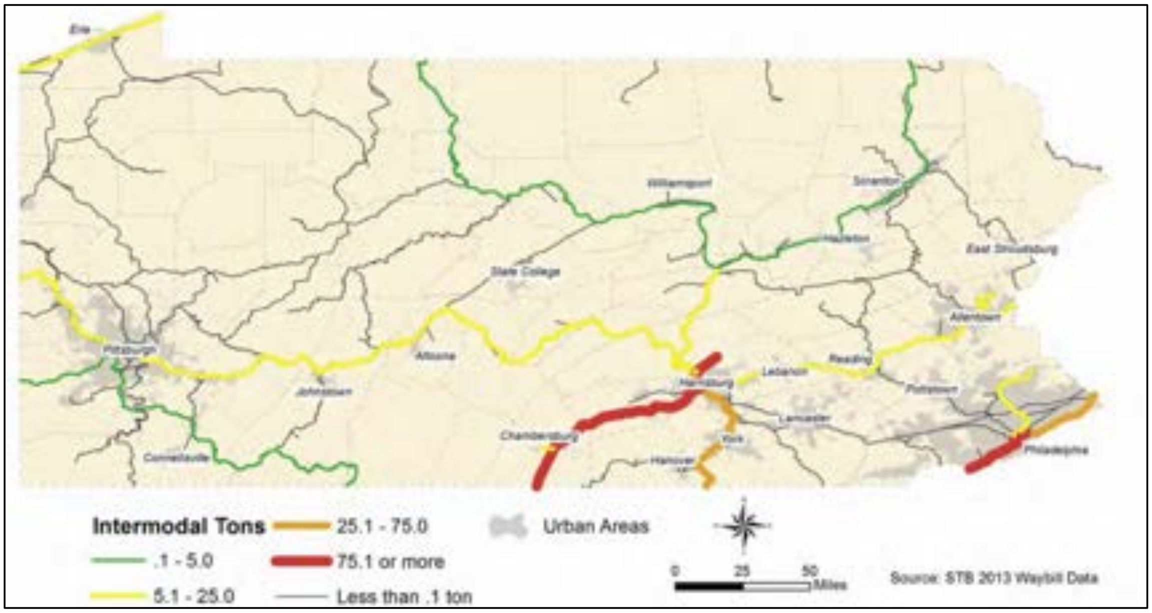

Figure 3.1.20.1.4: Intermodal Movement Flows in PA by Tonnage (2013)[147]

Aviation:

The county has 1 publicly owned airport, the Franklin County Regional Airport (FCRA). Its governing authority is the Susquehanna Area Regional Airport Authority (SARAA). SARAA, in addition to the FCRA (formally known as the Chambersburg Municipal Airport), is in control of the Harrisburg International Airport, Capital City Airport, and the Gettysburg Regional Airport. SARAA's website notes that *"FCRA hosts approximately 10,000 operations each year including recreational flying, agricultural spraying, corporate and business flying, aerial inspections and various community events"*[148]. SARAA's website also notes that *"FCRA is home to the only full-service skydiving center in South Central Pennsylvania."* FCRA is located 2-3 miles north of the Borough of Chambersburg and just south of Letterkenny Army Depot. FCRA is generally located near agricultural fields (abutting land use), single family countryside homes, and a suburban style housing development. Due to the county's proximately to Harrisburg International Airport, Capital City Airport, PA Air National Guard (in Middletown, PA and Fort Indiantown Gap, PA), 167th Airlift Wing (West Virginia Air National Guard in Martinsburg, WV), and the Hagerstown-Washington County Regional Airport, the county's airspace is frequently visited by larger aircraft for multiple purposes including commercial and military training. A five-mile radius area around each airport should be considered a high-risk area since most aviation incidents occur near take-off or landing sites. Air traffic flyovers present the possibility of injury, damage to structures, and fire, if an aircraft were to crash. For more information regarding aviation in Franklin County, please view the Franklin County Long-Range Transportation Plan (http://franklincountypa.gov/ckeditorfiles/files/Planning/planning_Franklin_LRTP-AdoptedMay12013.pdf). **Figure 3.1.20.1.5** depicts the location of FCRA and nearby aviation facilities with the 5,10, and 20 mile radii annotated. **Figure 3.1.20.1.6** is a closer view of the

147 PennDOT, 2016
148 Harrisburg International Airport

Franklin County Regional Airport (FRCA).

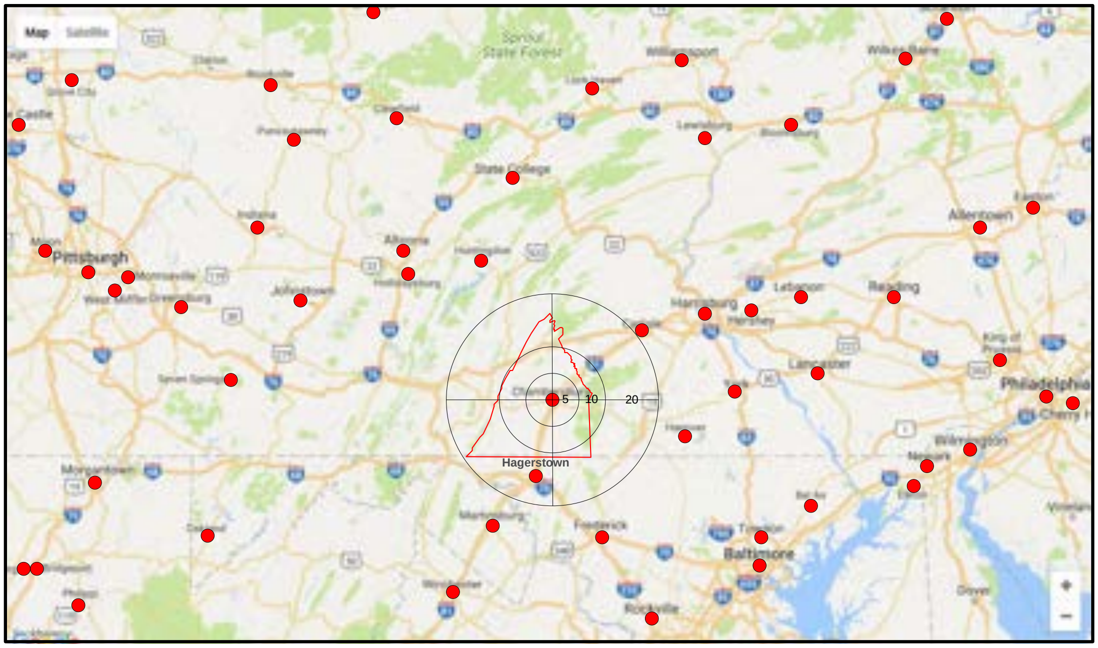

Figure 3.1.20.1.5: Location of FCRA and Nearby Public Airports in Franklin County

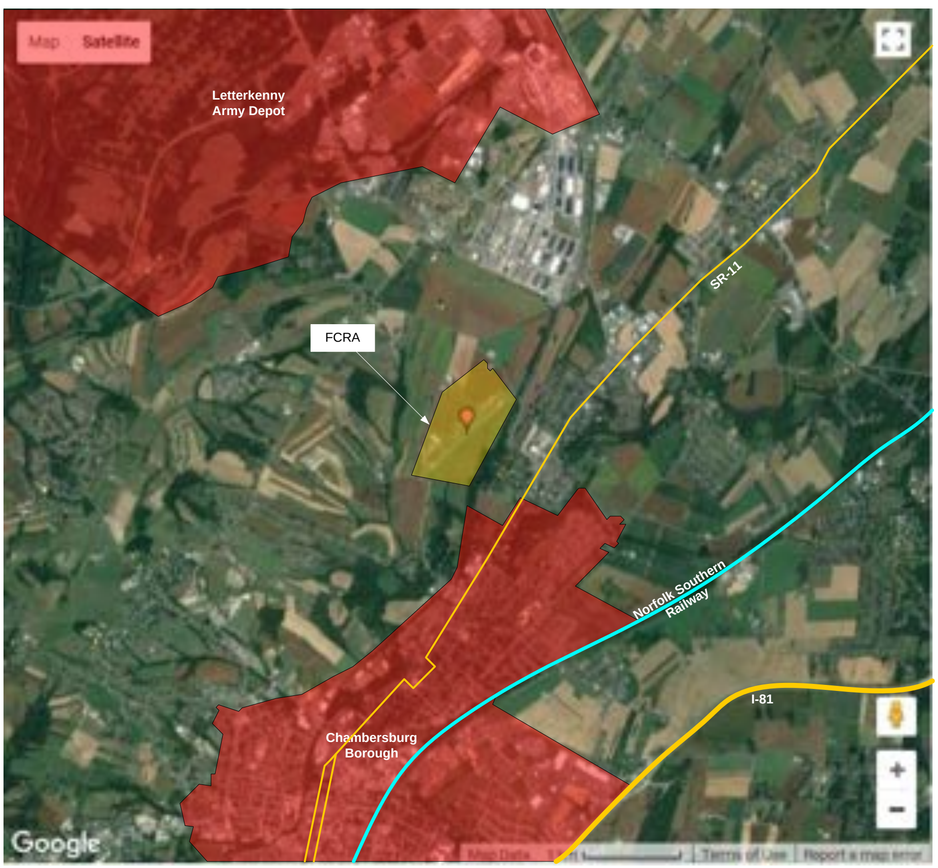

Figure 3.1.20.1.6: Franklin County Regional Airport (FRCA)

The Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB) are the agencies responsible for monitoring air travel and investigation accidents. Some of the most common causes of aviation accidents occur as a result of violations of FAA and NTSB regulations. Some other causes of accidents include, but are not limited to:

- Pilot or flight crew errors – Pilot errors are the number one cause of aviation accidents and account for the highest number of fatalities. Pilots have the responsibility to transport passengers safely from one place to another and follow the FAA and NTSB regulations to better ensure passenger safety. If a pilot or flight crew makes an error, an accident may occur.
- Faulty equipment – Faulty aircraft equipment or mechanical features are another common cause of an aviation accident.
- Aircraft design flaws – The manufacturer of an aircraft is responsible for an aviation accident if the structural design is flawed and results in an accident.
- Failure to properly fuel or maintain the aircraft – If any regulations and safety standards set by the FAA or NTSB are violated, an accident may occur.
- Negligence of Federal Air Traffic Controllers – The failure of air traffic controllers to properly monitor the airways is another cause of aviation accidents (Aviation Law News, Date Unknown).

Highway and Bridge:

Franklin County's (2013) Long-Range Transportation Plan (LRTP) notes that the county's highway network includes the Pennsylvania Turnpike (I-76), I-81, 15 state routes, 2 US Routes (11 and 30), and more than 100 local roads. Based on mileage, local roads represent the majority of the system (70%), however, only 12% percent of the daily vehicle miles traveled (DVMT) in Franklin County are on local roads. The majority of travel occurs on I-76 and I-81, which traverse the county. These 2 routes accommodate 38% of the county's DVMT, but only account for 2% of roadway mileage in the county. The LRTP also describes the bridge system in Franklin County: There are a total of 411 state- and locally-owned bridges in Franklin County. The PennDOT Bridge Management System (BMS) identifies 306 bridges greater than 8 feet and 15 bridges 8 feet or less in length on the state-owned network. Fourteen (14) percent of the bridges greater than 8 feet in length are structurally deficient. On the locally-owned network there are 90 bridges that are greater than or equal to 20 feet in length, of which, 11% are structurally deficient. An unknown number of local bridges with a total length of less than 20 feet are also located throughout the county.

From State Line, PA to Shippensburg, PA, Franklin County has 9 existing and 1 planned (future) interchange with I-81 as well as 2 interchanges with I-76. However, the majority of the average daily traffic occurs on I-81, US 11, US 30 and SR (PA) 16.

The highway and bridge system also includes traffic signals. The county's traffic signal system contains a total of 119 traffic signals. Seventy-five (75) percent of these traffic signals are concentrated in and around Chambersburg Borough and along Route 16 in the Boroughs of Greencastle and Waynesboro. Chambersburg Borough accounts for 42% of the signals in the county's system, with a total of 50 signals within its jurisdiction.

The LRTP notes that 98 state owned bridges greater than 8 feet within Franklin County are structurally deficient, functionally obsolete, or posted for weight. More specifically, 4 state-owned bridges have been posted for weight, which are located near Orrstown Borough, village of Cove Gap, village of Turkey Foot, and the Village of Concord. Of the 90 locally-owned bridges with a total length greater than 20 feet, 11% (10 bridges) are structurally deficient (SD) and 22% (20 bridges) are functionally obsolete (FO). Six (6) local bridges are posted for weight restrictions and 1 bridge is closed. Refer to **Table 3.1.20.1.1** below for a listing of these local bridge conditions.

Location	Feature Intersected	# of Spans	Year Built	Year Reconstructed	Length (Ft)	Post Status	Structurally Deficient	Functionally Obsolete
1 mile NE of SR 4006	Conococheague Creek, West Branch	1	1930	1972	36	Posted for Load	Yes	No
2.3 miles SE of SR 641	Conodoquinet Creek	1	1885	--	109	Posted for Load	Yes	No
0.7 miles N of SR 416	Licking Creek	1	1883	1957	74	Posted for Load	No	Yes
3.5 miles SE Mercersburg/Conococ	Conococheague Creek West Branch	1	1904	1963	130	Posted for Load	No	Yes
1 mile SW of SR 4010	Wilson Run	1	1962	--	33	Posted for Load	No	No
Back Creek; Williamson	Back Creek	1	1876	--	119	Closed Bridge	Yes	No
1.8 miles SE Waynesboro/Red Run	Red Run	1	1935	1984	36	Posted for Load	Yes	No

Figure 3.1.20.1.1: Hazardous Conditions of Locally Owned Bridges in Franklin County[149]

Figure 3.1.20.1.7 depicts the county's highway and bridge systems.

149 Franklin County Long-Range Transportation Plan, 2013

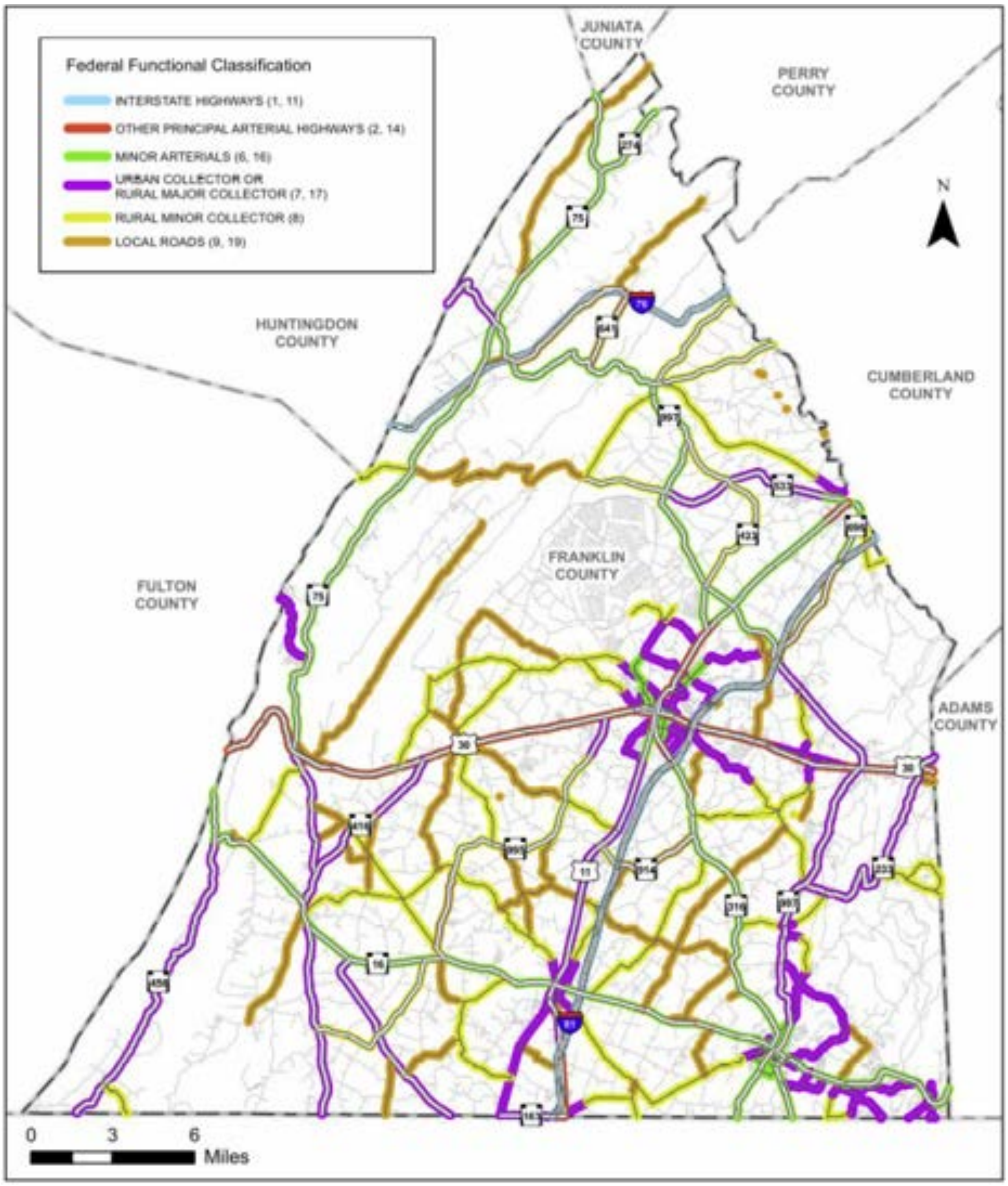

Figure 3.1.20.1.7: Franklin County Highway and Bridge Systems

There is no expected warning time for vehicular accidents. Contributing factors for these accidents are typically associated with the driver, vehicle, and the 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 have severe effects on those directly involved, as well as to others not directly involved. Other effects may include severe traffic delays, lost sales to businesses, delayed commodity shipments, and increased insurance costs[150].

[150] Cova J. T. and Conger S., 2004

Non-motorized Transportation:
Franklin County boasts a multitude of natural and built resources for bicyclist, pedestrian, and horse and buggy use. In Franklin County's more populated communities, pedestrians can walk along sidewalks and cross at numerous crosswalks and signalized intersections. Bicyclists can take advantage of Bicycle Route "S" that traverses the entire county as well as the existing grid street network in the county's larger communities and the recreation/exercise routes that extend throughout the countryside. Numerous recreational trails travel throughout the county, including nationally-recognized hiking and bicycling destinations. In northwestern Franklin County, where buggy traffic is heaviest, varying levels of accommodation exist along the county's roadway network, mainly in the form of wide shoulders. It is important to note the severity of a non-motorized versus motorized accidents/incidents due to the high concentration of Amish communities in Franklin County and a growing bicycling community.

3.1.20.2. Range of Magnitude

A transportation hazard may be defined as a condition created by moving anything by common carrier. Transportation hazards can be divided into two categories: hazards created by the material that is being transported; and hazards created by the transportation medium. Transportation systems available in Franklin County include air, rail, and road/highway/street. A major accident in each of these transportation systems is possible. All of these systems and supporting transportation resources provide services locally, regionally, and nationally.

Vehicular Accidents/Hazards: A vehicular accident is a road/highway/street incident that usually involves one vehicle colliding with another vehicle or other road/highway/street user or an animal or stationary roadside object (e.g.: telephone pole, building, or a tree). A vehicular accident may result in injury, property damage, or possibly fatalities. Many factors contribute to vehicle accidents/incidents, including equipment failure, poor road conditions, weather, traffic volume, and driver behavior.

Aviation Accidents/Hazards: According to the International Civil Aviation Organization, an aviation accident is an occurrence with the operation of an aircraft that takes place between the time a person boards the aircraft with the intention of flying to a destination to the time the person disembarks the aircraft. There are 3 different situations that qualify as an aviation accident:

- A person is fatally or seriously injured;
- The aircraft sustains damage or structural failure; or
- 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[151].

Hazardous Materials (HAZMAT) in Transit: A HAZMAT is defined as a substance or material determined to be capable of posing an unreasonable risk to health, safety, or property when

[151] National Business Aviation Association

transported. They come in various forms that can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. As stated previously in the HAZMAT definition, unreasonable risk covers a broad range of health, fire, and environmental considerations. HAZMAT substances include explosives, flammable solids, substances that become dangerous when wet, oxidizing substances, and toxic liquids. An accident involving a vehicle carrying HAZMAT becomes a HAZMAT incident if the HAZMAT leaks, is involved in a fire, or if the potential for release, or other hazards exists. Hazards can occur during production, storage, transportation, use, or disposal[152]. Additional effects of the release of hazardous materials from transportation accidents are addressed in the Environmental Hazard profile (**Section 3.1.5**).

<u>Railway Accidents/Hazards:</u> Railway accidents are accidents involving one or more trains.

Transportation accidents described here include incidents involving road, air, and rail travel. At a minimum, transportation accidents can result in damage to the vehicles and minor injuries to passengers and drivers. At worst, significant transportation accidents can result in death or serious injury or extensive property loss or damage coupled with business interruptions and hours of congestion. Most air incidents are non-fatal and cause minor injuries or property damage. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but as of 2012, Penn DOT estimated that every hour (across the Commonwealth) 10 people are injured in a car crash, and every 7 hours someone dies as a result of a car crash. Most fatal crashes occur in the summer months of July, August, and September. The expected impacts of transportation accidents are amplified by the fact that there is often little warning of accidents.

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.

3.1.20.3. Past Occurrence

County-wide vehicle crash analysis data was collected from PennDot for the years 2011 through 2015. An analysis of this data was conducted to logically group the crashes into common condition and causal factors. This analysis can be seen in **Table 3.1.20.3.1** below. The analysis allowed the project team to identify trends to indicate safety concerns. The data shows that most vehicle crashes are a single vehicle, run-off-the-road type of accidents generally involving fixed objects. It also shows that about half of these accidents are occurring on local versus state roads. However, the analysis becomes a little more interesting when you look at some of the causal factors. Driver impairment and experience/ability seem to be leading causes of most accidents and they tend to occur more often at intersections. It is understood that most accidents involve multiple factors and conditions and this chart captures single accidents with multiple entries, but it does give us empirical data in which to make some mitigation decisions to reduce the overall risk to the travelling public.

[152] Ready.gov

Accident Description	2011	2012	2013	2014	2015
Total Crashes	**1,468**	**1,453**	**1,370**	**1,441**	**1,505**
Single Vehicle Run-Off-The-Road Crashes	**618**	**632**	**608**	**625**	**645**
Hit Fixed Object Crashes	**497**	**479**	**519**	**496**	**512**
Hit Utility Pole Crashes	154	148	162	178	181
Hit Tree Crashes	97	119	108	86	111
Hit Guiderail Crashes	66	76	72	69	77
Intersection Crashes	**464**	**411**	**414**	**453**	**425**
Stop Controlled Intersection Crashes	195	155	162	193	179
Signalized Intersection Crashes	134	104	117	125	132
Running Red Light Crashes	38	34	28	25	33
Pedestrian Crashes	26	35	20	27	29
Bicycle Crashes	8	13	10	14	7
Driver Impairment Crashes	**415**	**416**	**446**	**442**	**476**
Distracted Driver Crashes	174	177	188	183	213
Alcohol-Related Crashes	142	141	129	141	131
Drinking Driver Crashes	139	139	127	138	130
Aggressive Driving Crashes	60	47	80	72	85
Drowsy/Asleep Driver Crashes	39	51	49	46	47
Driver Experience/Ability Related Crashes	**382**	**386**	**368**	**415**	**435**
Crashes Involving a 65+ Year Old Driver	261	263	271	311	314
Crashes Involving a 65-74 Year Old Driver	151	149	153	185	187
Crashes Involving a 75+ Year Old Driver	110	114	118	126	127
Crashes Involving a 16-17 Year Old Driver	121	123	97	104	121
Crashes Involving a 17 Year Old Driver	88	90	68	75	83
Crashes Involving a 16 Year Old Driver	33	33	29	29	38
Local Road (only) Crashes	**301**	**328**	**298**	**283**	**304**
Unrestrained Crashes	**192**	**198**	**135**	**161**	**156**
Heavy Truck Crashes	**64**	**99**	**97**	**78**	**91**
Head-on / Opposite Direction Side Swipe Crashes	**84**	**86**	**84**	**83**	**87**
Motorcycle Crashes	**51**	**60**	**55**	**53**	**58**
Vehicle Failure Related Crashes (any factor)	**45**	**52**	**47**	**69**	**55**
Speeding Crashes	**38**	**32**	**39**	**47**	**44**
Work Zone Crashes	**28**	**33**	**16**	**12**	**9**
Cross Median Crashes	**9**	**9**	**14**	**11**	**11**
Train/Trolley with Motor Vehicle Crashes	**1**	**0**	**1**	**1**	**1**

Table 3.1.20.3.1: Vehicle Accidents in Franklin County (2011-2015)[153]

In addition to the analysis above, in October 2017, PennDOT reported the 5-year Rolling Average Baseline for 2012-2016 for Franklin County. They reported 22 fatalities, 1.524 fatality rate, 53.8 number of serious injuries, 3.722 serious injury rate, and 7 non-motorized fatalities and

[153] PennDOT, 2015

serious injuries.

We performed a search of our Computer Aided Dispatch (CAD) system to see how many Pedestrian related accidents and incidents were recorded in the county between October 2010 and April 2017. **Table 3.1.20.3.2** lists all pedestrian accidents responded to in the county including all fatal, injury, and non-injury events.

Municipality	Accidents with Fatalities	Accidents with Injuries	Accidents without Injuries	Total Pedestrian Accidents
Antrim Township	0	22	0	**22**
Chambersburg Borough	2	188	39	**229**
Fannett Township	0	2	0	**2**
Greencastle Borough	0	27	4	**31**
Greene Township	1	29	2	**32**
Guilford Township	0	30	0	**30**
Hamilton Township	0	17	0	**17**
Letterkenny Township	0	0	0	**0**
Lurgan Township	0	2	0	**2**
Mercersburg Borough	0	6	0	**6**
Metal Township	0	2	0	**2**
Mont Alto Borough	0	4	0	**4**
Montgomery Township	1	2	0	**3**
Orrstown Borough	0	1	0	**1**
Peters Township	2	5	0	**7**
Quincy Township	0	7	0	**7**
Shippensburg Borough	0	7	0	**7**
Southampton Township	1	11	0	**12**
St Thomas Township	1	11	0	**12**
Warren Township	0	0	0	**0**
Washington Township	0	32	9	**41**
Waynesboro Borough	3	90	10	**103**
Totals	**11**	**208**	**64**	**570**

Table 3.1.20.3.2: Pedestrian Accidents in Franklin County (2010-2017)

Franklin County is also a busy area for commercial and private aviation traffic. A search of the

National Transportation Board (NTSB) and Federal Aviation Administration's (FAA) accident/incident databases as well as other online resources was performed for Franklin County. We were able to uncover several incidents and accidents that have occurred in Franklin County since 1965. **Figure 3.1.20.3.1** below shows the geographic location of the accidents that were uncovered. **Table 3.1.20.3.3** below shows all aviation incidents and accidents that were discovered.

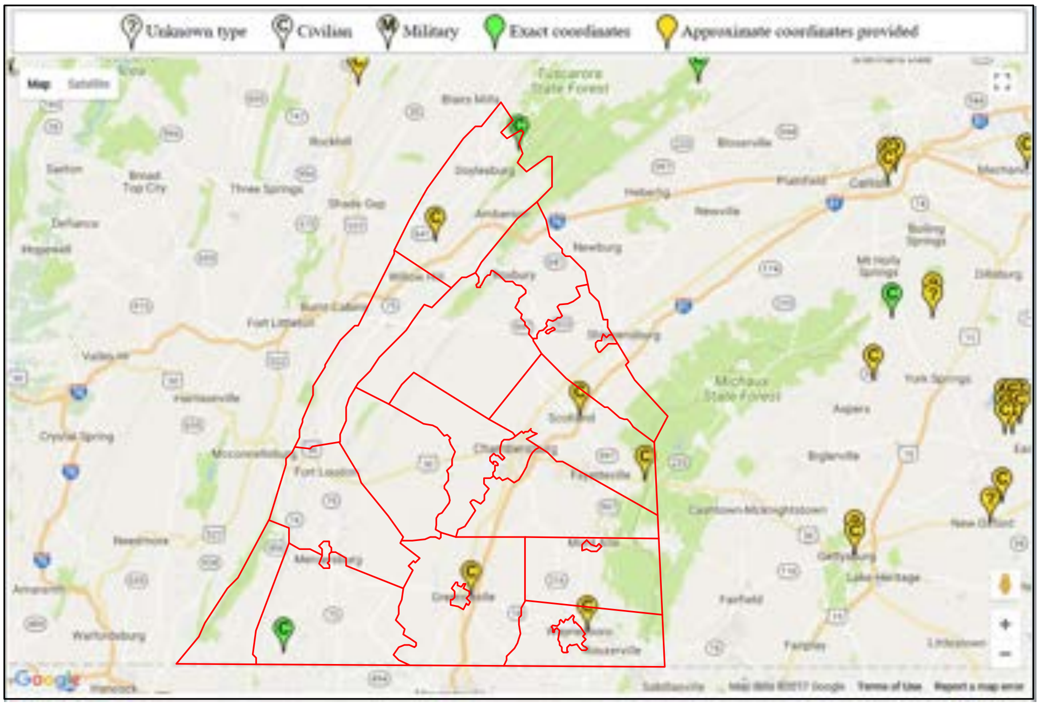

Figure 3.1.20.3.1: Aviation Accidents in Franklin County (1965-2017)[154]

[154] Baker, Lee C, 2009-2011

Date	Location	Event Type	Airport (if appropriate)	Event description	Injuries/Fatalities (if known)
4/12/2009	Chambersburg, PA	Incident	Franklin County Regional Airport	Landing	
4/25/2006	Montgomery Township	Accident		Cessna 172L crash	I fatality plane
1/14/2004	Chambersburg, PA	Incident	Franklin County Regional Airport	Roll-out (Fixed Wing)	
8/15/2002	Chambersburg, PA	Incident	Franklin County Regional Airport	To initial climb (1st Power Reduction)	
8/3/2000	Chambersburg, PA	Incident	Franklin County Regional Airport	Other Ground Operations	
6/8/2000	Chambersburg, PA	Incident	Franklin County Regional Airport	Normal Cruise	
11/18/1998	Chambersburg, PA	Incident		Forced Precautionary Landing from cruise	
8/8/1998	Chambersburg, PA	Incident		Level Off Touchdown	
10/8/1996	Fannett Township	Accident		Beech F33A crash	2 fatalities plane
6/15/1996	Chambersburg, PA	Incident		Parachute Jumping	
8/20/1994	Chambersburg, PA	Incident		Forced Precautionary Landing from cruise	
8/16/1994	Waynesboro Borough	Accident		Cessna 320C crashed	2 fatalities plane/ 2 fatalities ground
5/12/1992	Chambersburg, PA	Incident	Lost Acres	Level Off Touchdown	
11/18/1998	Chambersburg, PA	Incident	Franklin County Regional Airport	Forced Precautionary Landing from cruise	
3/3/1984	Chambersburg, PA	Incident	Franklin County Regional Airport	Force Precautionary Landing	
12/7/1984	Chambersburg, PA	Incident	Chambersburg Municipal Airport	Ground Taxi, other airplane	
8/16/1982	Greene Township	Accident		Cessna A152 crash	
11/28/1981	Chambersburg, PA	Incident	Chambersburg Municipal Airport	Roll-out (Fixed Wing)	
8/18/1979	Greene Township	Accident		Cessna 172M crash	
1/15/1978	Chambersburg, PA	Incident		Forced Precautionary Landing from cruise	
6/18/1972	Fannett Township	Accident		Beech 23 crash	
8/15/1965	Greencastle Borough	Accident		Piper PA-22 crash	

Table 3.1.20.3.3: Aviation Accidents & Incidents Franklin County (1965-2017)[155,156]

As one can see, we have had several accidents and incidents over the past 50 years, but only one aviation accident in the past 20 years in Franklin County. The aviation industry is highly regulated and takes lessons learned from accidents and incidents to improve overall safety of the

155 Baker, Lee C., 2009-2011

156 NTSB, Aviation Accident Database & Synopses

travelling public. As a result, the accident trend in Franklin County has dropped significantly. However, we do have a small regional airport and several mountain ridges surrounding the county. Since pilot error is a general contributing factor to most private plane crashes, the aviation accident threat is still a viable concern to the travelling public as well as those living nearby this regional airport.

Federal Railroad administration (FRA) defines an accident/incident as a reportable event. These include: (1) collisions, derailments, and other events involving the operation of on track equipment; (2) impacts between railroad on-track equipment and highway users at crossings; and (3) all other incidents or exposures that cause a fatality or injury to any person. Accidents/incidents are divided into three groups:

1. **Train accident.** A safety-related event involving on-track rail equipment, causing monetary damage to the rail equipment and track.

2. **Highway-rail grade crossing incidents.** Any impact between a rail and highway user at a designated crossing site.

3. **Other incidents.** Any death, injury, or occupational illness of a railroad employee that is not the result of a "train accident" or "highway-rail incident."

Even with the significant freight train traffic in Franklin County due to the 2 Intermodal Railroads Hubs (Norfolk Southern & CSX), we have only recorded 1 accident between 2004 and 2014 (see **Figure 3.1.20.3.2** below).

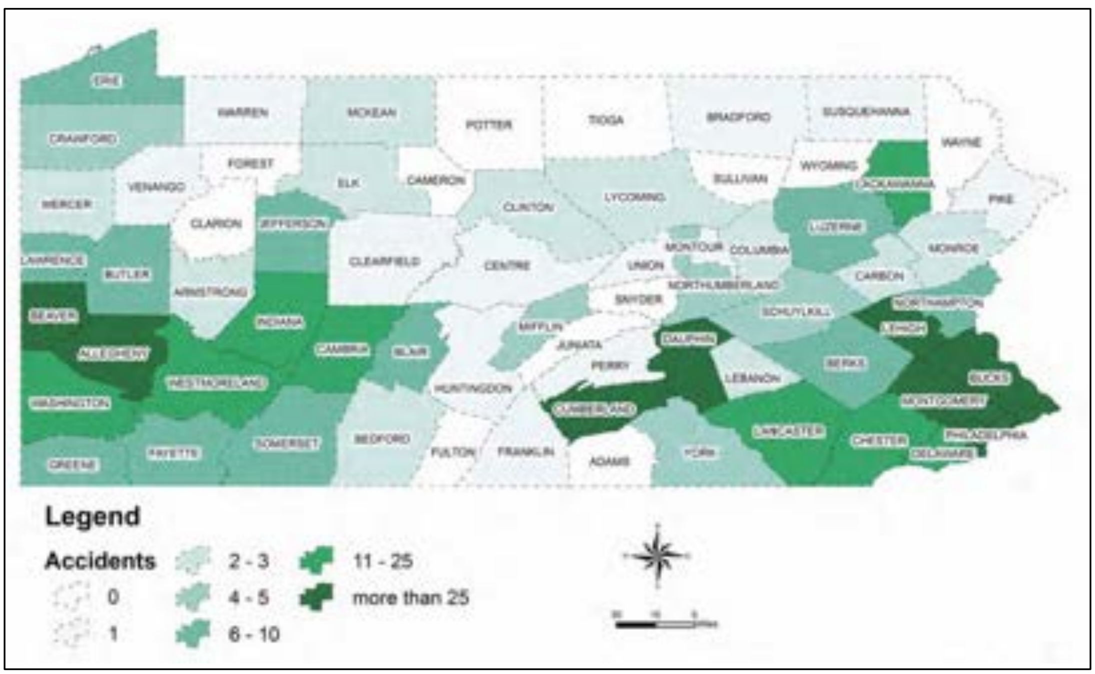

Figure 3.1.20.3.2: Total Train Incidents in PA by County (2004-2014)[157]

[157] PennDOT, 2016

However, the number of train crossing collisions (incidents) in that same timeframe is a bit higher, between 11 and 25 in the same time period (See **Figure 3.1.20.3.3** below).

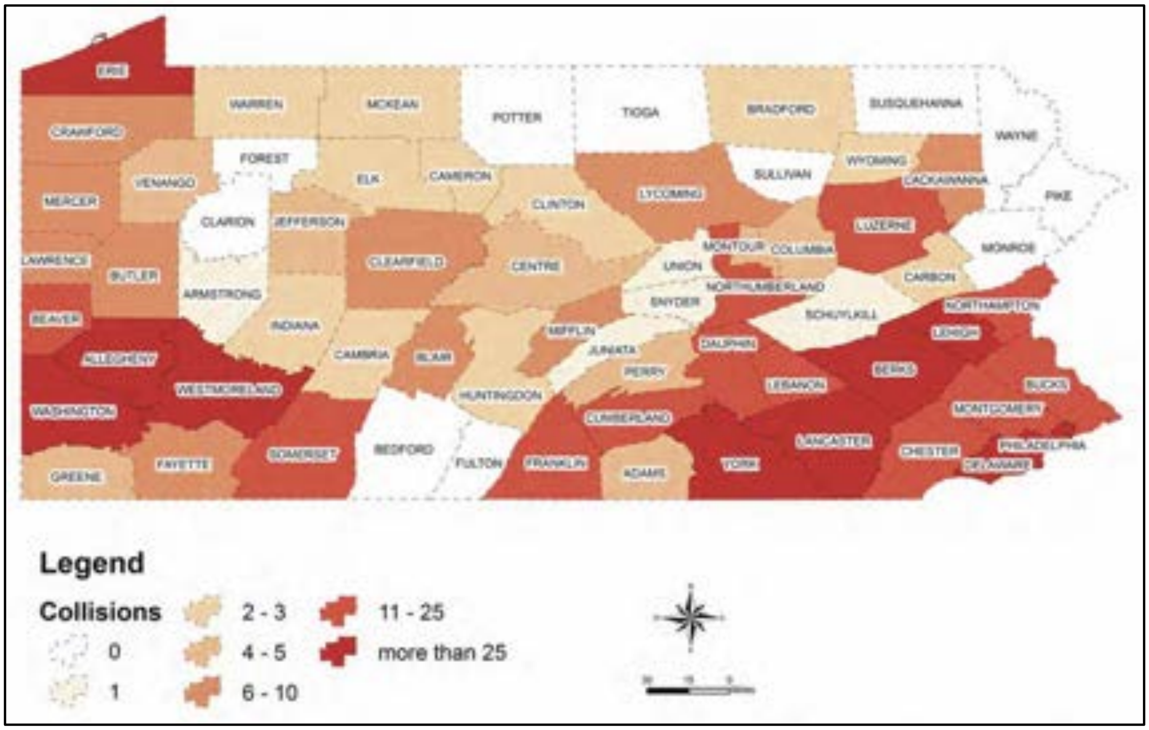

Figure 3.1.20.3.3: Total Crossing Collisions in PA by County (2004-2014)[158]

We performed a search of our Computer Aided Dispatch (CAD) system to see how many railway related accidents and incidents were recorded in the county between October 2010 and April 2017. **Table 3.1.20.3.4** lists all railroad accidents and incidents in which rail company units were dispatched. This includes a significant amount of incidents involving maintenance and repair of crossing signals as well as reports of trespass or impingement on the railway right-of-way.

158 PennDOT, 2016

Municipality	Train Incident	Highway Rail Grade Crossing Incident	Other Incidents		Totals
			Maintenance Calls	Right-of-way impingement	
Antrim Township	0	1	13	3	**17**
Chambersburg Borough	0	1	63	8	**72**
Fannett Township	0	0	0	0	**0**
Greencastle Borough	0	0	0	0	**0**
Greene Township	0	0	22	0	**22**
Guilford Township	1	2	75	12	**90**
Hamilton Township	0	0	0	0	**0**
Letterkenny Township	0	0	1	0	**1**
Lurgan Township	0	0	0	0	**0**
Mercersburg Borough	0	0	0	0	**0**
Metal Township	0	0	0	0	**0**
Mont Alto Borough	0	0	0	0	**0**
Montgomery Township	0	0	0	0	**0**
Orrstown Borough	0	0	0	0	**0**
Peters Township	0	0	0	0	**0**
Quincy Township	0	0	7	1	**8**
Shippensburg Borough	0	0	0	0	**0**
Southampton Township	0	0	20	5	**25**
St Thomas Township	0	0	0	0	**0**
Warren Township	0	0	0	0	**0**
Washington Township	0	0	7	4	**11**
Waynesboro Borough	0	0	0	0	**0**
Totals	**1**	**4**	**208**	**33**	**246**

Table 3.1.20.3.4: Railway Accidents and Incidents in Franklin County (2010-2017)

3.1.20.4. Future Occurrence

Transportation hazards are impossible to accurately predict, but an analysis of the data provided above can provide general areas of concern to allow for the development of mitigation actions for each municipality.

New highway and logistic/warehouse construction, including the addition of interchange 12 on I-81 (Guilford Springs Road) and the industrial zoned land between US Route 11 and I-81 (between Chambersburg and Marion) will likely result in increased trucking and traffic congestion. However, there is some hope that the Greater Chambersburg Traffic Signal Improvement Project will properly coordinate traffic signals to help improve the flow of vehicle traffic. Additionally, the current trend of shopping is moving from purchasing products at the ‘brick and mortar’ stores to online will continue and we will likely see an increase in delivery vehicles across all types of highways, roads, and streets.

Non-motorized accidents may continue to occur at the same level in Franklin County until driver behavior and/or highways/roads/streets are rebuilt or renovated to include the non-motorized user (e.g. wider shoulder for horse and buggy use).

The average rate of aviation accidents nationwide is 8.47 accidents per 100,000 flight hours. Therefore, the likelihood of an aviation incident in the county is considered low.

A review of the railway accident/incident information above indicates that the numbers of accidents in the county will remain relatively low. However, it is expected as increased train traffic continues due to our 2 intermodal facilities, the number of railway incidents will continue to rise.

3.1.20.5. Vulnerability Assessment

Transportation systems available in the county include rail, road/street, and air. Hazards associated with transportation can either be created by natural hazards that affect the roadway or rail system, the material being transported, or created by the transportation medium itself. Overall, the probability of future transportation accidents can be considered ***highly likely*** according to the Risk Factor Methodology (See **Section 1.2**).

Figure 3.1.20.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Transportation Accident hazard. One can see that only 4 of 22 municipalities rated this threat as either a Catastrophic or Major event. However, 10 of the remaining 18 municipalities have it ranked as a Moderate threat. This is a Moderate threat ranked number 7 highest for Franklin County.

Transportation Accident Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	4	30%	3	30%	3	20%	4	10%	1	10%	3.2	10.12%	0.3238
Chambersburg Borough	4	30%	1	30%	1	20%	4	10%	1	10%	2.2	14.05%	0.3091
Fannett Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	1.59%	0.0334
Greencastle Borough	3	30%	2	30%	1	20%	4	10%	1	10%	2.2	2.73%	0.0601
Greene Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	11.82%	0.2128
Guilford Township	4	30%	2	30%	4	20%	4	10%	1	10%	3.1	9.38%	0.2908
Hamilton Township	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	7.29%	0.1312
Letterkenny Township	4	30%	1	30%	2	20%	4	10%	1	10%	2.4	1.58%	0.0379
Lurgan Township	3	30%	1	30%	2	20%	4	10%	1	10%	2.1	1.42%	0.0298
Mercersburg Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	0.97%	0.0126
Metal Township	4	30%	3	30%	2	20%	2	10%	1	10%	2.8	1.13%	0.0316
Mont Alto Borough	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	1.01%	0.0182
Montgomery Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	3.68%	0.0773
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	0.14%	0.0017
Peters Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	2.86%	0.0458
Quincy Township	2	30%	3	30%	2	20%	4	10%	1	10%	2.4	3.41%	0.0818
Shippensburg Borough	2	30%	3	30%	2	20%	4	10%	1	10%	2.4	0.75%	0.0180
Southampton Township	3	30%	3	30%	3	20%	4	10%	1	10%	2.9	5.49%	0.1592
St Thomas Township	3	30%	2	30%	1	20%	4	10%	1	10%	2.2	3.79%	0.0834
Warren Township	1	30%	1	30%	2	20%	3	10%	1	10%	1.4	0.21%	0.0029
Washington Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	9.55%	0.0955
Waynesboro Borough	2	30%	3	30%	1	20%	4	10%	1	10%	2.2	7.02%	0.1544
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.212

Figure 3.1.20.5.1: Municipal Transportation Accident Threat Vulnerability Self-Assessment

Potential losses from transportation hazards include human health and life, property, and natural resources. Vehicular accidents, flooded roadways, aviation accidents, and accidents at public railroad crossings at grade 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 depends on population density, both by day and night, and on the proportions located indoors and outdoors.

As a result of insufficient data, a full loss estimate was not completed for the transportation hazard. Loss of roadway use 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 the congestion of another, and not only affect the county, but the region as a whole. Increased development in the county and region will contribute to increased road and rail traffic.

While it is not possible to predict when and where a transportation accident will occur, the local fire and police departments, as well as the Pennsylvania State Police, are generally well-equipped and prepared to respond to these situations. In addition, established emergency procedures are in place and remediation occurs in a timely manner, so any infrastructure would be repaired as needed. However, these events can be costly.

In regards to vehicular accidents, data indicate that these are frequent occurrences; as traffic increases, the potential for vehicular accidents also can occur. Law enforcement, driver education, and transportation management efforts can help to reduce the potential for accidents. Existing and future mitigation efforts should continue to be developed and employed to reduce the potential impact of such events and prepare the county and local responders for these situations.

3.1.21. Urban Fire and Explosion

Urban fire and explosion hazards incorporate vehicle and building/structure fires as well as overpressure rupture, overheat, or other explosions that do not ignite. Statewide, this hazard occurs in the denser, more urbanized areas and occurs most often in residential structures.

3.1.21.1. Location and Extent

Structural fires within Franklin County have had a detrimental impact on life and property just like in any other county over the past decade. In today’s time there is a never ending change in building material that has created a threat of fire loss on a regular basis.

3.1.21.2. Range of Magnitude

The severity of any structure fire varies and is measured according to any losses associated with an incident. If the structure fire is a residential structure the impact to a local economy will be more minimal unlike if it were to be a commercial structure. The loss of life caused by a structure fire is opposite of the two impacts above. Normally the loss of life in a structure fire is more common to occur within a residential structure rather than a commercial structure.

In Franklin County most structure fires occur in a residential structure and are limited in duration and resources needed. While most of these fires are in the smaller aspect, the risk for large fires within a commercial structure is present every day. Many of the commercial structures within Franklin County have experienced some type of small fire but they have been contained, but still could lead to a large catastrophic fire.

3.1.21.3. Past Occurrence

Franklin County experiences a number of urban fires, most of which are small and affect a limited number of structures at a single event. Franklin County has little to no history of explosion events over the last 10 years. A detail analysis of the Franklin County Computer Aided Dispatch (CAD) System was performed to collect data on urban fires in Franklin County. **Table 3.1.21.3.1** shows all the responses to commercial/business/industry fires in Franklin County from April 2007 through April 2017. This does include agricultural building fires as this is a leading industry in the county.

Municipality	Business/ Industry Fires	Silo Fires	Barn Fires	Totals
Antrim Township	28	3	19	**50**
Chambersburg Borough	88	1	1	**90**
Fannett Township	4	0	13	**17**
Greencastle Borough	17	0	0	**17**
Greene Township	44	0	20	**64**
Guilford Township	45	2	21	**68**
Hamilton Township	13	0	15	**28**
Letterkenny Township	5	1	2	**8**
Lurgan Township	3	0	3	**6**
Mercersburg Borough	12	0	1	**13**
Metal Township	7	0	4	**11**
Mont Alto Borough	1	0	0	**1**
Montgomery Township	2	0	13	**15**
Orrstown Borough	0	0	0	**0**
Peters Township	4	4	12	**20**
Quincy Township	13	0	11	**24**
Shippensburg Borough	23	0	0	**23**
Southampton Township	13	1	13	**27**
St Thomas Township	6	1	16	**23**
Warren Township	0	0	2	**2**
Washington Township	20	0	7	**27**
Waynesboro Borough	43	0	0	**43**
Totals	**391**	**13**	**173**	**577**

Table 3.1.21.3.1: Commercial Fire Responses (2007-2017)

Table 3.1.21.3.2 shows the residential fire response in the county from April 2007 through April 2017.

Municipality	Chimney Fires	House Fires	Mobile Home Fires	Shed/Out Building Fires	Garage Fires	Appliance Fires	Multi-Dwelling Fires	Totals
Antrim Township	27	68	14	24	2	3	1	**139**
Chambersburg Borough	31	180	0	11	0	22	70	**314**
Fannett Township	12	19	4	10	2	0	0	**47**
Greencastle Borough	5	34	2	2	0	3	11	**57**
Greene Township	35	97	22	17	4	2	7	**184**
Guilford Township	40	95	4	15	2	5	9	**170**
Hamilton Township	21	59	13	24	1	5	11	**134**
Letterkenny Township	9	18	5	6	0	2	0	**40**
Lurgan Township	8	22	0	3	0	0	0	**33**
Mercersburg Borough	7	11	0	0	0	0	2	**20**
Metal Township	11	9	4	9	1	1	0	**35**
Mont Alto Borough	3	9	1	3	0	0	0	**16**
Montgomery Township	8	41	2	11	1	0	0	**63**
Orrstown Borough	0	1	0	0	0	0	1	**2**
Peters Township	17	30	4	14	4	1	1	**71**
Quincy Township	20	32	9	12	1	1	1	**76**
Shippensburg Borough	5	41	2	0	1	2	16	**67**
Southampton Township	16	43	13	8	3	5	1	**89**
St Thomas Township	22	31	14	14	2	1	1	**85**
Warren Township	1	6	0	2	0	1	0	**10**
Washington Township	36	82	16	10	0	2	9	**155**
Waynesboro Borough	12	118	1	8	0	8	39	**186**
Totals	**346**	**1,046**	**130**	**203**	**24**	**64**	**180**	**1,993**

Table 3.1.21.3.2: Residential Fire Responses (2007-2017)

There were several different types of fire responses captured in our CAD analysis that either applied to both residential and commercial responses, or were a false positive for actual fire response. These incidents are captured in **Table 3.1.21.3.3** below.

Municipality	Automatic Fire Alarms	Arson	Electrical Fires	Rekindle Fires	Smoke Inside	Totals
Antrim Township	450	0	4	1	2	**457**
Chambersburg Borough	2,809	14	7	0	20	**2,850**
Fannett Township	64	0	1	0	0	**65**
Greencastle Borough	266	2	2	0	6	**276**
Greene Township	1,404	0	6	0	8	**1,418**
Guilford Township	671	0	1	0	5	**677**
Hamilton Township	238	0	2	3	1	**244**
Letterkenny Township	43	0	0	0	0	**43**
Lurgan Township	15	0	0	2	0	**17**
Mercersburg Borough	515	1	0	0	2	**518**
Metal Township	18	0	0	0	1	**19**
Mont Alto Borough	281	0	1	0	2	**284**
Montgomery Township	128	0	1	0	3	**132**
Orrstown Borough	0	0	0	0	0	**0**
Peters Township	86	0	0	0	4	**90**
Quincy Township	341	0	2	2	0	**345**
Shippensburg Borough	276	0	0	0	7	**283**
Southampton Township	179	0	3	0	2	**184**
St Thomas Township	105	0	4	0	2	**111**
Warren Township	4	0	0	0	0	**4**
Washington Township	563	2	6	1	5	**577**
Waynesboro Borough	555	7	8	0	9	**579**
Totals	**9,011**	**26**	**48**	**9**	**79**	**9,173**

Table 3.1.21.3.3: Miscellaneous Fire Response Activity (2007-2017)

As one can see from the data above, Franklin County has over 3 times as many residential fire responses as we do commercial responses. It was not possible to collect the damages to life or property due to these fires. However, as indicated in **Section 3.1.21.3.2** above, the cost associated with residential fires is far smaller than that of commercial fires, but loss of life tends to be greater.

3.1.21.4. Future Occurrence

The future occurrence of urban fire and explosion events can be considered ***likely*** as defined by the Risk Factor Methodology probability criteria (**Section 1.2**). Residential fires are more common within Franklin County but industrial fires have a potentially higher risk because of the possibility of there being flammable chemicals and greater fuel sources which make industrial fires to be the greater risk due to those factors.

3.1.21.5. Vulnerability Assessment

Figure 3.1.21.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Urban Fire and Explosion hazard. One can see that only seven 7 of 22 municipalities rated this threat as either a Major or Moderate event. This is a Minor threat for Franklin County ranked number 18 overall.

Urban Fire/Explosion
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	10.12%	0.2125
Chambersburg Borough	4	30%	2	30%	2	20%	4	10%	1	10%	2.7	14.05%	0.3794
Fannett Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.59%	0.0159
Greencastle Borough	1	30%	1	30%	2	20%	3	10%	1	10%	1.4	2.73%	0.0382
Greene Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	11.82%	0.1891
Guilford Township	1	30%	2	30%	1	20%	4	10%	1	10%	1.6	9.38%	0.1501
Hamilton Township	1	30%	1	30%	3	20%	4	10%	1	10%	1.7	7.29%	0.1239
Letterkenny Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	1.58%	0.0332
Lurgan Township	2	30%	1	30%	1	20%	4	10%	1	10%	1.6	1.42%	0.0227
Mercersburg Borough	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	0.97%	0.0126
Metal Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	1.13%	0.0113
Mont Alto Borough	2	30%	1	30%	2	20%	4	10%	1	10%	1.8	1.01%	0.0182
Montgomery Township	3	30%	2	30%	2	20%	4	10%	1	10%	2.4	3.68%	0.0883
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	1	10%	1.2	0.14%	0.0017
Peters Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	2.86%	0.0372
Quincy Township	1	30%	2	30%	1	20%	4	10%	1	10%	1.6	3.41%	0.0546
Shippensburg Borough	2	30%	3	30%	1	20%	4	10%	1	10%	2.2	0.75%	0.0165
Southampton Township	2	30%	2	30%	2	20%	4	10%	1	10%	2.1	5.49%	0.1153
St Thomas Township	1	30%	1	30%	1	20%	4	10%	1	10%	1.3	3.79%	0.0493
Warren Township	1	30%	2	30%	2	20%	4	10%	1	10%	1.8	0.21%	0.0038
Washington Township	1	30%	1	30%	1	20%	1	10%	1	10%	1.0	9.55%	0.0955
Waynesboro Borough	2	30%	3	30%	1	20%	4	10%	1	10%	2.2	7.02%	0.1544
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.824

Figure 3.1.21.5.1: Municipal Urban Fire and Explosion Threat Vulnerability Self-Assessment

The areas within Franklin County that should be considered more vulnerable to urban fires and explosions are the areas where large buildings are located or the development is close. Franklin County has two more densely populated municipalities with populations over 5,000. They are the Borough of Chambersburg at 20,691 (rated as a Major event) and the Borough of Waynesboro at 10,845 (rated as a Moderate event) per the 2016 US Census estimate.

As of December 31, 2006, all communities in Pennsylvania are required to comply with the Uniform Construction Codes. This includes requirements to comply with both the International Fire Code and the International Wildland Urban Interface Code. The adoption and enforcement of these codes will hopefully decrease the overall vulnerability of structures in Franklin County. However, these regulations will only affect new construction, as well as additions and renovations to existing structures. Older buildings that do not meet the criteria established in these modern fire codes will continue to remain vulnerable to urban fire and explosion events.

To give a better perspective on this issue, we looked at the 2011-2015 American Community Survey 5-yr estimate numbers to determine the age of the houses in the county and some predictions on future construction. However, since the Census does not break up the ages of the houses on the 2006 date of the adoption of the Uniform Construction Code, we had to make the age cut-line at the year 2000. What this means to our analysis is that the true percentage of houses built after the Uniform Construction Code was adopted is significantly smaller than our assessed number. Even so, you can see that the percentage of houses built after the year 2000 in the county is only 17% (see **Table 3.1.21.5.1** below). That means at least 83% of the homes in the county were built using the older construction codes. Again, because we used 2000 instead of 2006, this number of older homes is most certainly larger, but one can see the order of magnitude problem we have in the county as a result of older construction.

Municipalities	% of Houses built in Time Period							Estimated number of houses in municipality	% of houses built after 2000, per municipality	Estimated number of houses built after 2000 in municipality	% of houses built after 2000, in the county
	2014 and later	2010 to 2013	2000 to 2009	1980 1999	1960 to 1979	1940 to 1959	1939 or earlier				
Antrim Township	0.7	1.3	23.2	29.3	25.7	11.3	8.4	5508	25.2	1388	25.2
Chambersburg Borough	0.0	1.4	12.0	16.9	16.2	21.7	31.8	8873	13.4	1189	13.4
Fannett Township	0.0	1.2	7.8	25.8	22.3	12.2	30.8	1041	9.0	94	9.0
Greencastle Borough	0.0	0.0	15.1	19.5	24.2	20.3	20.9	1856	15.1	280	15.1
Greene Township	0.0	2.5	19.6	28.9	28.0	11.4	9.6	7261	22.1	1605	22.1
Guilford Township	0.0	0.2	16.3	31.8	28.6	11.8	11.3	6250	16.5	1031	16.5
Hamilton Township	0.0	2.2	19.7	33.1	23.5	14.6	7.0	4669	21.9	1023	21.9
Letterkenny Township	0.0	0.6	6.1	30.2	33.4	14.8	14.9	1044	6.7	70	6.7
Lurgan Township	0.5	0.0	10.1	16.9	28.5	27.5	16.5	843	10.6	89	10.6
Mercersburg Borough	0.0	0.0	5.4	15.2	15.4	18.7	45.3	774	5.4	42	5.4
Metal Township	0.4	0.0	9.4	35.2	23.8	11.5	19.7	955	9.8	94	9.8
Mont Alto Borough	0.0	0.0	9.2	20.8	27.6	21.5	20.8	700	9.2	64	9.2
Montgomery Township	0.0	0.5	21.3	24.0	26.7	8.2	19.3	2496	21.8	544	21.8
Orrstown Borough	0.0	0.0	0.0	3.1	11.5	42.7	42.7	109	0	0	0
Peters Township	1.9	0.5	11.2	16.1	30.9	17.6	21.7	1734	13.6	236	13.6
Quincy Township	0.0	0.0	9.7	34.1	29.5	10.8	15.9	2120	9.7	206	9.7
Shippensburg Borough	0.0	0.8	8.5	16.2	25.3	17.3	31.9	2898	9.3	270	9.3
Southampton Township	0.0	2.5	21.4	35.2	20.3	13.6	7.1	3339	23.9	798	23.9
St Thomas Township	0.0	0.0	11.6	16.1	36.1	16.5	19.8	2397	11.6	278	11.6
Warren Township	0.0	9.4	12.2	31.7	18.0	3.6	25.2	166	21.6	36	21.6
Washington Township	0.3	3.2	18.1	30.6	22.5	11.6	13.9	6144	21.6	1327	21.6
Waynesboro Borough	0.0	1.6	10.3	12.6	13.5	22.3	39.7	5148	11.9	613	11.9
County Totals								**66,325**		**11,277**	**17.0 %**

Table 3.1.21.5.1: Estimated Age of Homes in Franklin County (2011-2015)[159]

[159] US Census Bureau, American Community Survey 5-Year Estimates, 2011-2015

3.1.22. Utility Interruption

Utilities as defined in this Hazard Mitigation Plan refer to power, water, sewer, communications, and gas services. These services are essential to the normal operations of the people of Franklin County as well as the economy that supports them.

Interruptions to these services can be caused by many factors, including weather events, geological events, construction accidents, vehicle accidents, and intentional man-made destruction. Utilities that employ above-ground wiring (power and communications) are especially vulnerable to the effects of other hazards such as high wind, heavy snow, ice, rain, and vehicular accidents. These events can be small in nature and very hard to track. However, they can be quite large and impact entire regions of the state and/or country.

3.1.22.1. Location and Extent

Utility interruptions in electric, water, communications, sewer, and gas services are common in Franklin County. However, a majority of our interruptions are electric related. Most of the power and communications interruptions are caused by third party vehicular accidents and affect a small number of the population for a short amount of time. Water, sewer, and gas interruptions frequently occur in the county but are localized and usually due to human error as well.

Weather, such as severe thunderstorms, wind storms, and winter storms, increases the chance of a regional power or communications disruption. These types of events also require more resources and manpower during the response and recovery stages. These larger events are rare in the county, but have occurred here in the past.

3.1.22.2. Range of Magnitude

Most severe utility interruptions and power failures are regional events. A loss of utilities can have numerous impacts including, but not limited to, food spoilage, loss of water supply (damaged pipeline/pump failure), loss of heating or air conditioning, basement flooding, lack of indoor lighting, and lack of telephone and internet service. These issues range from a minor nuisance to a full hazard event, but the degree of damage or harm depends on the population affected and the severity/duration of the outage.

At a minimum, utility interruptions can cause short term disruption in the normal operations of business, government, and private citizen functioning and activities like traffic signals, elevators, and retail sales. The impacts of a utility outage can be compounded by coinciding with other hazard events, such as a severe winter storm. In these cases, high risk populations are in peril as they rely on these utilities to maintain safe temperatures in their homes and businesses.

3.1.22.3. Past Occurrence

Information on past events of this nature had to be extracted from the Franklin County 911 Dispatch Center's Computer Aided Dispatch (CAD) system. Individual searches on keywords and/or responding units had to be performed against the entire data set of all 911 incidents. This created a large subset of data that had to be manually inspected for relevant details. In order to get pertinent information and keep the data collection manageable, the range or search dates was limited to 2 years.

Table 3.1.22.3.1 shows the number of communications and power outages addressed by the Franklin County 911 Operations Center from May 2015 to Apr 2017. Inspection of this chart reveals that over 69% of all power/communications incidents involved above ground utility lines or equipment. Some of these incidents were due to wind/storm/tree damage, but about half were due to vehicular accidents.

Municipality	Wires Down	Maintenance	Pole Damage – Auto Accident	Power Outage	Totals
Antrim Township	4	10	8	2	**24**
Chambersburg Borough	0	0	1	1	**2**
Fannett Township	5	3	3	0	**11**
Greencastle Borough	4	4	4	1	**13**
Greene Township	25	9	12	4	**50**
Guilford Township	13	7	13	5	**38**
Hamilton Township	5	3	4	3	**15**
Letterkenny Township	2	2	1	1	**6**
Lurgan Township	4	3	2	0	**9**
Mercersburg Borough	2	1	0	1	**4**
Metal Township	1	0	5	1	**7**
Mont Alto Borough	3	1	3	1	**8**
Montgomery Township	10	5	11	1	**27**
Orrstown Borough	0	0	0	0	**0**
Peters Township	9	2	7	1	**19**
Quincy Township	5	3	8	1	**17**
Shippensburg Borough	0	1	0	0	**1**
Southampton Township	3	1	10	1	**15**
St Thomas Township	6	8	6	2	**22**
Warren Township	3	1	1	0	**5**
Washington Township	14	9	21	1	**45**
Waynesboro Borough	15	8	11	8	**42**
Totals	**133***	**81**	**131***	**35**	**380**
*** Incidents Involving Above Ground Utilities = 264/380 = 0.6947 = 69.47%**					

Table 3.1.22.3.1: Reported Communications and Power Incidents (2015-2017)[160]

Table 3.1.22.3.2 below captures the gas utility outages from May 2007 through April 2017. This chart reveals that over 36% of the incidents reported are due to human error either by way of a vehicle accident or construction/digging without having the utility lines surveyed first.

[160] Franklin County CAD System, 2007-2017

Municipality	Gas Leak Residence/ Business	Maintenance	Transmission Line Leak	Gas Leak – Vehicle Accident	Gas Leak – Digging/ Construction	Totals
Antrim Township	3	2	1	4	0	**10**
Chambersburg Borough	7	1	0	0	0	**8**
Fannett Township	0	0	0	0	0	**0**
Greencastle Borough	6	0	0	1	2	**9**
Greene Township	2	0	0	5	0	**7**
Guilford Township	9	4	1	6	4	**24**
Hamilton Township	0	0	2	0	0	**2**
Letterkenny Township	0	0	0	0	0	**0**
Lurgan Township	0	0	0	0	0	**0**
Mercersburg Borough	1	0	0	1	1	**3**
Metal Township	0	0	0	0	0	**0**
Mont Alto Borough	3	0	0	2	1	**6**
Montgomery Township	0	2	0	1	0	**3**
Orrstown Borough	0	0	0	0	0	**0**
Peters Township	0	0	0	0	0	**0**
Quincy Township	1	1	0	4	1	**7**
Shippensburg Borough	0	0	0	0	0	**0**
Southampton Township	6	1	0	1	0	**8**
St Thomas Township	0	0	0	0	0	**0**
Warren Township	0	0	0	0	0	**0**
Washington Township	5	2	0	2	1	**10**
Waynesboro Borough	19	0	0	2	7	**28**
Totals	**62**	**13**	**4**	**29***	**17***	**125**
*** Accidents Involving Human Error = 46/125 = 0.3651 = 36.51%**						

Table 3.1.22.3.2: Reported Gas Utility Outages (2007-2017)[161]

Table 3.1.22.3.3 below captures the water and sewage service outages from May 2007 through April 2017. The biggest take-away from this chart is that there are 3 municipalities (Antrim Township, Chambersburg Borough, and Washington Township) that make up 63% of all water

161 Franklin County CAD System, 2007-2017

and sewage outages in the county. These municipalities account for over 32% of the total population of the county, which can account for this higher percentage, but it may also indicate aging infrastructure systems that could be a target for mitigation.

Municipality	Water Main/ Service Interruption	Sewer Line Back-ups/Leaks	Fire Hydrant Leaks/Accidents	Water Quality Issues (Turbidity)	Totals
Antrim Township	15	27	5	0	**47***
Chambersburg Borough	37	8	9	0	**54***
Fannett Township	0	0	0	0	**0**
Greencastle Borough	3	3	1	0	**7**
Greene Township	13	1	3	0	**17**
Guilford Township	25	4	0	0	**29**
Hamilton Township	7	3	0	0	**10**
Letterkenny Township	0	0	0	0	**0**
Lurgan Township	4	0	0	0	**4**
Mercersburg Borough	3	0	0	0	**3**
Metal Township	0	0	0	0	**0**
Mont Alto Borough	0	0	0	0	**0**
Montgomery Township	0	0	0	0	**0**
Orrstown Borough	0	0	0	0	**0**
Peters Township	5	1	0	0	**6**
Quincy Township	0	1	0	0	**1**
Shippensburg Borough	0	0	0	0	**0**
Southampton Township	8	0	1	0	**9**
St Thomas Township	3	0	0	0	**3**
Warren Township	0	0	0	0	**0**
Washington Township	48	3	2	2	**55***
Waynesboro Borough	1	1	0	0	**2**
Totals	**172**	**52**	**21**	**2**	**247**
*** Total number of outages from these three municipalities is 63% of the total in the county**					

Figure 3.1.22.3.3: Reported Water/Sewer Utility Outages (2007-2017)[162]

[162] Franklin County CAD System, 2007-2017

3.1.22.4. Future Occurrence

Utility interruptions are difficult to predict. Franklin County expects several utility interruptions each year, but they are generally minor in nature and have a short duration. Long-term utility disruptions are more likely to occur during severe weather events, but provisions are in place with local municipalities and the American Red Cross to open heating/cooling centers for these longer duration events to protect the at-risk populations. Considering the historical information and outlook for recurrence, it is assessed that the probability of a Utility Interruption happening again in Franklin County is ***highly likely*** as defined by the Risk Factor Methodology Probability criteria (**Section 1.2**).

3.1.22.5. Vulnerability Assessment

Utility interruptions most severely affect individuals with access and functional needs (e.g., 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 heat during extreme cold can be especially detrimental to those with medical needs, children, and the elderly. Additionally, a lack of clean, potable water has health implications for all people, and a lack of water supply may also impact the sewer system and the availability of sewer service.

All critical facilities are vulnerable to utility interruptions, especially the loss of power. Therefore, all critical facilities, houses, population, and infrastructure as outlined in **Tables 2.4.5 and 2.4.6, Section 2** are vulnerable. The establishment of reliable backup power at these facilities is extremely important to continue to provide for the health, safety, and well-being of population and economy of Franklin County.

Figure 3.2.22.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Utility Interruption hazard. One can see that 10 of 22 municipalities rated this threat as either a Catastrophic or Major event. Furthermore, 8 of the remaining 12 municipalities have it ranked as a Moderate threat. This is a Moderate threat for Franklin County ranked number 4 overall.

Utility Interruption Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	3	20%	4	10%	2	10%	2.4	10.12%	0.2429
Chambersburg Borough	4	30%	1	30%	4	20%	4	10%	2	10%	2.9	14.05%	0.4075
Fannett Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.59%	0.0175
Greencastle Borough	2	30%	2	30%	4	20%	4	10%	2	10%	2.6	2.73%	0.0710
Greene Township	3	30%	1	30%	2	20%	4	10%	2	10%	2.2	11.82%	0.2600
Guilford Township	4	30%	1	30%	4	20%	4	10%	2	10%	2.9	9.38%	0.2720
Hamilton Township	2	30%	1	30%	3	20%	4	10%	2	10%	2.1	7.29%	0.1531
Letterkenny Township	3	30%	1	30%	3	20%	4	10%	2	10%	2.4	1.58%	0.0379
Lurgan Township	2	30%	1	30%	3	20%	4	10%	2	10%	2.1	1.42%	0.0298
Mercersburg Borough	2	30%	1	30%	4	20%	4	10%	2	10%	2.3	0.97%	0.0223
Metal Township	2	30%	3	30%	2	20%	4	10%	2	10%	2.5	1.13%	0.0283
Mont Alto Borough	3	30%	1	30%	4	20%	4	10%	2	10%	2.6	1.01%	0.0263
Montgomery Township	4	30%	2	30%	3	20%	4	10%	2	10%	3.0	3.68%	0.1104
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	0.14%	0.0018
Peters Township	2	30%	1	30%	2	20%	4	10%	2	10%	1.9	2.86%	0.0543
Quincy Township	3	30%	2	30%	4	20%	4	10%	2	10%	2.9	3.41%	0.0989
Shippensburg Borough	2	30%	2	30%	4	20%	4	10%	2	10%	2.6	0.75%	0.0195
Southampton Township	3	30%	1	30%	3	20%	4	10%	2	10%	2.4	5.49%	0.1318
St Thomas Township	4	30%	2	30%	2	20%	4	10%	2	10%	2.8	3.79%	0.1061
Warren Township	3	30%	2	30%	3	20%	4	10%	2	10%	2.7	0.21%	0.0057
Washington Township	2	30%	1	30%	2	20%	4	10%	2	10%	1.9	9.55%	0.1815
Waynesboro Borough	3	30%	1	30%	2	20%	4	10%	2	10%	2.2	7.02%	0.1544
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.433

Figure 3.1.22.5.1: Municipal Utility Interruption Threat Vulnerability Self-Assessment

No data regarding economic impacts from utility interruptions in Franklin County is available. However, utility 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.

In Franklin County the risk factor for Utility Interruptions future occurrence is moderate. These minor interruptions are generally short lived and are more frequent. However, if the outage lasts for an extended period of time, medical facilities and nursing homes become extremely vulnerable.

3.1.23. Wildfire

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or rural area.

3.1.23.1. Location and Extent

Franklin County experiences a number of fires every year, most of which are small and affect one or more residential structures. However, a significant portion of county land consists of forests or farms, which are more prone to wildfires.

Wildfires occur throughout wooded and open vegetation areas of Pennsylvania. 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. Wildfires can be started by human negligence, lightning strikes, and rare instances of spontaneous combustion.

Data collected from DCNR (see **Appendix F**) shows that for Pennsylvania, the greatest potential for wildfires is in the Spring months of March, April, and May and to a lesser extent, the Autumn months of October and November. In the Spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris. In the Fall, dried leaves are also fuel for fires. The percentage of wildfires occurring each month in Pennsylvania is shown in **Figure 3.1.23.1.1** below.

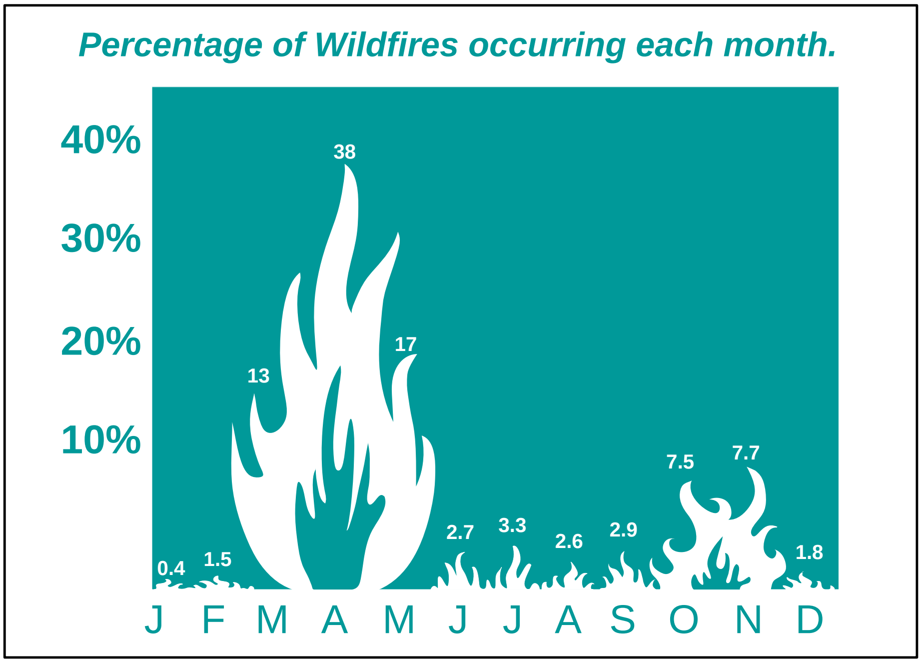

Figure 3.1.23.1.1: Percentage of PA Wildfires Each Month (1940-2015)[163]

A review of the Wildfire data in the county's Computer Aided Dispatch (CAD) system shows that this pattern is somewhat different for Franklin County. We see a leveling out of the occurrence per month and a distinct rise in the Summer months (see **Figure 3.1.23.1.2** below).

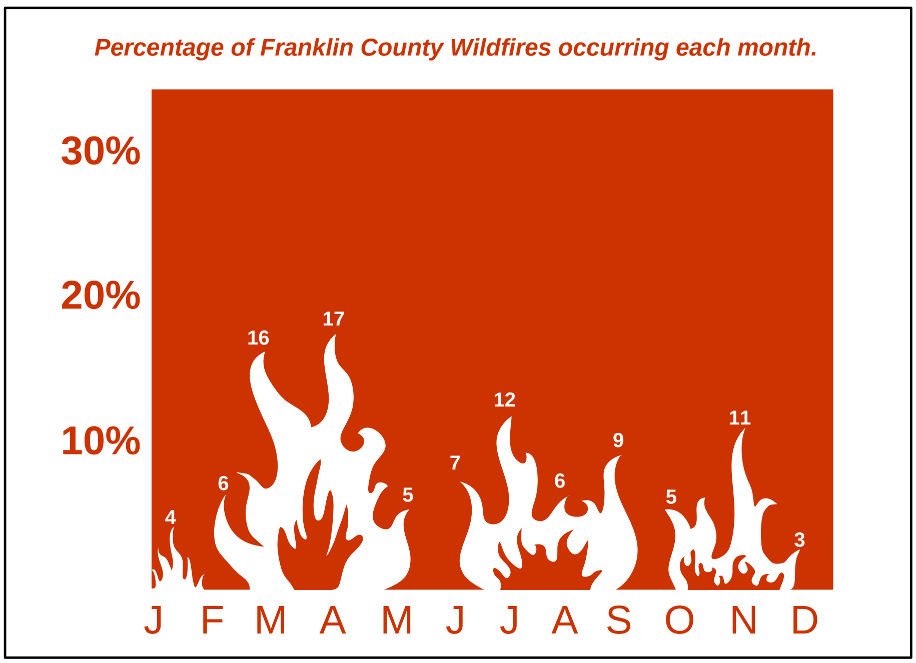

Figure 3.1.23.1.2: Percentage of Franklin County Wildfires per Month (2007-2017)

[163] Franklin County CAD System, 2007-2017

The differences in these charts could simply be the amount of data used in our local analysis. Our set covered roughly 10 years of data versus the 75 years of the PA data set. However, it does indicate that a local trend could be developing in our county over the past 10 years, possibly due to local drought conditions (see **Section 3.1.3**).

3.1.23.2. Range of Magnitude

As stated above, wildfires can occur at any time of the year, but mostly occur during long, dry, hot spells. Any small fire in a wooded area, 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 the Commonwealth of Pennsylvania can occur in fields, grass, and brush as well as in the forest itself. In Franklin County, much of the western and southeast portions of the County consist of forested areas (See **Figure 2.4.1, Section 2**). Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. Ninety-eight (98) percent of wildfires in Pennsylvania are caused by people, often by debris burns. Several fires have started in a private backyard and traveled through dead grasses and weeds into bordering woodlands.

An uncontrolled fire (wildfire) is one of the most destructive fires caused by nature or man. It kills people, livestock, and wildlife. It destroys property, valuable timber, forage, and inestimable scenic and recreational value.

Vegetation loss is often an environmental concern with wildfires, but it typically is not a serious impact since natural re-growth occurs with time. 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.

3.1.23.3. Past Occurrence

An analysis of our CAD system was done to extract all instances of Brush and Mountain Fires in the county over the past ten years. **Table 3.1.23.3.1** illustrates the findings of this analysis.

Municipality	Brush Fires	Mountain Fires	Totals
Antrim Township	186	0	**186**
Chambersburg Borough	145	0	**145**
Fannett Township	48	8	**56**
Greencastle Borough	16	0	**16**
Greene Township	120	1	***121**
Guilford Township	171	10	***181**
Hamilton Township	73	3	**76**
Letterkenny Township	32	2	**34**
Lurgan Township	40	2	**42**
Mercersburg Borough	13	0	**13**
Metal Township	38	5	**43**
Mont Alto Borough	8	0	**8**
Montgomery Township	98	8	**106**
Orrstown Borough	0	0	**0**
Peters Township	70	10	**80**
Quincy Township	93	16	***109**
Shippensburg Borough	6	0	**6**
Southampton Township	86	1	***87**
St Thomas Township	80	1	**81**
Warren Township	13	4	**17**
Washington Township	126	5	***131**
Waynesboro Borough	41	0	**41**
Totals	**1503**	**76**	**1579**
*** Municipalities that make up part of the Michaux State Forrest; 629/1579 = 40% of the wildfires in the county.**			

Table 3.1.23.3.1: Wildfire Events in Franklin County (2007-2017)

A major concern with respect to wildfires is the Michaux State Forest, located in Franklin, Cumberland, and Adams Counties. The Michaux State Forest totals more than 85,000 acres and is utilized for not only recreational purposes, but also wood products and timber resources. Numerous local communities in the 3-county area also depend on the forest for its pure water supplies. Therefore, fires within the forest can have severe impacts on the well-being of residents and the local economy.

According to the DCNR, Forestry Bureau, there have been a total of 38.26 acres burned as a result of wildfires in the Michaux State Forest between 2011 and 2017. These forest fires are the result of numerous causes, including campfires, debris, lightning, and smoking. **Table 3.1.23.3.2** below lists the wildfire occurrences in the Michaux State Forrest since 2011. **Figure 3.1.23.3.1** plots these fires on the map to show the areas impacted by these wildfires.

Date	Minicipality	Wildfire Name	Acres Impacted	Cause
2/18/2017	Quincy Township	Pulpit Rock	7.00	Camp Fire
11/9/2016	Quincy Township	Snowy Mt	1.00	Incendiary
10/24/2016	Guilford Township	Brown Rocks	5.00	Incendiary
9/23/2016	Quincy Township	Moonshine	0.10	Camp Fire
11/21/2015	Guilford Township	White Rocks	0.01	Camp Fire
9/28/2015	Greene Township	Rocky Mountain	0.01	Camp Fire
4/19/2015	Guilford Towship	Smith Corl Ridge	0.10	Debris Burning
4/13/2015	Guilford Township	White Rock Rd	0.25	Incendiary
4/8/2015	Quincy Township	Oak Rd	0.50	Incendiary
4/2/2015	Guilford Township	Corls Ridge Rd	0.50	Debris Burning
11/5/2014	Greene Township	Heisey Rd	0.25	Miscellaneous
11/2/2014	Greene Township	Mt Cydonia 2	0.10	Incendiary
11/1/2014	Greene Township	Mt Cydonia	0.10	Incendiary
9/12/2014	Southampton Township	Stillhouse Powerline	0.01	Equipment Use
8/31/2014	Guilford Township	White Rocks 2	1.70	Camp Fire
8/27/2014	Guilford Township	White Rocks	0.01	Camp Fire
3/15/2014	Quincy Township	Monns Gap	1.00	Incendiary
11/14/2013	Greene Township	Ridge Rd	0.01	Incendiary
9/10/2013	Quincy Township	WWII Reenactment	0.10	Equipment Use
4/7/2013	Quincy Township	Spruce Rd	0.50	Debris Burning
1/19/2013	Southampton Township	Stillhouse Powerline	0.80	Miscellaneous
4/11/2012	Quincy Township	Powerline	0.10	Incendiary
4/7/2012	Washington Township	Weather Stone	7.10	Debris Burning
4/6/2012	Quincy Township	Brown	0.01	Debris Burning
1/20/2012	Quincy Township	Staley Rd	0.25	Incendiary
7/18/2011	Washington Township	Rattlesnake Run Rd	0.02	Incendiary
7/12/2011	Quincy Township	Swift Run	10.50	Miscellaneous
6/14/2011	Washington Township	Appalachian Trail	0.12	Incendiary
2/19/2011	Guilford Township	Landfill	1.00	Equipment Use
2/16/2011	Guilford Township	Knouse Pond	0.11	Miscellaneous
Total			38.26 Acres	

Table 3.1.23.3.2: Wildfires in Michaux State Forest (2011-2017)

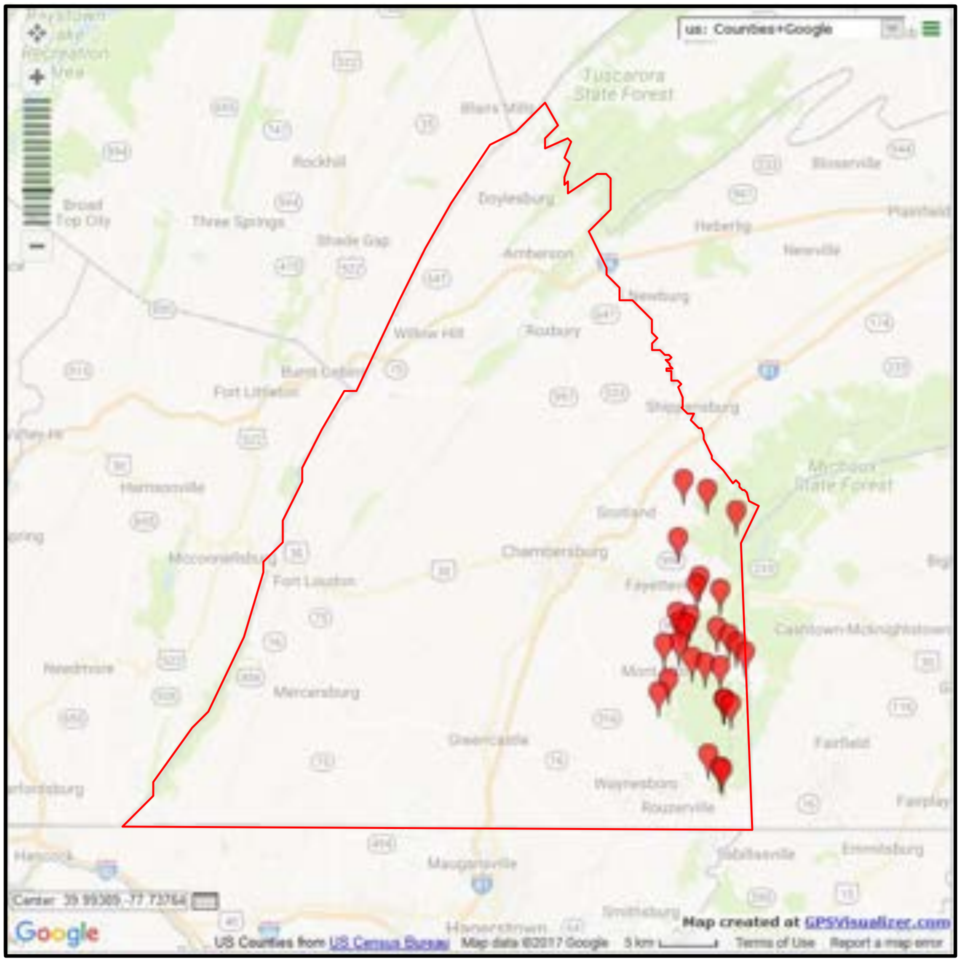

Figure 3.1.23.3.1: Wildfires in Michaux State Forest (2011-2017)

3.1.23.4. Future Occurrence

Weather conditions like drought can increase the likelihood of fires burning out of control and becoming a wildfire. Any fire, without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire. The probability of future wildfires should be considered ***likely*** according to the Risk Factor Methodology (see **Section 1.2**). 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 (see **Section 3.1.3** for the Drought hazard), increase the likelihood of wildfires occurring.

3.1.23.5. Vulnerability Assessment

Analyzing the Past Occurrence data and the causal factors of wildfires, it is apparent that Franklin County will continue to experience these events. However, there is no data to indicate any loss of life and little data to indicate that the events we have experienced have resulted in significant financial losses. Therefore, even though the likelihood of recurrence is moderate, the impact of these incidents has been low. It is still a viable threat to the county, and mitigation actions can be put in place to further reduce the occurrence rate and impact of these events. One action that we have added is to restart the Franklin County Firewise program and encourage municipal participation to raise awareness of the threat and implement preventive measures.

Figure 3.1.23.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Wildfire hazard. One can see that only 3 of 22 municipalities rated this threat as a Major event, and none of those are the municipalities in the Michaux State Forest. Furthermore, only 5 of the remaining 19 municipalities have it ranked as a Moderate threat. This is still considered a Minor threat for Franklin County, ranked number 19 overall.

Wildfire
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	10.12%	0.2226
Chambersburg Borough	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	14.05%	0.2248
Fannett Township	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	1.59%	0.0175
Greencastle Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	2.73%	0.0355
Greene Township	2	30%	1	30%	1	20%	4	10%	2	10%	1.7	11.82%	0.2009
Guilford Township	1	30%	1	30%	2	20%	4	10%	2	10%	1.6	9.38%	0.1501
Hamilton Township	1	30%	1	30%	3	20%	4	10%	2	10%	1.8	7.29%	0.1312
Letterkenny Township	4	30%	2	30%	2	20%	4	10%	2	10%	2.8	1.58%	0.0442
Lurgan Township	2	30%	1	30%	3	20%	2	10%	2	10%	1.9	1.42%	0.0270
Mercersburg Borough	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	0.97%	0.0136
Metal Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	1.13%	0.0249
Mont Alto Borough	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	1.01%	0.0141
Montgomery Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	3.68%	0.0810
Orrstown Borough	1	30%	1	30%	1	20%	3	10%	2	10%	1.3	0.14%	0.0018
Peters Township	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	2.86%	0.0400
Quincy Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	3.41%	0.0750
Shippensburg Borough	1	30%	1	30%	1	20%	4	10%	2	10%	1.4	0.75%	0.0105
Southampton Township	2	30%	2	30%	2	20%	4	10%	2	10%	2.2	5.49%	0.1208
St Thomas Township	3	30%	2	30%	2	20%	4	10%	2	10%	2.5	3.79%	0.0948
Warren Township	2	30%	3	30%	2	20%	4	10%	2	10%	2.5	0.21%	0.0053
Washington Township	2	30%	1	30%	2	20%	4	10%	2	10%	1.9	9.55%	0.1815
Waynesboro Borough	1	30%	1	30%	1	20%	1	10%	2	10%	1.1	7.02%	0.0772
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													1.794

Figure 3.1.23.5.1: Municipal Wildfire Threat Vulnerability Self-Assessment

It is important to note that most wildfires in Pennsylvania are human-caused. As a result, the occurrence of future wildfire events will strongly depend on patterns of human activity. Events are more likely to occur in wildfire-prone areas experiencing new or additional development. Wildfires may also be more likely after Invasive Species (**Section 3.1.10**) infestations or Windstorm events (**Section 3.1.19**); these events would add additional potential fuel load to fire-prone locations.

3.1.24. Winter Storm

Winter storms consist of cold temperatures, heavy snow or ice, and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called Nor'easters.

3.1.24.1. Location and Extent

Winter Storms can, and usually do, impact the entire county. Within Franklin County, there are variations in the average amount of snowfall that is received because of geography and elevation differences. The higher elevations receive on average 25-50 inches, whereas the lower elevations see between 10-25 inches, as shown in **Figure 3.1.24.1.1**[164]**.**

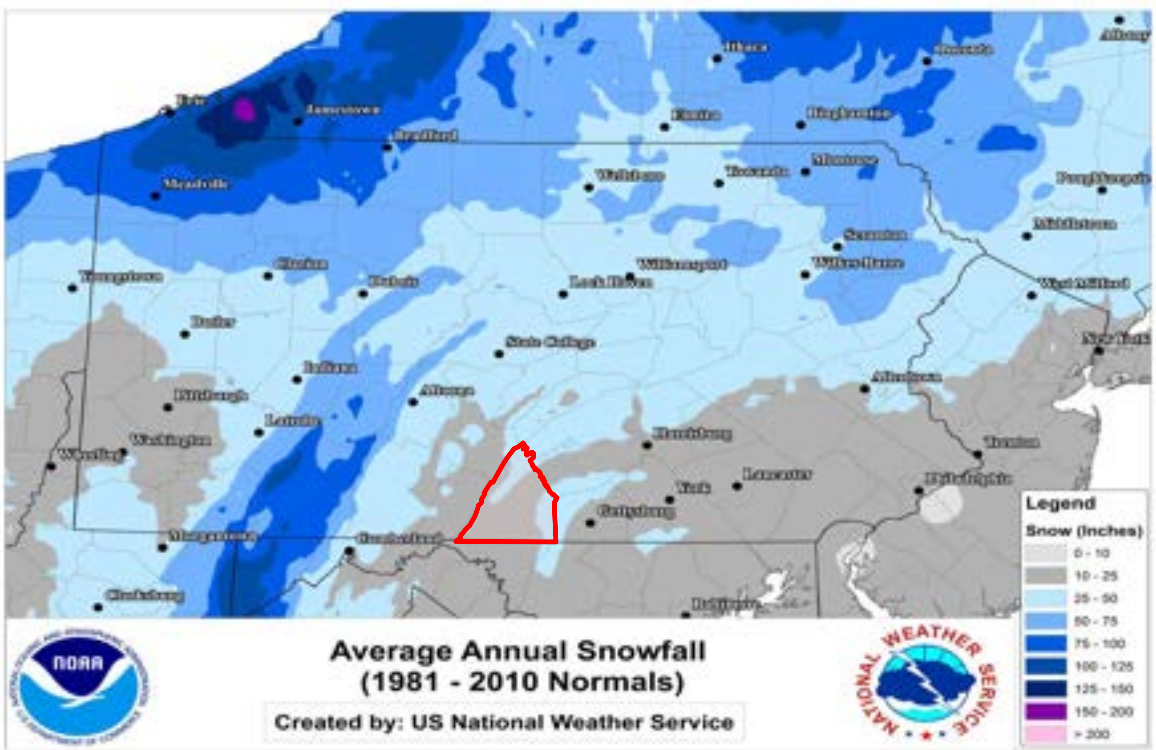

Figure 3.1.24.1.1: Average Annual Snowfall for Franklin County PA (1981-2010)

[164] NOAA/NWS

3.1.24.2. Range of Magnitude

A winter storm can adversely affect roadways, utilities, business activities, and can cause hypothermia, frostbite, or loss of life. These storms may introduce heavy snow, ice, winter flooding, and extreme cold temperatures into the region[165]. This section will only discuss heavy snow and ice conditions. Extreme cold temperatures and winter flooding are covered in **Section 3.1.6** and **Section 3.1.7** respectively.

Heavy Snow: Heavy snow can immobilize a region and paralyze a community by closing major transportation arteries, thus stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines leading to humanitarian and medical crises during periods of reduced mobility. Rural homes and farms may be isolated for days and unprotected livestock may be lost. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on our municipalities. The following are examples of snow conditions common in Franklin County[166]:

- **Blizzard** – Winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for 3 hours or more.

- **Blowing Snow** – Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.

- **Snow Squalls**- Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.

- **Snow Showers** – Snow falling at varying intensities for brief periods of time. Some accumulation is possible.

- **Snow Flurries** – Light snow falling for short durations with little or no accumulation.

Ice: Heavy accumulations of ice can bring down trees and topple utility poles and communications towers. Ice can disrupt communications and power for days while utility companies repair extensive damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces. The following are ice conditions that impact Franklin County:

- **Freezing Rain** – Frozen precipitation that melts upon encountering warmer air only to refreeze on cold surfaces upon reaching the ground as a sheet of ice.

- **Sleet** – Frozen precipitation that melts upon encountering warmer air but refreezes prior to hitting the ground.

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[165] NOAA/NES, 2008
[166] NOAA/NES, 2008

3.1.24.3. Past Occurrence

Franklin County and the Commonwealth of Pennsylvania have a long history of severe winter weather. Franklin County has experienced the following types of severe winter weather events (See **Table 3.1.24.3.1** below) since 1993, according to the National Centers for Environmental Information (NCEI)[167]:

Severe Winter weather Type	Occurrences
Blizzards/Heavy Snow	28
Ice Storm	6
Winter Storm	19
Totals	**53**

Table 3.1.24.3.1: Severe Winter Weather Events for Franklin County (1993-2018)

From this data, one can see that Franklin County has experienced 53 winter storm events, since 1993. The NCEI data on past occurrence for winter storm events is the most comprehensive list of data available for the county. The county does not have or maintain data on damages caused by winter storms at the local level.

There have been a number of key past winter storm events for Franklin County. However, the most significant one was on January 22-24, 2016. The storm, named Winter Storm Jonas by The Weather Channel, dumped over 29 inches of snow in 48 hours in parts of Franklin County[168]. This resulted in 21 of 22 municipalities as well as the county enacting disaster declarations. Both state and federal partners declared disasters as well. As a result of this one winter storm, Franklin County and our municipalities filed for well over $900,000 in federal disaster relief funding to cover the manpower (overtime), equipment, and material costs required to return to normal operations.

Table 3.1.24.3.2 below specifically lists all of the Blizzard/Heavy Snow Events; **Table 3.1.24.3.3** lists the Ice Storms; and **Table 3.1.24.3.4** lists all the Winter Storms Franklin County since 1993.

[167] NOAA/NCEI
[168] The Herald Mail, 2016

Location	Severe Weather Event	Date
Multiple Counties	Heavy Snow	11/25/2014
Multiple Counties	Heavy Snow	2/13/2014
York, Franklin, Schuykill, Lebanon, Adams, Fulton, Bedford, Lancaster, Somerset, and Dauphin	Heavy Snow	2/3/2014
Fulton, Cambria, Somerset, Bedford, Adams, Franklin, Blair, and Huntingdon	Heavy Snow	3/6/2013
Multiple Counties	Heavy Snow	10/29/2011
York, Adams, Cumberland, Franklin, Cambria, Huntingdon, Blair, Bedford, Somerset, and Fulton	Heavy Snow	2/21/2011
Adams, York, Lancaster, Lebanon, Franklin, Dauphin, Bedford, Fulton, and Somerset	Heavy Snow	1/26/2011
Multiple Counties	Heavy Snow	3/16/2007
Multiple Counties	Heavy Snow	12/9/2005
Multiple Counties	Heavy Snow	2/24/2005
Multiple Counties	Heavy Snow	2/3/2004
York, Somerset, Huntingdon, Fulton, Cambria, Blair, Bedford, Adams, and Franklin	Heavy Snow	1/25/2004
Multiple Counties	Heavy Snow	12/5/2003
Multiple Counties	Heavy Snow	2/16/2003
Multiple Counties	Heavy Snow	2/6/2003
Multiple Counties	Heavy Snow	12/25/2002
Multiple Counties	Heavy Snow	12/5/2002
Multiple Counties	Heavy Snow	1/6/2002
Multiple Counties	Heavy Snow	3/4/2001
Multiple Counties	Heavy Snow	1/20/2001
Multiple Counties	Heavy Snow	1/30/2000
Multiple Counties	Heavy Snow	1/25/2000
Multiple Counties	Heavy Snow	3/14/1999
Somerset, Bedford, and Franklin	Heavy Snow	1/28/1998
Multiple Counties	Heavy Snow	12/29/1997
Multiple Counties	Heavy Snow	11/28/1996
Multiple Counties	Heavy Snow	1/12/1996
Multiple Counties	Blizzard	1/7/1996

Table 3.1.24.3.2: Blizzard/Heavy Snow Events in Franklin County (1993-2018)[169]

[169] NOAA/NCEI

Location	Severe Weather Event	Date
Adams and Franklin	Ice Storm	1/5/2014
Multiple Counties	Ice Storm	1/6/2009
Multiple Counties	Ice Storm	2/6/2004
Multiple Counties	Ice Storm	12/10/2002
Centre, Somerset, Fulton, Cambria, Bedford, and Franklin	Ice Storm	10/29/2002
Multiple Counties	Ice Storm	1/15/1998

Table 3.1.24.3.3: Ice Storm Events in Franklin County (1993-2018)

Location	Severe Weather Event	Date
Multiple Counties	Winter Storm	2/13/2017
Multiple Counties	Winter Storm	2/15/2016
Multiple Counties	Winter Storm	1/22/2016
Multiple Counties	Winter Storm	2/4/2014
Multiple Counties	Winter Storm	12/14/2013
Multiple Counties	Winter Storm	2/9/2010
Multiple Counties	Winter Storm	2/5/2010
Multiple Counties	Winter Storm	12/19/2009
Multiple Counties	Winter Storm	1/27/2009
Multiple Counties	Winter Storm	2/1/2008
Multiple Counties	Winter Storm	12/15/2007
Multiple Counties	Winter Storm	2/13/2007
Multiple Counties	Winter Storm	12/16/2005
Multiple Counties	Winter Storm	12/13/2000
Multiple Counties	Winter Storm	2/18/2000
Multiple Counties	Winter Storm	1/14/1999
Multiple Counties	Winter Storm	1/8/1999
Multiple Counties	Winter Storm	1/2/1999
Multiple Counties	Winter Storm	2/13/1997

Table 3.1.24.3.4: Winter Storm Events in Franklin County (1993-2018)

3.1.24.4. Future Occurrence

Winter storms are a regular, annual occurrence in Franklin County and should be considered ***highly likely***, based on the Risk Factor criteria (See **Section 1.2**).

Table 3.1.24.4.1 below shows the snow and sleet totals per month since January of 2012 through August of 2017 for Franklin County PA[170]. There are 3 reporting locations in Franklin County; Chambersburg (USC00361354), Greencastle (US1PAFN0001) and South Mountain (USC00368308). From this table, one can see that the probability of snow/sleet related events is high, especially in December, January, February, and March. In these months, one can also see that the total accumulation varies widely, but the possibility of depths over 6 inches can be easily achieved. There is no reason to believe the winter weather trends shown in **Table 3.1.24.4.1** below will not continue.

Snow/Sleet in Inches per Month since 2012																			% Chance on average of Snow/Sleet in Month	Average Accumulation in inches if it does Snow/Sleet per month
	2012			2013			2014			2015			2016			2017				
	Chambersburg (USC00361354)	Greencastle (US1PAFN0001)	South Mountain (USC368308)	Chambersburg (USC00361354)	Greencastle (US1PAFN0001)	South Mountain (USC368308)	Chambersburg (USC00361354)	Greencastle (US1PAFN0001)	South Mountain (USC368308)	Chambersburg (USC00361354)	Greencastle (US1PAFN0001)	South Mountain (USC368308)	Chambersburg (USC00361354)	Greencastle (US1PAFN0001)	South Mountain (USC368308)	Chambersburg (USC00361354)	Greencastle (US1PAFN0001)	South Mountain (USC368308)		
January	4.2			2.9	2.5	4.2	7.5	5.6	13.2	14.2	9.4	14.3	29.9	30.0	34.3	2.4	0.8	2.4	100%	10.3
February				4.4	0.8	6.2		4.1	25.6	7.4	5.3	7.4	6.4	5.1	8.8	2.0	0.8	3.0	83%	5.8
March				13.4	7.0	16.1			8.1	11.9	6.5	13.6	0.3	0.5	0.8	14.3	8.0	17.1	83%	7.8
April															0.5				17%	0.2
May																			0%	
June																			0%	
July																			0%	
Aug																			0%	
September																			0%	
October																			0%	
November	0.5		0.5				5.0	3.0	4.3										33%	2.2
December	10.9	5.1	11.8		3.5	10.1			1.0				1.2		2.6				67%	3.9

Indicates that data was not available at time of this HMP draft (10/11/2017)

Table 3.1.24.4.1: Probability of Snow/Sleet per Month for Franklin County (2012-2017)

3.1.24.5. Vulnerability Assessment

Based on all the information available, every community in Franklin County is equally vulnerable to the direct impacts of winter storms. However residents in the mountainous areas of the county may be more susceptible to disasters during severe storms, due to hazardous road conditions on steep inclines. This is especially true when emergency medical assistance may be required during the snow event.

Figure 3.1.24.5.1 below lists the vulnerability self-assessments of each of the Franklin County municipalities for the Winter Storm hazard. One can see that 11 of 22 municipalities rated this threat as either a Catastrophic or Major event. Furthermore, 9 of the remaining 11 municipalities rated this as a Moderate threat. This is a Major threat to Franklin County ranked number 1 overall.

[170] NOAA/NCEI, Global Summary for Months 2012 through 2017 for Franklin County PA

Winter Storm
Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Municipality	Probability (1-4)	30%	Impact (1-4)	30%	Spatial (1-4)	20%	Warning Time (1-4)	10%	Duration (1-4)	10%	Risk Factor (RF)	% of County Population	Contribution to County RF
Antrim Township	4	30%	2	30%	4	20%	1	10%	3	10%	3.0	10.12%	0.3036
Chambersburg Borough	4	30%	1	30%	4	20%	2	10%	3	10%	2.8	14.05%	0.3934
Fannett Township	2	30%	2	30%	4	20%	1	10%	3	10%	2.4	1.59%	0.0382
Greencastle Borough	2	30%	2	30%	4	20%	1	10%	3	10%	2.4	2.73%	0.0655
Greene Township	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	11.82%	0.2837
Guilford Township	4	30%	1	30%	4	20%	1	10%	3	10%	2.7	9.38%	0.2533
Hamilton Township	2	30%	2	30%	4	20%	2	10%	3	10%	2.5	7.29%	0.1823
Letterkenny Township	4	30%	2	30%	4	20%	2	10%	3	10%	3.1	1.58%	0.0490
Lurgan Township	3	30%	2	30%	4	20%	3	10%	3	10%	2.9	1.42%	0.0412
Mercersburg Borough	3	30%	1	30%	4	20%	1	10%	3	10%	2.4	0.97%	0.0233
Metal Township	2	30%	1	30%	1	20%	2	10%	3	10%	1.6	1.13%	0.0181
Mont Alto Borough	2	30%	2	30%	4	20%	1	10%	3	10%	2.4	1.01%	0.0242
Montgomery Township	3	30%	3	30%	4	20%	1	10%	3	10%	3.0	3.68%	0.1104
Orrstown Borough	2	30%	1	30%	2	20%	3	10%	3	10%	1.9	0.14%	0.0027
Peters Township	2	30%	1	30%	4	20%	2	10%	3	10%	2.2	2.86%	0.0629
Quincy Township	4	30%	2	30%	4	20%	1	10%	3	10%	3.0	3.41%	0.1023
Shippensburg Borough	2	30%	2	30%	4	20%	1	10%	3	10%	2.4	0.75%	0.0180
Southampton Township	3	30%	2	30%	3	20%	4	10%	3	10%	2.8	5.49%	0.1537
St Thomas Township	3	30%	2	30%	2	20%	2	10%	3	10%	2.4	3.79%	0.0910
Warren Township	4	30%	2	30%	4	20%	1	10%	3	10%	3.0	0.21%	0.0063
Washington Township	2	30%	1	30%	3	20%	3	10%	3	10%	2.1	9.55%	0.2006
Waynesboro Borough	3	30%	2	30%	4	20%	1	10%	3	10%	2.7	7.02%	0.1895
Municipal Weighted Average Risk Factor (RF)(*Updated 09/07/2021*)													2.613

Figure 3.1.24.5.1: Municipal Winter Storm Threat Vulnerability Self-Assessment

Because of the frequency of winter storms in Franklin County, strategies have been developed at the county and municipal level to respond to these events. Snow removal and utility repair equipment are prepositioned to respond to typical snow/ice events. Additionally, the use of auxiliary heat and electricity supplies, such as wood burning stoves, kerosene heaters, and gasoline powered generators reduce the vulnerability of the population to extreme cold temperatures commonly associated with winter storms.

Vulnerability to the effects of winter storms on buildings is dependent on the type and age of the structure. **Table 3.1.24.5.1** below lists "built on" date percentages for residences in our municipalities. It is evident that a large portion of the housing in the county was built prior to 1960 (34.1%). Due to older building codes at time of construction and the impacts of age (and/or lack of maintenance) on facilities built before 1960, one would expect to see an increase in hazards related to snow and ice loads during severe winter weather[171]. This is especially true for residences in the Boroughs of Chambersburg, Waynesboro, Mercersburg, and Orrstown, where the percentage of houses built before 1960 is over 50%.

[171] US Census Bureau, American Community Survey 5-Year Estimates, 2011 - 2015

Municipalities	% of Houses built in Time Period							Estimated number of houses in municipality	Estimated number of houses built before 1960 in municipality	% of houses built before 1960, per municipality
	2014 and later	2010 to 2013	2000 to 2009	1980 1999	1960 to 1979	1940 to 1959	1939 or earlier			
Chambersburg Borough	0.0	1.4	12.0	16.9	16.2	21.7	31.8	8873	4747	53.5
Waynesboro Borough	0.0	1.6	10.3	12.6	13.5	22.3	39.7	5148	3192	62.0
Washington Township	0.3	3.2	18.1	30.6	22.5	11.6	13.9	6144	1567	25.5
Greene Township	0.0	2.5	19.6	28.9	28.0	11.4	9.6	7261	1525	21.0
Guilford Township	0.0	0.2	16.3	31.8	28.6	11.8	11.3	6250	1444	23.1
Shippensburg Borough	0.0	0.8	8.5	16.2	25.3	17.3	31.9	2898	1426	49.2
Antrim Township	0.7	1.3	23.2	29.3	25.7	11.3	8.4	5508	1085	19.7
Hamilton Township	0.0	2.2	19.7	33.1	23.5	14.6	7.0	4669	1009	21.6
St Thomas Township	0.0	0.0	11.6	16.1	36.1	16.5	19.8	2397	870	36.3
Greencastle Borough	0.0	0.0	15.1	19.5	24.2	20.3	20.9	1856	765	41.2
Southampton Township	0.0	2.5	21.4	35.2	20.3	13.6	7.1	3339	691	20.7
Montgomery Township	0.0	0.5	21.3	24.0	26.7	8.2	19.3	2496	686	27.5
Peters Township	1.9	0.5	11.2	16.1	30.9	17.6	21.7	1734	681	39.3
Quincy Township	0.0	0.0	9.7	34.1	29.5	10.8	15.9	2120	566	26.7
Mercersburg Borough	0.0	0.0	5.4	15.2	15.4	18.7	45.3	774	495	64.0
Fannett Township	0.0	1.2	7.8	25.8	22.3	12.2	30.8	1041	448	43.0
Lurgan Township	0.5	0.0	10.1	16.9	28.5	27.5	16.5	843	371	44.0
Letterkenny Township	0.0	0.6	6.1	30.2	33.4	14.8	14.9	1044	310	29.7
Metal Township	0.4	0.0	9.4	35.2	23.8	11.5	19.7	955	298	31.2
Mont Alto Borough	0.0	0.0	9.2	20.8	27.6	21.5	20.8	700	296	42.3
Orrstown Borough	0.0	0.0	0.0	3.1	11.5	42.7	42.7	109	93	85.4
Warren Township	0.0	9.4	12.2	31.7	18.0	3.6	25.2	166	48	28.8
County Totals								**66325**	**22612**	**34.1**

Table 3.1.24.5.1: Percentages of House Built Prior to 1960 per Municipality (2011-2015)[172]

People residing in structures lacking adequate equipment to protect against cold temperatures or significant snow and ice are more vulnerable to winter storm events and contingency plans need to be developed for possible evacuation and relocation. Even for communities that are prepared to respond to winter storms, severe events involving snow accumulations that exceed 6 or more inches in a 12-hour period can cause a large number of traffic accidents, strand motorists due to drifting snow, interrupt power and communications systems, and cause failure of inadequately designed or maintained roof systems.

Additional vulnerabilities exist due to icy and snow covered roadways. This is a potential risk on all roads, even the most widely travelled routes in the county. The areas of most concern are those routes in Franklin County that are considered major arteries for traffic through the Cumberland Valley region (i.e. I-81 and I-76, The PA Turnpike).

[172] US Census Bureau, American Community Survey 5-Year Estimates, 2011 - 2015

4. Summary

4.1. Ranking Results

Using the methodology described in **Section 1.2** above**, Figure 4.1.1** below lists the County roll-up weighted Risk Factors calculated for each of the 24 potential hazards identified in this Hazard Mitigation Plan Update.

2021 Franklin County Hazard Threat Assessment Roll-Up

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

	Montgomery TWP	Antrim TWP	Quincy TWP	Greencastle Borough	Warren TWP	Chambersburg Borough	Southampton TWP	Guilford TWP	Letterkenny TWP	Greene TWP	Mont Alto Borough	Waynesboro Borough	St Thomas TWP	Shippensburg Borough	Lurgan TWP	Hamilton TWP	Mercersburg Borough	Metal TWP	Peters TWP	Washington TWP	Fannett TWP	Orrstown Borough	Municipal Weighted Average
Winter Storm	3.0	3.0	3.0	2.4	3.0	2.8	2.8	2.7	3.1	2.4	2.4	2.7	2.4	2.4	2.9	2.5	2.4	1.6	2.2	2.1	2.4	1.9	2.613
Hurricane, Tropical Storm, Nor'easter	2.8	2.8	2.8	2.8	2.5	2.5	2.4	2.5	2.6	2.7	1.8	2.8	2.2	2.3	2.7	1.9	2.2	1.9	2.2	2.5	1.3	1.8	2.501
Tornado, Windstorm	3.1	3.0	2.5	3.1	2.3	2.4	2.1	2.8	2.3	2.1	1.9	2.8	2.7	2.2	2.3	2.5	2.8	1.6	1.3	1.8	2.5	1.2	2.437
Utility Interruption	3.0	2.4	2.9	2.6	2.7	2.9	2.4	2.9	2.4	2.2	2.6	2.2	2.8	2.6	2.1	2.1	2.3	2.5	1.9	1.9	1.1	1.3	2.433
Drought	2.5	2.6	2.2	2.5	2.6	2.2	2.4	2.2	3.1	2.3	2.0	2.5	2.9	2.2	1.5	1.9	2.2	2.0	1.9	1.8	2.2	1.5	2.261
Extreme Temperatures	2.7	2.4	2.7	2.4	2.5	2.7	1.9	2.4	2.4	1.9	1.9	2.4	2.7	2.1	2.3	1.9	2.4	1.8	2.2	1.7	2.2	1.4	2.259
Transportation Accident	2.1	3.2	2.4	2.2	1.4	2.2	2.9	3.1	2.4	1.8	1.8	2.2	2.2	2.4	2.1	1.8	1.3	2.8	1.6	1.0	2.1	1.2	2.212
Lightning Strike	3.1	2.4	2.2	2.2	2.3	2.2	2.6	1.7	2.3	2.2	1.6	2.8	2.2	1.4	1.6	2.2	2.5	1.9	1.4	1.8	2.5	1.5	2.194
Dam Failure	2.1	1.9	2.0	2.5	2.3	2.6	2.4	1.8	1.6	1.9	1.6	2.5	1.9	1.5	3.3	2.0	1.6	2.2	1.6	2.6	1.3	1.5	2.152
Pandemic and Infectious Disease	3.2	2.1	2.8	2.5	2.5	1.9	2.4	2.3	1.3	2.8	2.1	2.3	2.7	2.2	1.3	1.8	1.3	2.9	1.4	1.3	1.3	1.5	2.149
Hailstorm	2.2	2.1	2.0	2.4	2.3	2.8	2.1	2.6	2.0	1.8	1.9	2.5	2.7	2.0	2.5	2.2	2.2	1.0	1.2	1.0	1.0	1.5	2.117
Environmental Hazards (HAZMAT Release)	2.2	2.4	2.4	2.6	2.0	1.9	2.7	2.8	2.7	1.7	2.2	1.7	2.3	2.4	1.9	1.8	1.1	2.2	1.4	2.2	1.1	1.3	2.112
Flood, Flash Flood, Ice Jam	2.3	2.0	2.7	2.5	2.3	1.7	2.3	2.4	2.3	1.7	1.5	1.8	2.1	1.9	2.3	1.9	1.2	2.1	2.2	2.5	2.5	1.4	2.065
Invasive Species	2.5	2.3	2.3	2.5	2.2	2.8	1.5	1.3	1.3	1.7	1.3	2.2	2.7	1.3	1.9	2.2	2.2	1.3	1.6	1.3	1.3	1.5	1.991
Earthquake	2.2	2.0	1.6	2.3	2.4	2.8	2.7	2.0	1.9	1.6	1.1	2.5	1.3	1.9	1.6	1.9	2.8	2.1	1.3	1.0	1.0	1.2	1.967
Terrorism	3.0	1.9	2.3	3.0	1.7	1.4	2.2	2.2	3.5	1.7	1.4	2.0	2.0	1.6	1.1	1.8	2.9	2.1	1.4	1.1	1.1	1.3	1.852
Subsidence, Sinkhole	2.8	2.2	1.9	1.6	1.3	2.2	2.6	2.7	1.8	1.6	1.0	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3	1.0	1.0	1.2	1.843
Urban Fire and Explosion	2.4	2.1	1.6	1.4	1.8	2.7	2.1	1.6	2.1	1.6	1.8	2.2	1.3	2.2	1.6	1.7	1.3	1.0	1.3	1.0	1.0	1.2	1.824
Wildfire	2.2	2.2	2.2	1.3	2.5	1.6	2.2	1.6	2.8	1.7	1.4	1.1	2.5	1.4	1.9	1.8	1.4	2.2	1.4	1.9	1.1	1.3	1.794
Nuclear Incident	1.3	2.9	2.2	2.5	3.1	1.5	1.9	1.9	1.3	1.8	1.4	1.3	1.3	2.5	1.3	1.6	2.5	1.6	1.9	1.3	1.3	1.5	1.770
Radon Exposure	2.3	2.0	2.4	1.6	1.3	2.6	1.5	1.4	2.5	1.4	1.6	1.3	1.6	1.3	1.6	1.8	1.3	1.3	1.6	1.3	1.3	1.5	1.751
Civil Disturbance	2.7	1.3	1.6	1.4	1.8	1.7	2.2	1.7	1.4	1.9	1.7	1.1	2.3	1.9	1.4	1.6	1.6	1.1	1.4	1.1	1.1	1.3	1.618
Mass Food and Animal Feed Contamination	3.0	1.6	2.2	1.7	2.6	1.7	1.6	1.9	1.3	1.3	1.6	1.1	2.4	2.0	1.8	1.6	1.1	1.1	1.2	1.1	1.1	1.3	1.602
Landslide	1.8	1.6	1.3	1.8	2.2	1.3	1.2	1.6	1.3	1.1	1.3	1.3	1.3	1.1	1.3	1.5	1.0	1.6	1.3	1.0	1.0	1.2	1.343
Average Score	2.52	2.27	2.26	2.24	2.23	2.21	2.21	2.17	2.15	1.87	1.70	2.04	2.17	1.92	1.90	1.89	1.87	1.80	1.59	1.55	1.49	1.40	
2020 Census Population %	3.68	10.12	3.41	2.73	0.21	14.05	5.49	9.38	1.58	11.82	1.01	7.02	3.79	0.75	1.42	7.29	0.97	1.13	2.86	9.55	1.59	0.14	

Figure 4.1.1: Franklin County "Roll-up" Weighted Risk Factors (*Updated 09/07/2021*)

Based on the results in **Figure 4.1.1** above, there are 2 *Major* risks, 11 *Moderate* risks, 10 *Minor* risks, and 1 *Insignificant* risk hazards in Franklin County. You can see from **Figure 4.1.1** that each municipality has different priorities for each risk hazard. These priorities are being kept in this HVA as well as the 2018 HMP to allow for the municipalities to reference these planning documents for use in updating their Emergency Operations Plans. This is also a means to increase emergency plan integration throughout the county.

The methodology outlined in **Section 1.2** was briefed to the HMPT at the 5 Oct 2017 HMP Team meeting and approved unanimously. The results, **Figure 4.1.1**, were briefed at the 24 Sept 2021 Hazard Mitigation Plan (HMP) Annual Update Team meeting for final approval and inclusion in the Franklin County HVA – 2021.

4.2. Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for flood, flash flood, and ice jam, and tornado and windstorms. Estimates provided in this section are based on information provided from the Franklin County GIS and Tax Assessment Departments as well as previous events. Estimates are considered *potential* in that they generally represent losses that could occur in a countywide hazard scenario. In events that are localized, losses may be lower, while regional events could yield higher losses.

Potential loss estimates have 4 basic components, including:

- Replacement Value: Current cost of returning an asset to its pre-damaged condition, using present-day cost of labor and materials.
- Content Loss: Value of building's contents, typically measured as a percentage of the building replacement value.
- Functional Loss: The value of a building's use or function that would be lost if it were damaged or closed.
- Displacement Cost: The dollar amount required for relocation of the function (business or service) to another structure following a hazard event.

The structure data used in this plan includes building values provided in the county tax assessment database (base year 1961) and the 2014 GIS structure overlay. These values are representative of Replacement Value alone; Content Loss, Functional Loss, and Displacement Cost are not included. To get an estimated value in today's dollars, the figures were multiplied by a factor of 7.63. This is the value given to the county by the state and is based on the prior year sales for the county. **Table 4.2.1** illustrates the range of structure assessed values in Franklin County at the parcel level.

Municipality	Total # of Resident Parcels	Assessed Value of Residential Parcels (1961 $)	Estimated Value of Residential Parcels (2017 $)	Total # of Commercial Parcels	Assessed Value of Commercial Parcels (1961 $)	Estimated Value of Commercial Parcels (2017 $)	Estimated Value of All Parcels (2017 $)
Antrim Township	5,123	$117,445,710.00	$896,110,767.30	157	$21,897,970.00	$167,081,511.10	$1,063,192,278.40
Chambersburg Borough	6,021	$102,551,060.00	$782,464,587.80	870	$88,126,100.00	$672,402,143.00	$1,454,866,730.80
Fannett Township	791	$10,713,090.00	$81,740,876.70	33	$724,340.00	$5,526,714.20	$87,267,590.90
Greencastle Borough	1,438	$30,497,140.00	$232,693,178.20	147	$8,426,130.00	$64,291,371.90	$296,984,550.10
Greene Township	6,180	$133,737,510.00	$1,020,417,201.30	260	$30,372,350.00	$231,741,030.50	$1,252,158,231.80
Guilford Township	5,499	$128,490,040.00	$980,379,005.20	308	$56,945,740.00	$434,495,996.20	$1,414,875,001.40
Hamilton Township	3,532	$78,639,040.00	$600,015,875.20	133	$7,790,290.00	$59,439,912.70	$659,455,787.90
Letterkenny Township	1,029	$15,742,350.00	$120,114,130.50	28	$704,720.00	$5,377,013.60	$125,491,144.10
Lurgan Township	639	$10,935,450.00	$83,437,483.50	21	$544,960.00	$4,158,044.80	$87,595,528.30
Mercersburg Borough	530	$7,952,760.00	$60,679,558.80	93	$4,084,150.00	$31,162,064.50	$91,841,623.30
Metal Township	801	$9,030,650.00	$68,903,859.50	34	$992,550.00	$7,573,156.50	$76,477,016.00
Mont Alto Borough	548	$8,103,410.00	$61,829,018.30	19	$1,035,040.00	$7,897,355.20	$69,726,373.50
Montgomery Township	1,950	$40,938,040.00	$312,357,245.20	27	$3,521,840.00	$26,871,639.20	$339,228,884.40
Orrstown Borough	72	$794,220.00	$6,059,898.60	3	$59,150.00	$451,314.50	$6,511,213.10
Peters Township	1,583	$24,937,150.00	$190,270,454.50	67	$1,904,040.00	$14,527,825.20	$204,798,279.70
Quincy Township	1,688	$26,880,840.00	$205,100,809.20	52	$5,338,390.00	$40,731,915.70	$245,832,724.90
Shippensburg Borough	459	$8,970,030.00	$68,441,328.90	32	$1,975,930.00	$15,076,345.90	$83,517,674.80
Southampton Township	2,394	$49,185,120.00	$375,282,465.60	85	$87,206,620.00	$665,386,510.60	$1,040,668,976.20
St Thomas Township	1,776	$32,665,700.00	$249,239,291.00	76	$2,956,770.00	$22,560,155.10	$271,799,446.10
Warren Township	85	$1,540,680.00	$11,755,388.40	1	$41,400.00	$315,882.00	$12,071,270.40
Washington Township	4,976	$113,023,070.00	$862,366,024.10	231	$17,883,910.00	$136,454,233.30	$998,820,257.40
Waynesboro Borough	3,305	$48,178,830.00	$367,604,472.90	314	$15,587,760.00	$118,934,608.80	$486,539,081.70
County Totals	**50,419**	**$1,000,951,890.00**	**$7,637,262,920.70**	**2,991**	**$358,120,150.00**	**$2,732,456,744.50**	**$10,369,719,665.20**

Table 4.2.1: Franklin County Assessed Structure Values (2017)

Several of the hazards profiled in this plan can impact the entire county. From **Figure 4.2.1** above, it is apparent that Franklin County has in excess of $10B in structure value alone. If Content Loss, Functional Loss, and Displacement Cost values were included, this number would be substantially larger. This means that a catastrophic loss impacting the entire county (e.g. 7.2 earthquake) could see losses approaching that of major hurricanes on the East Coast. Thankfully, the chances of a county-wide disaster such as this are minimal.

Another way of thinking about losses for floods is to look at the number of claims and the dollar amount of loss experienced by NFIP communities. In Franklin County, there are 355 NFIP policies in force; these policies have accumulated 175 claims since 1978. The historical value of these claims exceeds $1 million. Looking at these historical losses, Greene Township has the most losses with over $480,000 in claims paid since 1978.

Table 4.2.2 illustrates the NFIP policy coverage and claims filed from 1978 to 2017. This is an incomplete representation of losses due to flooding as it does not capture uninsured losses, but it is a good indicator of loss trends due to flooding in Franklin County.

Municipality	Number of Policies	Total Coverage	Number of Claims	Value of Claims
Antrim Township	27	$5,769,500	8	$14,973
Chambersburg Borough	66	$12,880,400	30	$141,079
Fannett Township	2	$259,600	0	$0
Greencastle Borough	5	$1,325,000	6	$8,382
Greene Township	59	$11,722,900	66	$481,448
Guilford Township	28	$6,363,300	4	$17,407
Hamilton Township	15	$3,365,000	10	$18,343
Letterkenny Township	6	$1,470,000	0	$0
Lurgan Township	4	$940,000	2	$3,284
Mercersburg Borough	8	$1,961,800	2	$797
Metal Township	1	$130,000	1	$881
Mont Alto Borough	12	$1,154,400	0	$0
Montgomery Township	6	$1,040,500	1	$9,036
Peters Township	9	$1,647,000	2	$4,598
Quincy Township	18	$3,728,700	1	$0
Southampton Township	14	$2,741,700	16	$187,056
St Thomas Township	21	$3,733,500	10	$57,665
Warren Township	1	$49,500	0	$0
Washington Township	46	$10,525,100	8	$34,471
Waynesboro Borough	7	$1,547,200	8	$36,443
Total	**355**	**$72,355,100**	**175**	**$1,015,873**

Table 4.2.2: NFIP Policies and Claims (1978-2017)

Table 4.2.3 below list all the critical facilities and private/commercial structures that fall with the 1% annual chance floodplain by municipality. It should be noted that the values of the buildings in the floodplain were taken from the tax assessment database (base year 1961). The values were multiplied by a factor of 7.63 to get the estimated current year value. This factor is given to the county by the state and is based off of sales in the previous year. Additionally, the costs only reflect land and structure value of the property. It does not include Content Loss, Functionality Loss, or Displacement Costs. Furthermore, there are some properties in the database that reflect a $0 assessment due to their taxable status. Therefore, the value numbers below are very conservative and actual loss values could be substantially higher.

Municipality	Total Number of Critical Facilities in Municipality	Number of Critical Facilities in 1% Floodplain	Value of Critical Facilities in 1% Floodplain (1961)	Estimated (2017) Value of Critical Facilities in 1% Floodplain	Number of Private/ Commercial Buildings in 1% Floodplain	Value of Private/ Commercial Buildings in 1% Floodplain	Estimated (2017) Value of Private/ Commercial Buildings in 1% Floodplain
Antrim Township	75	2	$2,590	$19,762	241	$3,709,060	$28,300,128
Chambersburg Borough	97	12	$8,404,750	$64,128,243	249	$11,221,080	$85,616,840
Fannett Township	27	2	$23,540	$179,610	81	$573,660	$4,377,026
Greencastle Borough	24	0	$0	$0	0	$0	$0
Greene Township	100	9	$155,650	$1,187,610	727	$7,372,310	$56,250,725
Guilford Township	85	4	$23,420	$178,695	169	$6,158,110	$46,986,379
Hamilton Township	47	2	$6,190	$47,230	57	$810,760	$6,186,099
Letterkenny Township	20	1	$32,720	$249,654	73	$27,445,470	$209,408,936
Lurgan Township	21	2	$35,260	$269,034	32	$289,240	$2,206,901
Mercersburg Borough	10	0	$0	$0	34	$232,750	$1,775,883
Metal Township	15	1	$4,600	$35,098	55	$430,810	$3,287,080
Mont Alto Borough	6	2	$42,310	$322,825	71	$425,780	$3,248,701
Montgomery Township	12	2	$0	$0	112	$2,195,410	$16,750,978
Orrstown Borough	1	0	$0	$0	0	$0	$0
Peters Township	22	2	$7,400	$56,462	142	$4,062,700	$30,998,401
Quincy Township	48	7	$41,960	$320,155	230	$4,027,890	$30,732,801
Shippensburg Borough	5	0	$0	$0	1	$0	$0
Southampton Township	30	1	$24,040	$183,425	113	$2,068,990	$15,786,394
St Thomas Township	20	2	$2,300	$17,549	102	$1,660,800	$12,671,904
Warren Township	2	0	$0	$0	19	$308,030	$2,350,269
Washington Township	46	7	$451,670	$3,446,242	262	$4,770,950	$36,402,349
Waynesboro Borough	45	0	$0	$0	12	$314,980	$2,403,297
Total	**758**	**58**	**$9,258,400**	**$70,641,592**	**2,782**	**$78,078,780**	**$595,741,091**
Total Estimated (2017) Value of Structures in 1% Floodplain							**$666,382,683**

Table 4.2.3: Franklin County Critical Facilities in the 1% Floodplain (2017)

For the remaining hazards where loss estimates could not be determined, loss estimates are generalized based on the historical impact of the hazard. For droughts, the losses are largely agricultural; as a result, losses are expected to be some portion of Franklin County's $413 million in annual agricultural production (refer to **Table 3.1.13.2.1**), depending on the magnitude of the event. For nuclear incidents, losses in the 50-mile EPZ are largely crop and livestock-based; as a result, they will also be some portion of the county's agricultural production. Losses associated with Radon exposure are related to healthcare costs and lost wages, and the average mitigation cost for addressing this hazard is $1,200 per home, according to the EPA.

Losses associated with particular natural weather-related hazard events are sometimes reported to the National Climatic Data Center (NCDC) with the event. While these historic losses give a glimpse of potential losses in hazard events, they are not reported for all events and should be considered a broad estimate. Tornado and windstorm events have had losses totaling over $1.72 million in property loss and crop damage (refer to **Tables 3.1.19.3.1** and **3.1.19.3.2**). These events have also led to 1 death and 3 injuries. For winter storm events, only 1 of the past events had losses reported with that event; it had monetary losses estimated at over $900,000 county-wide.

4.3. Future Development and Vulnerability

Risk and vulnerability to natural and human-made 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. Franklin County is expected to experience a variety of factors that will, in some areas, increase vulnerability to hazards while in other areas, vulnerability may stay static or even be reduced.

Population change is perhaps the most significant indicator of changes in vulnerability in the future. As discussed in **Section 2.3**, the total population of Franklin County has grown by 20.64% from 2000 to 2020, but population change has been highly variable between jurisdictions. The population change in the county over time can be seen in **Table 4.3.1** below.

Municipality	Population 1970	Population 1980	% Change 1970-1980	Population 1990	% Change 1980-1990	Population 2000	% Change 1990-2000	Population 2010	% Change 2000-2010	Population 2020	% Change 2010-2020	% Change 1970-2020
Southampton Township	3,292	4,604	39.9%	5,484	19.1%	6,138	11.9%	7,987	30.1%	8,566	7.2%	160.2%
Hamilton Township	4,921	6,504	32.2%	7,745	19.1%	8,949	15.5%	10,788	20.5%	11,374	5.4%	131.1%
Antrim Township	7,378	9,326	26.4%	10,107	8.4%	12,504	23.7%	14,893	19.1%	15,778	5.9%	113.9%
Greene Township	9,504	11,470	20.7%	11,930	4.0%	12,284	3.0%	16,700	35.9%	18,436	10.4%	94.0%
Montgomery Township	3,221	4,252	32.0%	4,558	7.2%	4,949	8.6%	6,116	23.6%	5,740	-6.1%	78.2%
Washington Township	8,514	9,616	12.9%	11,119	15.6%	11,559	4.0%	14,009	21.2%	14,897	6.3%	75.0%
Letterkenny Township	1,419	1,960	38.1%	2,251	14.8%	2,074	-7.9%	2,318	11.8%	2,462	6.2%	73.5%
Guilford Township	9,291	10,567	13.7%	11,893	12.5%	13,100	10.1%	14,531	10.9%	14,627	0.7%	57.4%
Fannett Township	1,640	2,016	22.9%	2,309	14.5%	2,309	0.0%	2,548	10.4%	2,483	-2.6%	51.4%
St. Thomas Township	3,931	5,711	45.3%	5,861	2.6%	5,775	-1.5%	5,935	2.8%	5,917	-0.3%	50.5%
Metal Township	1,205	1,576	30.8%	1,612	2.3%	1,721	6.8%	1,866	8.4%	1,768	-5.3%	46.7%
Lurgan Township	1,649	1,986	20.4%	2,026	2.0%	2,014	-0.6%	2,151	6.8%	2,207	2.6%	33.8%
Greencastle Borough	3,293	3,679	11.7%	3,600	-2.1%	3,722	3.4%	3,996	7.4%	4,251	6.4%	29.1%
Chambersburg Borough	17,315	16,174	-6.6%	16,647	2.9%	17,862	7.3%	20,268	13.5%	21,903	8.1%	26.5%
Warren Township	262	269	2.7%	310	15.2%	334	7.7%	369	10.5%	328	-11.1%	25.2%
Peters Township	3,838	4,060	5.8%	4,090	0.7%	4,251	3.9%	4,430	4.2%	4,462	0.7%	16.3%
Waynesboro Borough	10,011	9,726	-2.8%	9,578	-1.5%	9,617	0.4%	10,568	9.9%	10,951	3.6%	9.4%
Mont Alto Borough	1,532	1,592	3.9%	1,395	-12.4%	1,357	-2.7%	1,705	25.6%	1,580	-7.3%	3.1%
Quincy Township	5,264	5,792	10.0%	5,704	-1.5%	5,846	2.5%	5,541	-5.2%	5,318	-4.0%	1.0%
Mercersburg Borough	1,727	1,617	-6.4%	1,640	1.4%	1,540	-6.1%	1,561	1.4%	1,507	-3.5%	-12.7%
Shippensburg Borough	1,364	885	-35.1%	1,003	13.3%	1,119	11.6%	1,076	-3.8%	1,163	8.1%	-14.7%
Orrstown Borough	262	247	-5.7%	220	-10.9%	231	5.0%	262	13.4%	214	-18.3%	-18.3%
County Totals	**100,833**	**113,629**	**12.7%**	**121,082**	**6.6%**	**129,255**	**6.7%**	**149,618**	**15.8%**	**155,932**	**4.2%**	**54.6%**

Table 4.3.1: Franklin County Population Percentage Changes (1970-2020)

From 1970 to 2020 only 3 municipalities lost a portion of their population, but it is clear that a trend exists showing a more rapid growth of the Townships immediately surrounding our most populous Boroughs. This population reallocation also impacts land use as farms and forests are being replaced with suburban developments to make room for this population transfer within the county.

Franklin County has grown moderately in the last 10 years (significantly over the last 50 years), but the county expects to remain largely rural due to our roots in an agricultural based economy. Hazard vulnerability and loss potential will still be higher in the places with higher population densities, but suburban growth will likely create increases in loss potential as more people will be living closer to areas more prone to hazards such as subsidence, utility interruptions, winter storms, and wildfires.

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Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance				
Dam Failure (High Hazard Dams)				
Drought				
Earthquake				
Environmental Hazards (HAZMAT Release)				
Extreme Temperature				
Flood, Flash Flood, Ice Jam				
Hailstorm				
Hurricane, Tropical Storm, Nor'Easter				
Invasive Species				
Landslide				
Lightning Strike				
Mass Food and Animal Feed Contamination				
Nuclear Incident				
Pandemic and Infectious Disease				
Radon Exposure				
Subsidence, Sinkhole				
Terrorism				
Tornado, Windstorm				
Transportation Accident (Air/Rail/Highway)				
Urban Fire and Explosion				
Utility Interruption (Comm/Power/Water/Sewage)				
Wildfire				
Winter Storm				

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence
1 = Very few injuries; minor property damage; minimal impact to critical facilities 2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day 3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week 4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure B.1.1: Hazard Assessment Survey – Page 1 of 6

Franklin County, PA Hazard Mitigation Assessment Definitions

Civil Disturbance	Civil disturbance hazards encompass a set of hazards emanating from a wide range of possible events that cause civil disorder, confusion, strife, and economic hardship. Civil disturbance hazards include the following: • Famine – a widespread scarcity of food leading to malnutrition and increased mortality • Economic Collapse, Recession – Very slow or negative growth • Misinformation – erroneous information spread unintentionally • Civil Disturbance, Public Unrest, Mass Hysteria, Riot – group acts of violence against property and individuals • Strike, Labor Dispute – controversies related to the terms and conditions of contract negotiations
Dam Failure	A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. There are four dams in Franklin county that are considered "high-hazard" dams by the Pennsylvania Department of Environmental Protection. This does not indicate an increased likelihood of failurre of these dams, simply that if they were to fail, the impact would be extensive. These dams are: • Roxbury Dam • Long Pine Run Dam • Carbaugh Run Dam • Antietam Dam
Drought	Drought is a natural climatic condition which occurs in virtually all climates, the consequences of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season of more in length. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought. The hazard is of particular concern in Pennsylvania due to the presence of farms as well as water-dependent industries and recreation areas across the Commonwealth. A prolonged drought could severely impact these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses.
Earthquake	An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 1-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in the loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake.
Environmental Hazards	Environmental hazards are hazards that pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. For the purposes of the Franklin County Hazard Mitigation Plan, environmental hazards include the following: • Hazardous materials releases – at fixed facilities or in transit, including toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive. • Coal Mining incidents – including the release of harmful chemicals and waste materials into water bodies or the atmosphere, explosions, fires, and other hazards and threats to life safety stemming from mining. • Oil and gas well incidents – including the release of harmful chemical and waste materials into water bodies or the atmosphere, explosions, fires, and other hazards and threats to life safety stemming from oil and gas extraction

Figure B.1.2: Hazard Assessment Survey – Page 2 of 6

Franklin County, PA Hazard Mitigation Assessment Definitions

Extreme Temperature	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. Extreme heat can be described as temperatures that hover 10 degrees F or more above the average high temperature for a region during the summer months. Extreme heat is responsible for more deaths in Pennsylvania tha all other natural disasters combined.
Flood, Flash Flood, Ice Jam	Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of the river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure.
Hailstorm	In addition to flooding and sever winds, hail is another potential damaging product of sever thunderstorms. Hailstorms occur when ice crystals form within a low pressure front due to the rapid rise of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation in the form of balls or irregularly shaped masses of ice greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the inensity of the heating at the Earth's surface. Damage to crops and vehicles are typically the most significant impacts of hailstones. Areas in eastern and central Pennsylvania typically experience less than 2 hailstorms per year while areas in western Pennsylvania experience 2-3 annually.
Hurricane, Tropical Storm, Nor'easter	Hurricanes, tropical storms, and nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise and whose diameter averages 10-30 miles across. While most of Pennsylvania is not directly affected by the devastating impacts cyclonic systems can have on coastal regions, many areas in the state are subject to the primary damaging forces associated with these storms including high-level sustained winds, heavy precipitation, and tornadoes. Areas in southeastern Pennsylvania could be susceptible to storm surge and tidal flooding. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season (June through November).
Invasive Species	An invasive species is a species that is not indigenous to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. These species can be any type of organism: plant, fish, invertebrate, mammal, bird, disease, or pathogen. Infestations may not necessarily impact human health, but can create a nuisance or agricultural hardships by destroying crops, defoliating populations of native plant and tree species, or interfering with ecological systems.

Figure B.1.3: Hazard Assessment Survey – Page 3 of 6

Franklin County, PA Hazard Mitigation Assessment Definitions

Landslide	A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, and changes in groundwater levels. Mudflows, mudslides, rock falls, rockslides, and rock topples are all forms of a landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides, and areas recently burned by forest and brush fires.
Lightning Strike	Lightning is a discharge of electrical energy resulting from the build-up of positive and negative charges within a thunderstorm. The flash or "bolt" of light usually occurs within clouds or between clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees F. On average, 89 people are killed each year by lightning strikes in the United States. Within Pennsylvania, the annual average number of thunder and lightning events a given area can expect ranges between 40-70 events per year.
Mass Food and Animal Feed Contamination	Mass food or animal feed contamination hazards occur when food or food sources are contaminated with pathogenic bacteria, viruses, or parasites, as well as chemical or natural toxins. They may lead to food borne illnesses and/or interruptions in the food supply. Contamination may occur die to natural food borne illnesses and chemical, biological, radiological, or nuclear exposure. Most food borne illnesses are caused by: Campylobacter in poultry; E. Coli in beef, leafy greens, and raw milk; Listeria in deli meats, unpasteurized soft cheeses, and produce; Salmonella in eggs and poultry; and Toxoplasma in meats. Contamination usually occurs accidentally during the production/preparation process but can also be the result of intentional acts.
Nuclear Incident	Nuclear incidents generally refer to events involving the release of significant levels of radioactivity or exposure of workers or the general public to radiation. Nuclear accidents/ incidents can be placed into three categories: • Criticality incidents – which involve loss of control of nuclear assemblies or power reactors • Loss of coolant accidents – which result whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system • Loss of containment accidents – which involve the release of radioactivity. The primary concern following such an incident or accident is the extent of radiation, inhalation, and ingestion of radioactive isotopes which can cause acute health effects, chronic health effects, and psychological effects. Franklin County is a support county for incidents at Three Mile Island. We would not be in the evacuation zones of any accident there, but we could be expected to house up to 1361 evacuees from municipalities in the evacuation zones. Portions of Franklin County do fall into the 50-mile contamination zone for food and animal feed if such an incident were to occur.
Pandemic and Infectious Disease	A pandemic occurs when infection from a new strain of a certain disease, to which most humans have no immunity, substantially exceeds the number of expected cases over a given period of time. Such a disease may or may not be transferable between humans and animals.
Radon Exposure	Radon is a cancer-causing natural radioactive gas that you can't see, smell, or taste. It is a large component of the natural radiation that humans are exposed to and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupational settings. According to the EPA, Radon is estimated to cause about 21,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer. An estimated 40% of the homes in Pennsylvania are believed to have elevated Radon levels.

Figure B.1.4: Hazard Assessment Survey – Page 4 of 6

Franklin County, PA Hazard Mitigation Assessment Definitions	
Subsidence, Sinkholes	Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. The collapse can take place slowly over time or quickly in a single event. In addition to natural processes, human activity such as water, natural gas, and oil extraction can cause subsidence and sinkhole formation. Franklin County has considerable deposits of limestone that is utilized in several quarry operations. It is estimated that 32 percent of the land is considered limestone. Therefore we should be aware of the potential hazard of sinkholes.
Terrorism	Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks; and the use of chemical, biological, nuclear, and radiological weapons. Increasingly, cyber-attacks have become a more pressing concern for governments across America.
Tornado, Wind Storm	A wind storm can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. The damage caused by a tornado is the result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour.
Transportation Accident	Transportation accidents can result from any for of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous materials release or disruption in critical supply/access routes, especially if vital transportation corridors or junctions are present (e.g. I-81, SR-30, I-76, SR 997, SR, 11, and SR 16). Traffic congestion in certain circumstances can also be hazardous. Traffic congestion is a condition that occurs when traffic demand approaches or exceeds the available capacity of the road network. This hazard should be carefully evaluated during emergency planning since it is a key factor in timely disaster or hazard response, especially in areas with high population density.
Urban Fire and Explosion	An urban fire involves a structure or property within an urban or developed area. For hazard mitigation purposes, major urban fires involving large buildings and/or multiple properties are of primary concern. The effects of a major urban fire include minor to significant property damage, loss of life, and residential or business displacement. Explosions are extremely rapid releases of energy that usually generate high temperatures and often lead to fires. The risk of severe explosions can be reduced through careful management of flammable and explosive hazardous materials.

Figure B.1.5: Hazard Assessment Survey – Page 5 of 6

Franklin County, PA Hazard Mitigation Assessment Definitions	
Utility Interruption	Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards include the following: • Geomagnetic Storms – including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems. • Fuel or Resource Shortage – resulting from supply chain breaks or secondary to other hazard events • Electromagnetic Pulse – originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronics systems • Information Technology Failure – due to software bugs, viruses, or improper use • Ancillary Support Equipment – electrical generating, transmission, system-control, and distribution-system equipment for the energy industry • Public Works failure – damage to or failure of highways, flood control systems, deepwater ports and harbors, public buildings, bridges, or dams • Telecommunications System Failure – damage to data transfer, communications, and processing equipment • Transmission Facility or Linear Utility Accident – liquefied natural gas leakages, explosions, or facility problems
Wildfire	A wildfire is a raging, uncontrolled fire that spreads rapidly 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. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, 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 fields, grass, brush, and forests. 98% of wildfires in Pennsylvania are a direct result of people, often caused by debris burns.
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility and disrupt transportation. The Commonwealth of Pennsylvania has a long history of severe winter weather.

Figure B.1.6: Hazard Assessment Survey – Page 6 of 6

Zone	Description
Special Flood Hazard Areas – High Risk	
A	Areas subject to inundation by the 1-percent-annual-chance flood event. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown.
AE, A1-A30	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. BFEs are shown within these zones. (Zone AE is used on new and revised maps in place of Zones A1-A30)
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1-3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1-3 feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone.
AR	Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection.
A99	Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system. These are areas of special flood hazard where enough progress has been made on the construction of a protection system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. Zone A99 may be used only when the flood protection system has reached specified statutory progress toward completion. No BFEs or flood depths are shown.
Coastal High Hazard Areas – High Risk	
V	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed coastal analyses have not been performed, no BFEs or flood depths are shown.
VE, V1-V30	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. BFEs derived from detailed hydraulic coastal analyses are shown within these zones. (Zone VE is used on new and revised maps in place of Zones V1–V30)
Moderate and Minimal Risk Areas	
B, X (shaded)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
C, X (unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. (Zone X (unshaded) is used on new and revised maps in place of Zone C.)
Undetermined Risk Areas	
D	Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

The Franklin County DFIRM consists of 118 panels. **Figure G.1** below shows the definitions for the icons found on the following county DFIRM maps. **Figures G.2** thru **G.119** shows these individual panels that make up the Franklin County DFIRM.

	Unknown		College		Communications Tower		Nursing Home
	Dam, Class B-1		School		Radio Tower		Bank
	Dam, Class C-3		Electric Substation		Treatment Plant		Broadcast Station
	Dam, Class C-4		Transformer Bank		Agriculture Storage		Gas Station
	EMS		Railroad Switch		Fuel Storage		Government Building
	Fire House		Sanitary Sewer		Resevoir		Hotel
	Police Station		Natural Gas Substation		Storage Tank		Medical Clinic
	Jail		SARA Facility		Water		Post Office
	Hospital		Tier II Facility		Day Care Center		Restaurant
							Residence/Business

Figure D.1: Legend for Franklin County DRIFM Maps

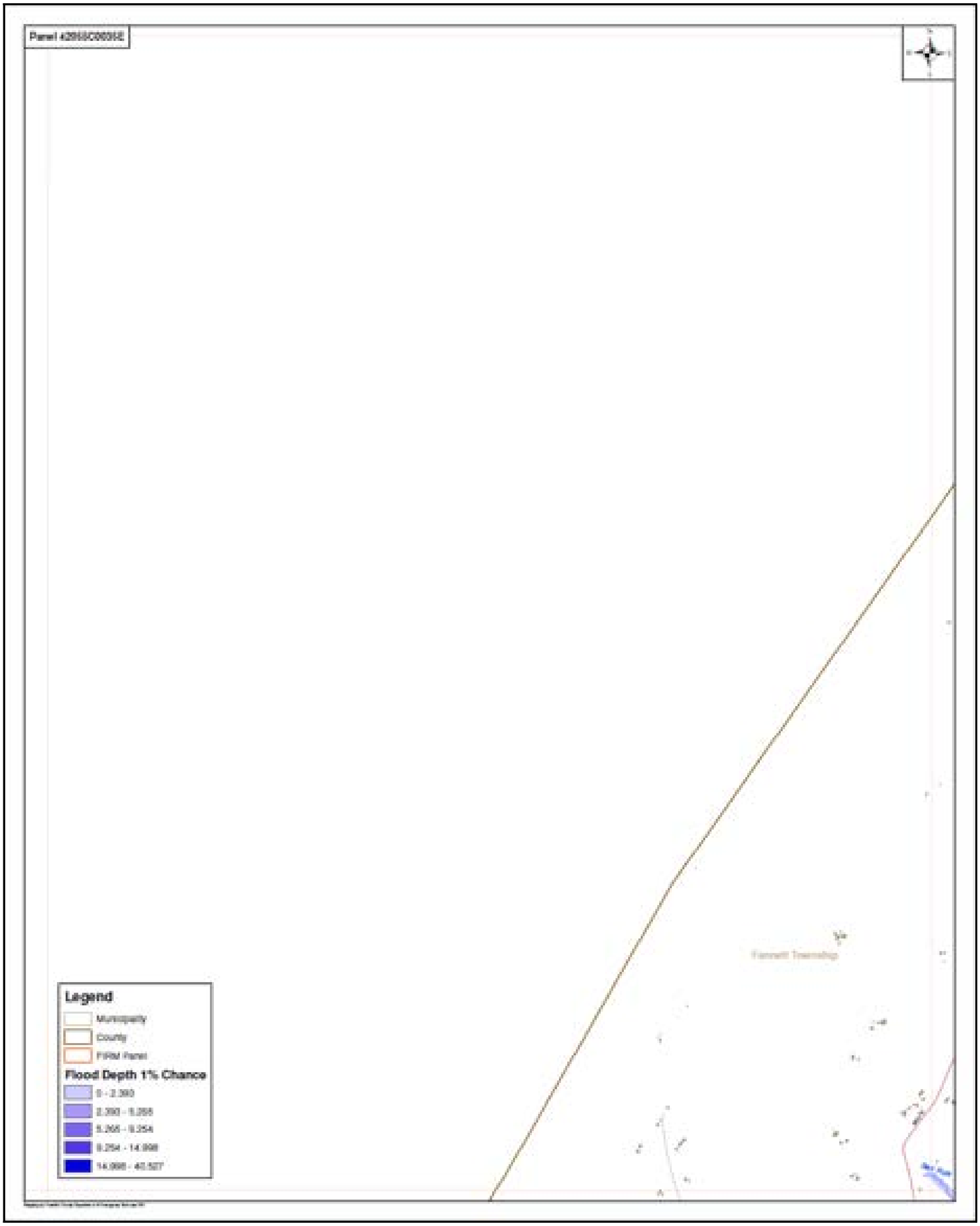


Figure D.2: Quadrant 1, Panel Number 42055C0035E

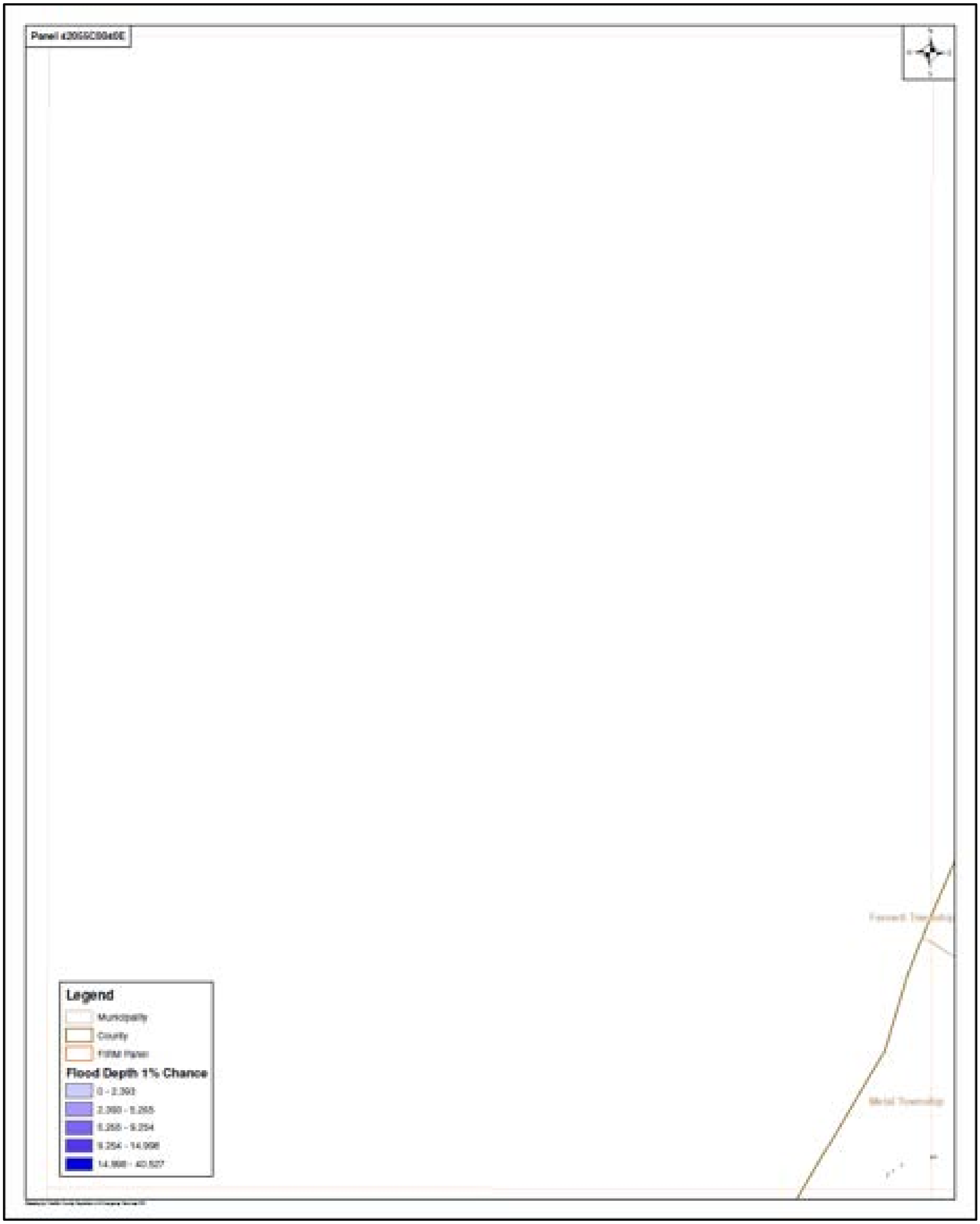


Figure D.3: Quadrant 1, Panel Number 42055C0040E

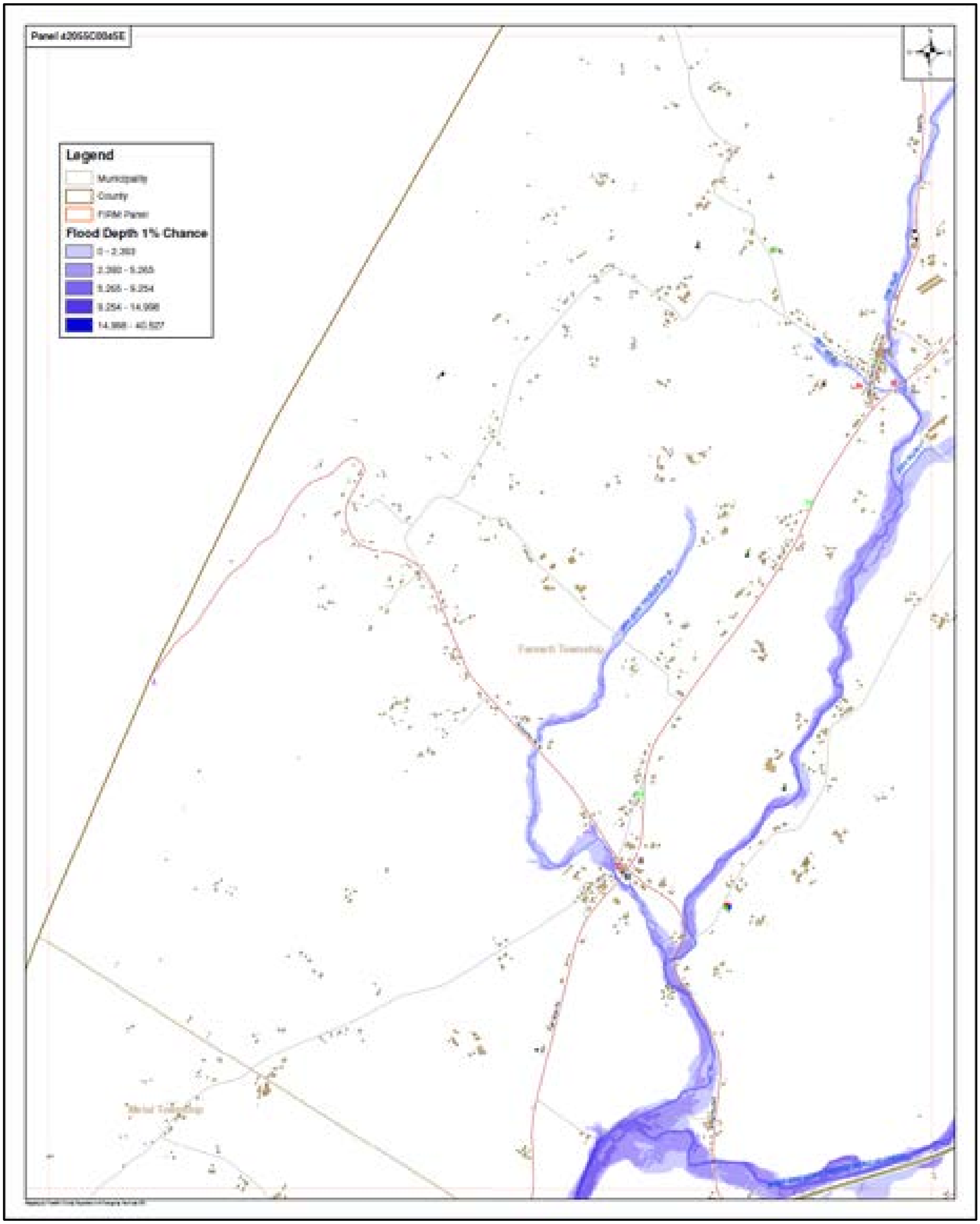


Figure D.4: Quadrant 1, Panel Number 42055C0045E

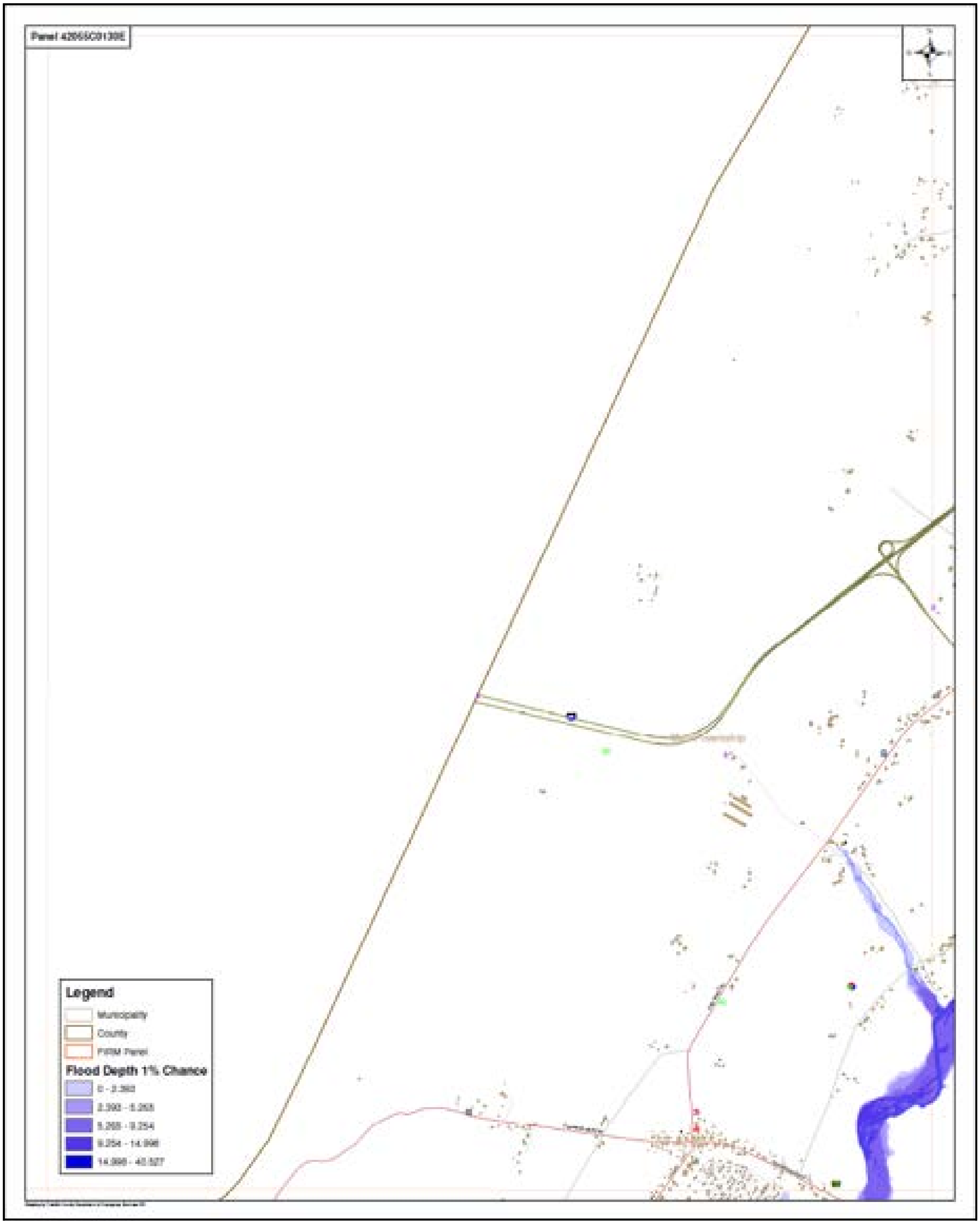


Figure D.5: Quadrant 1, Panel Number 42055C0130E

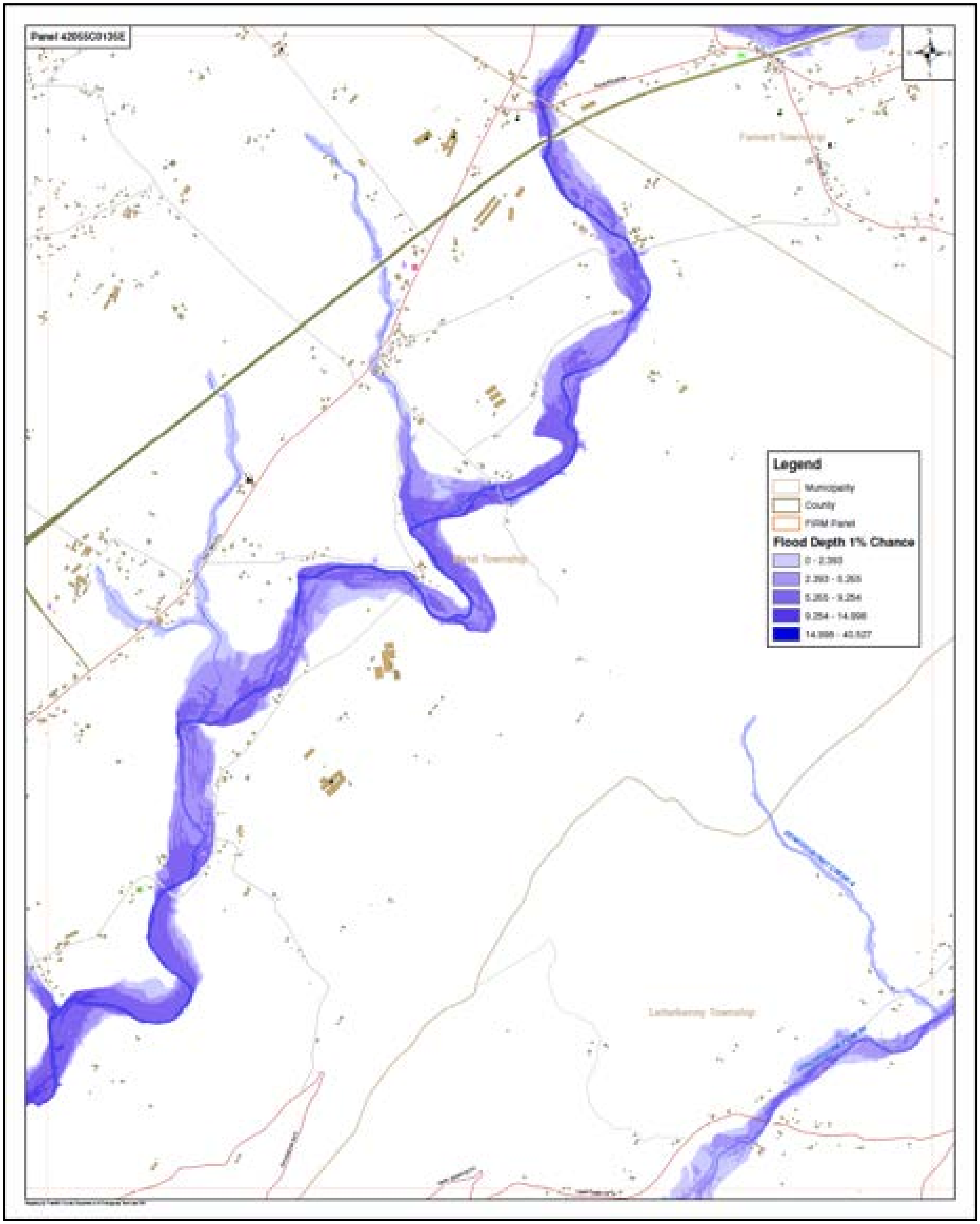


Figure D.6: Quadrant 1, Panel Number 42055C0135E

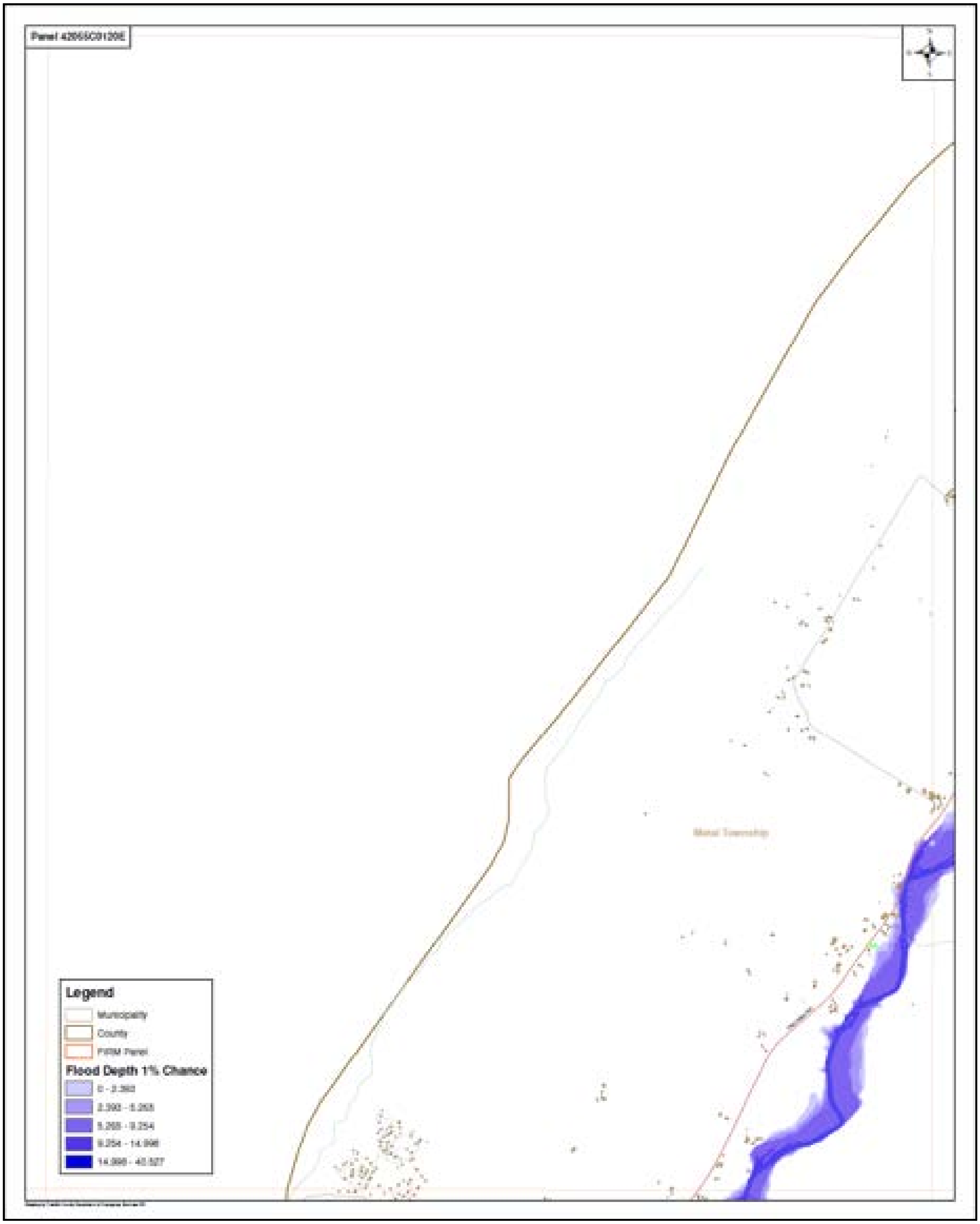


Figure D.7: Quadrant 1, Panel Number 42055C0120E

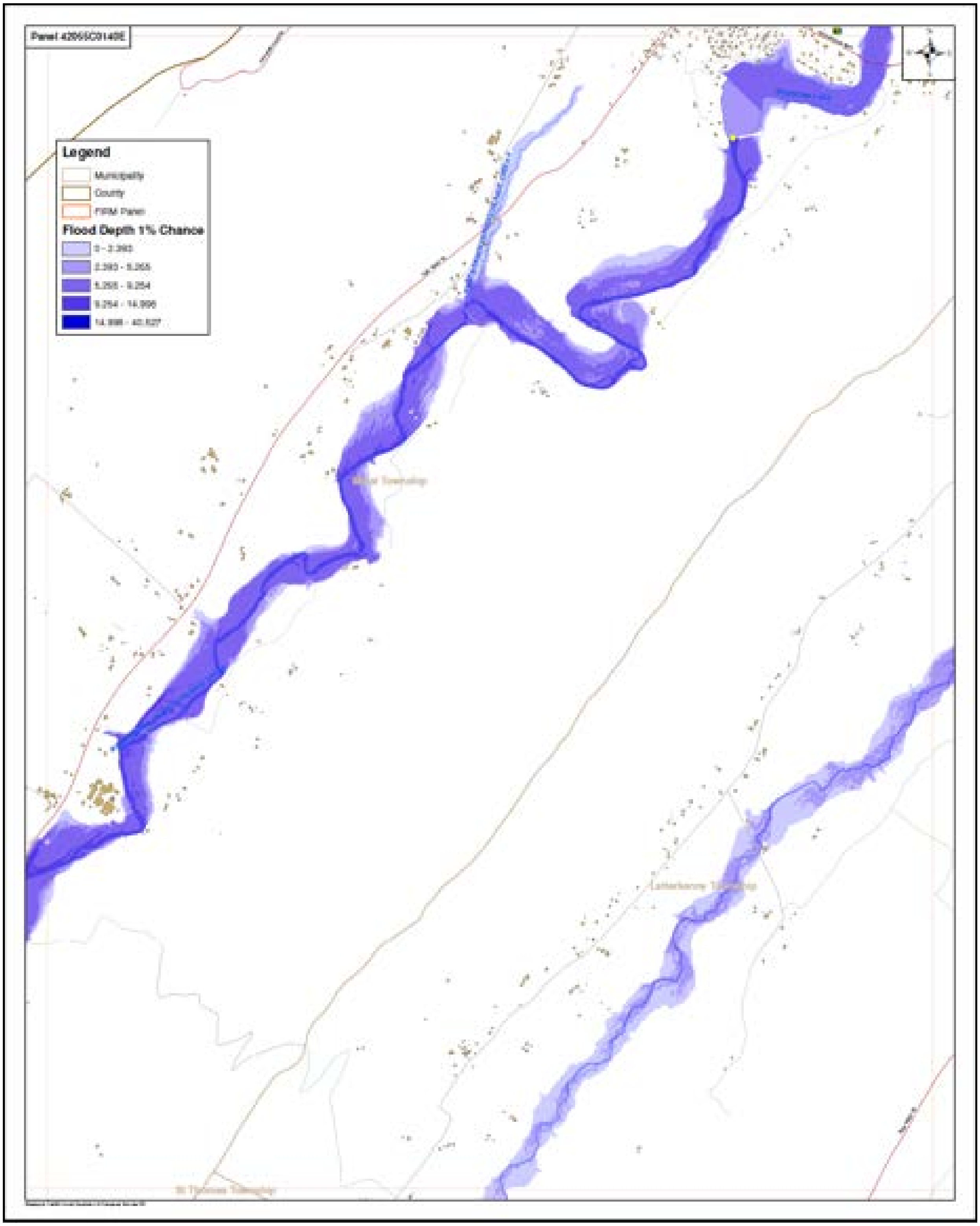


Figure D.8: Quadrant 1, Panel Number 42055C0140E

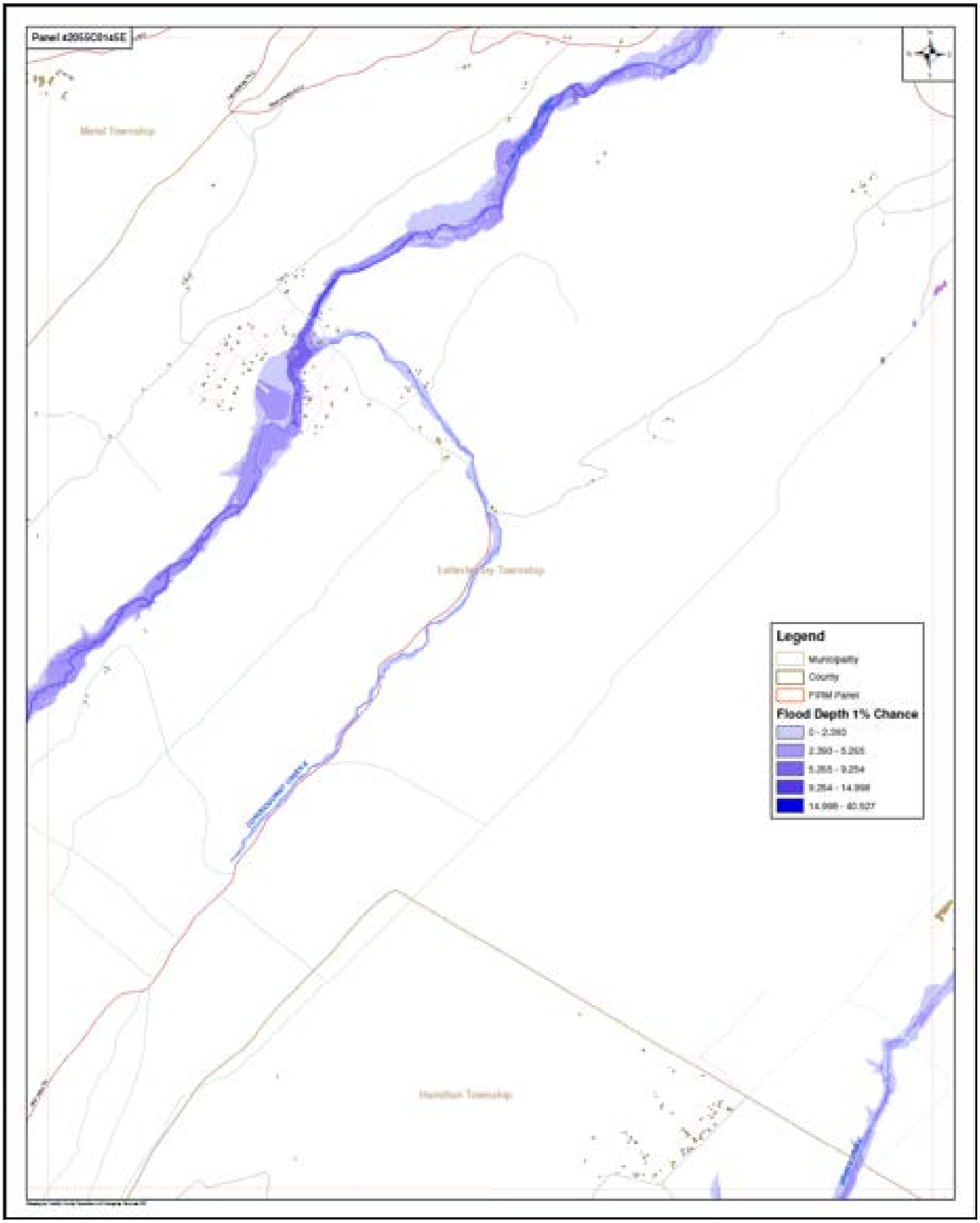


Figure D.9: Quadrant 1, Panel Number 42055C0145E

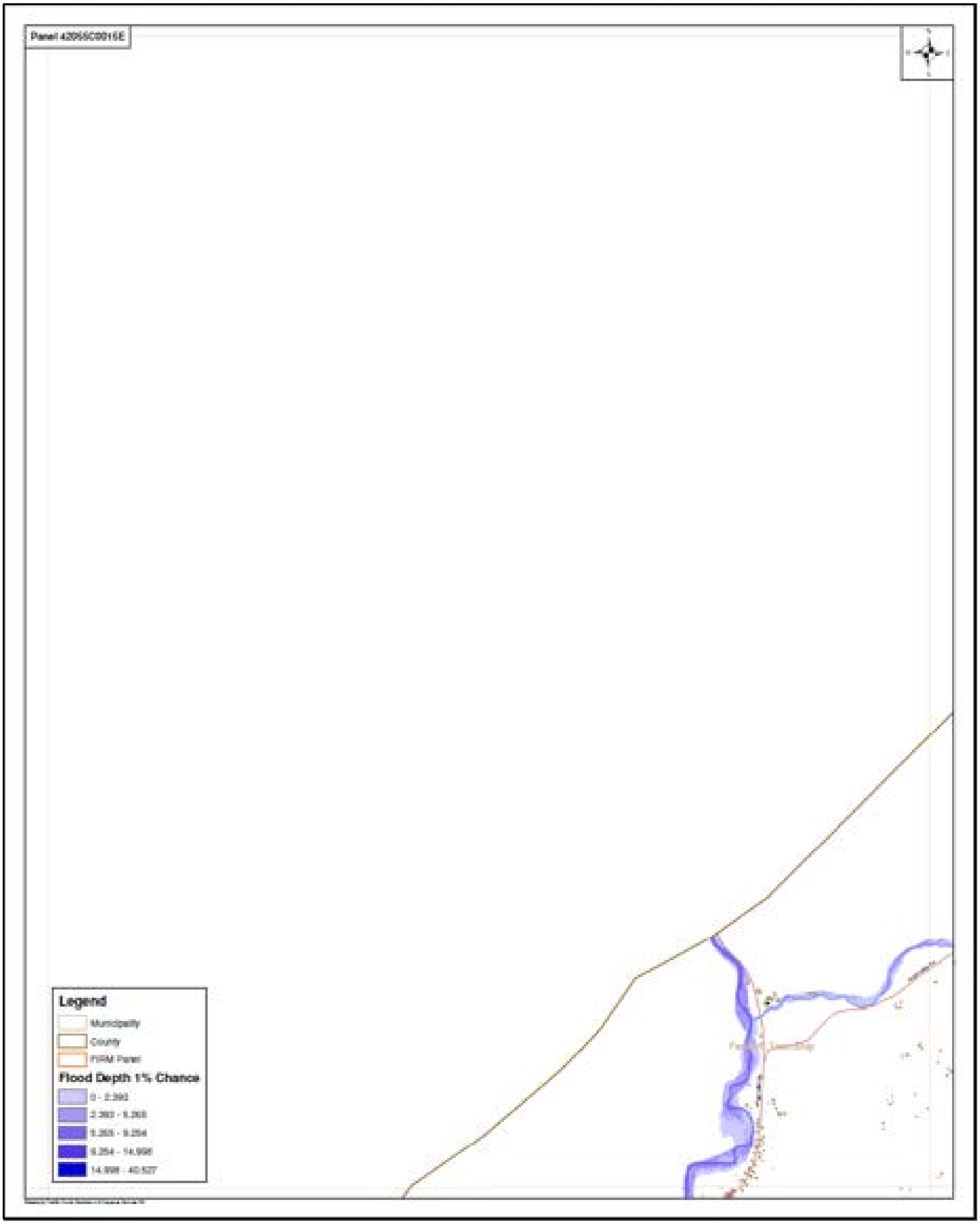


Figure D.10: Quadrant 2, Panel Number 42055C0015E

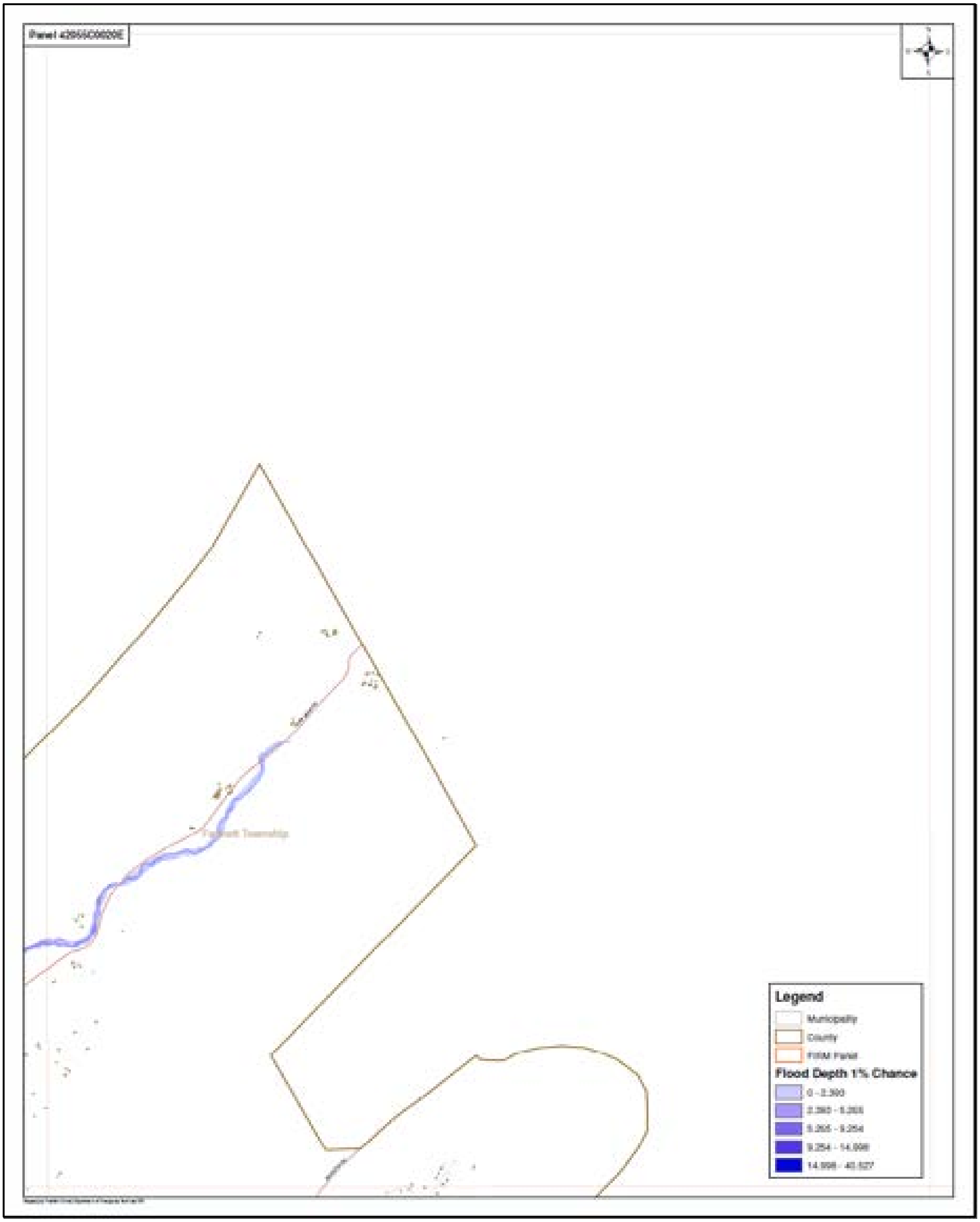


Figure D.11: Quadrant 2, Panel Number 42055C0020E

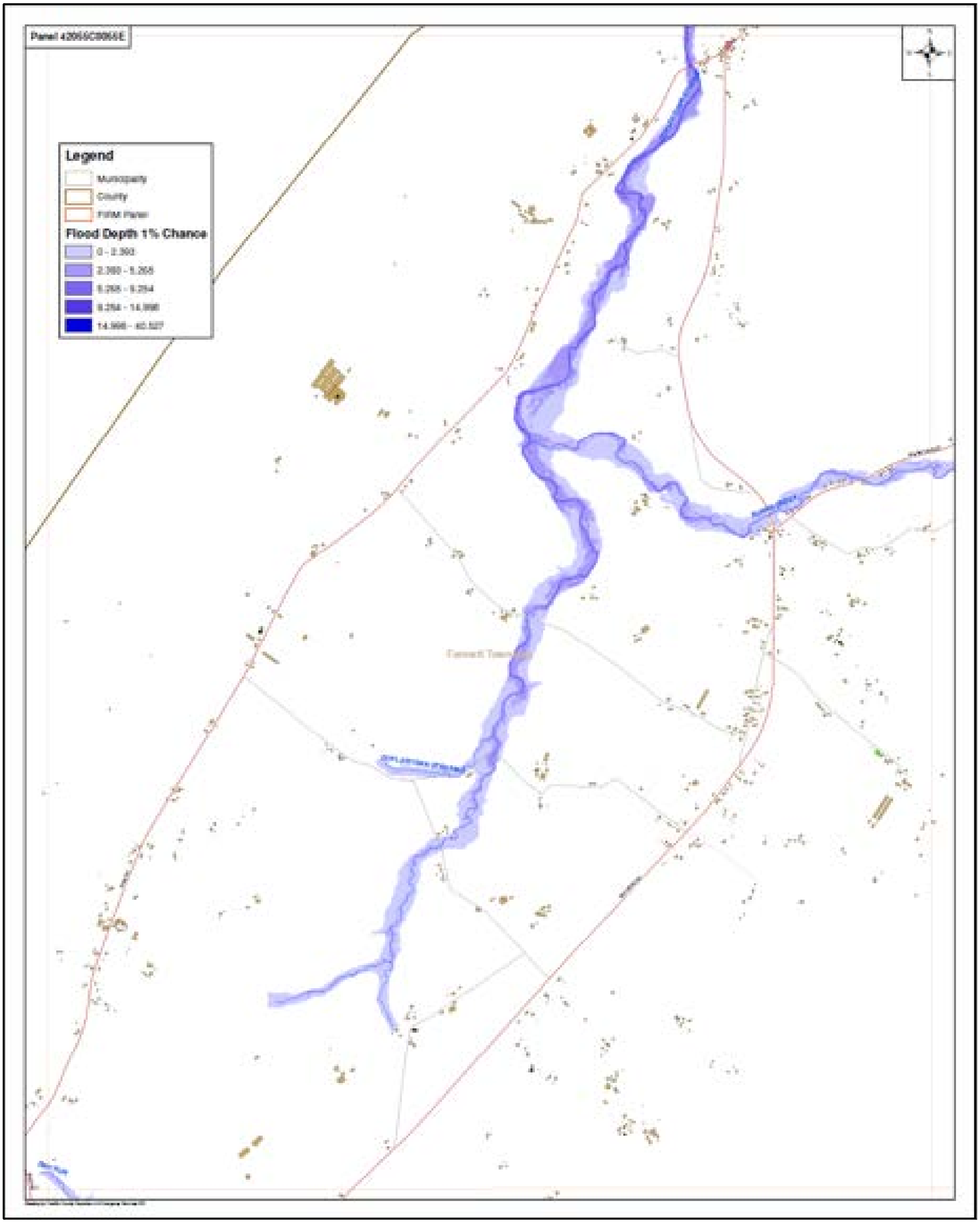


Figure D.12: Quadrant 2, Panel Number 42055C0055E

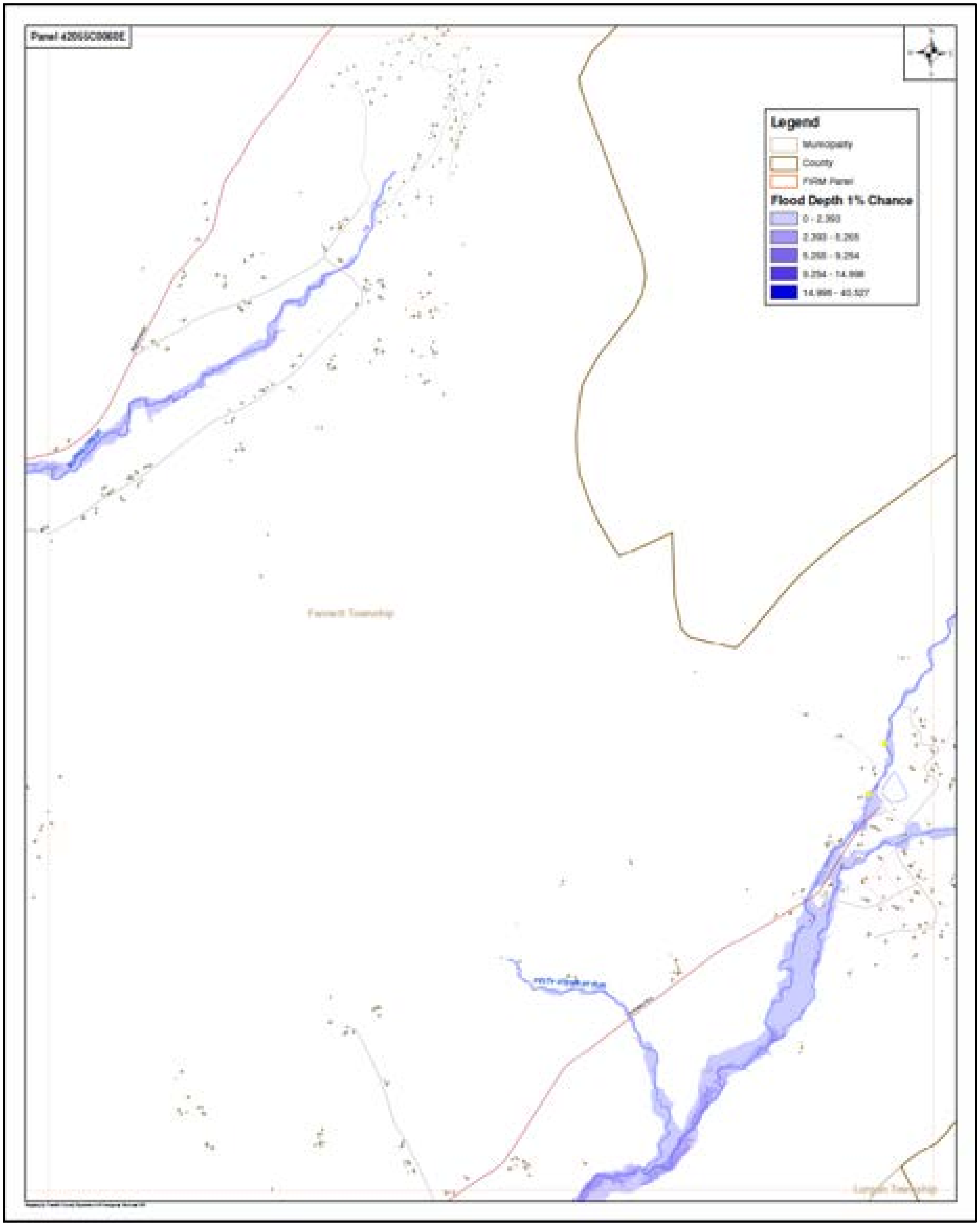


Figure D.13: Quadrant 2, Panel Number 42055C0060E

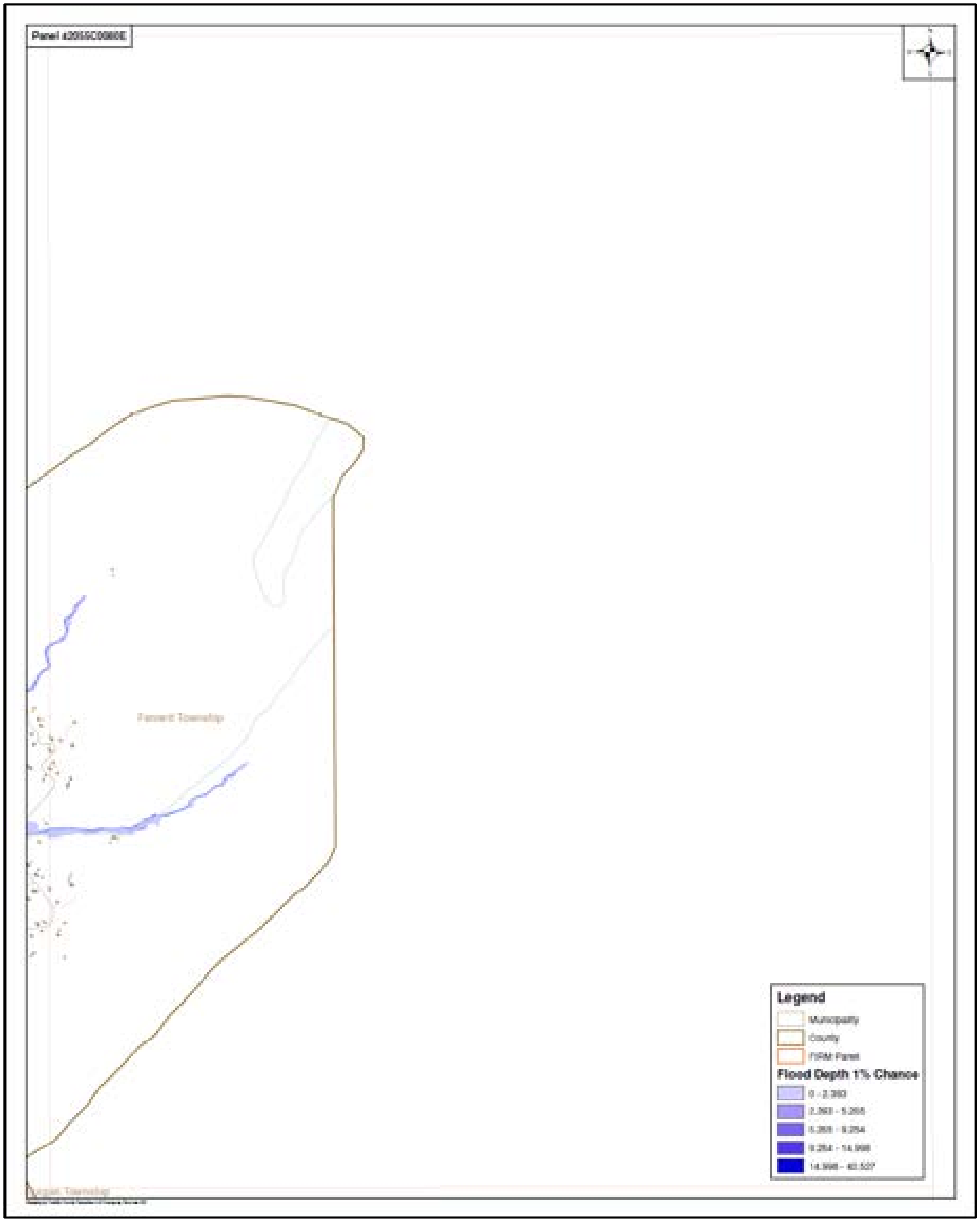


Figure D.14: Quadrant 2, Panel Number 42055C0080E

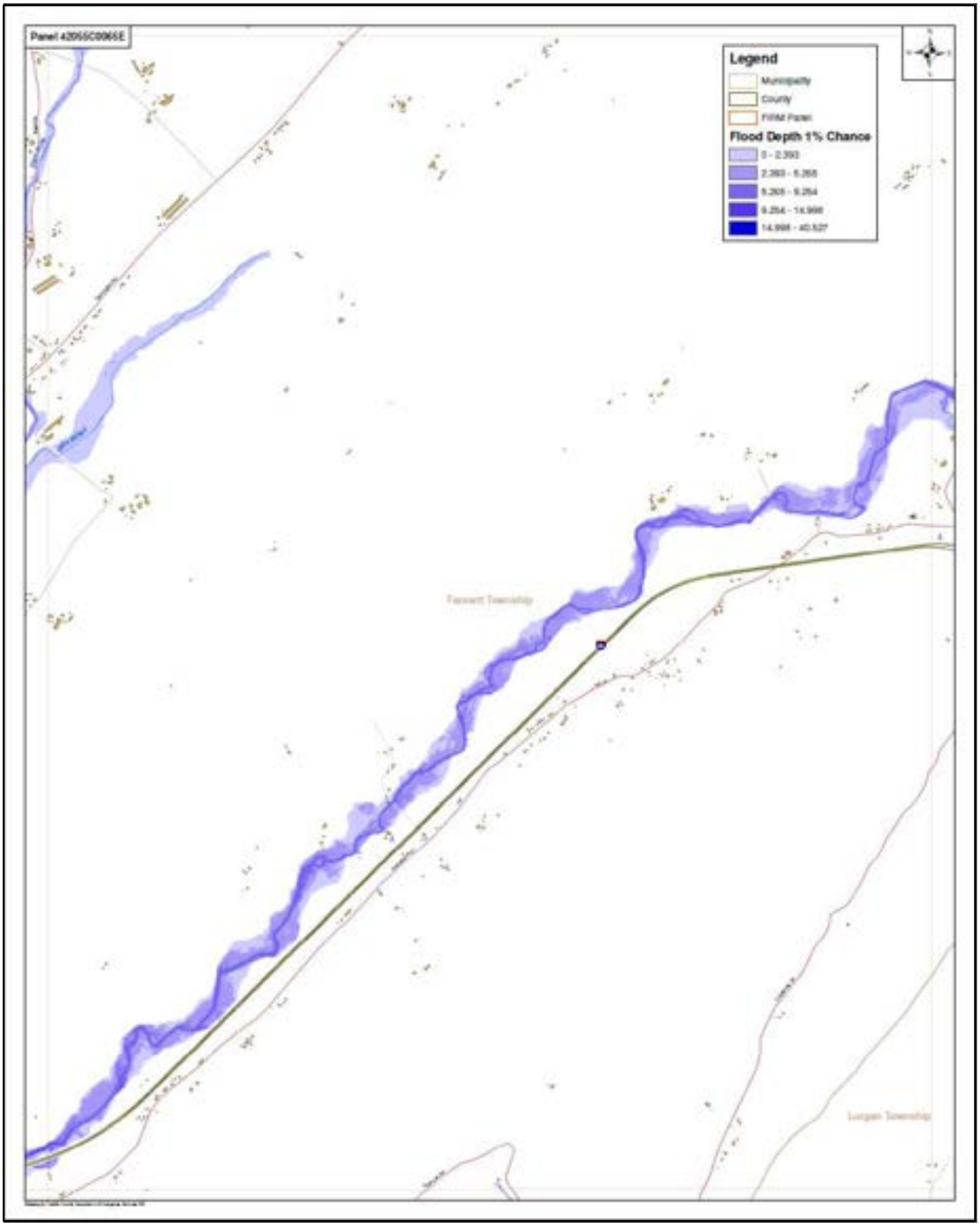


Figure D.15: Quadrant 2, Panel Number 42055C0065E

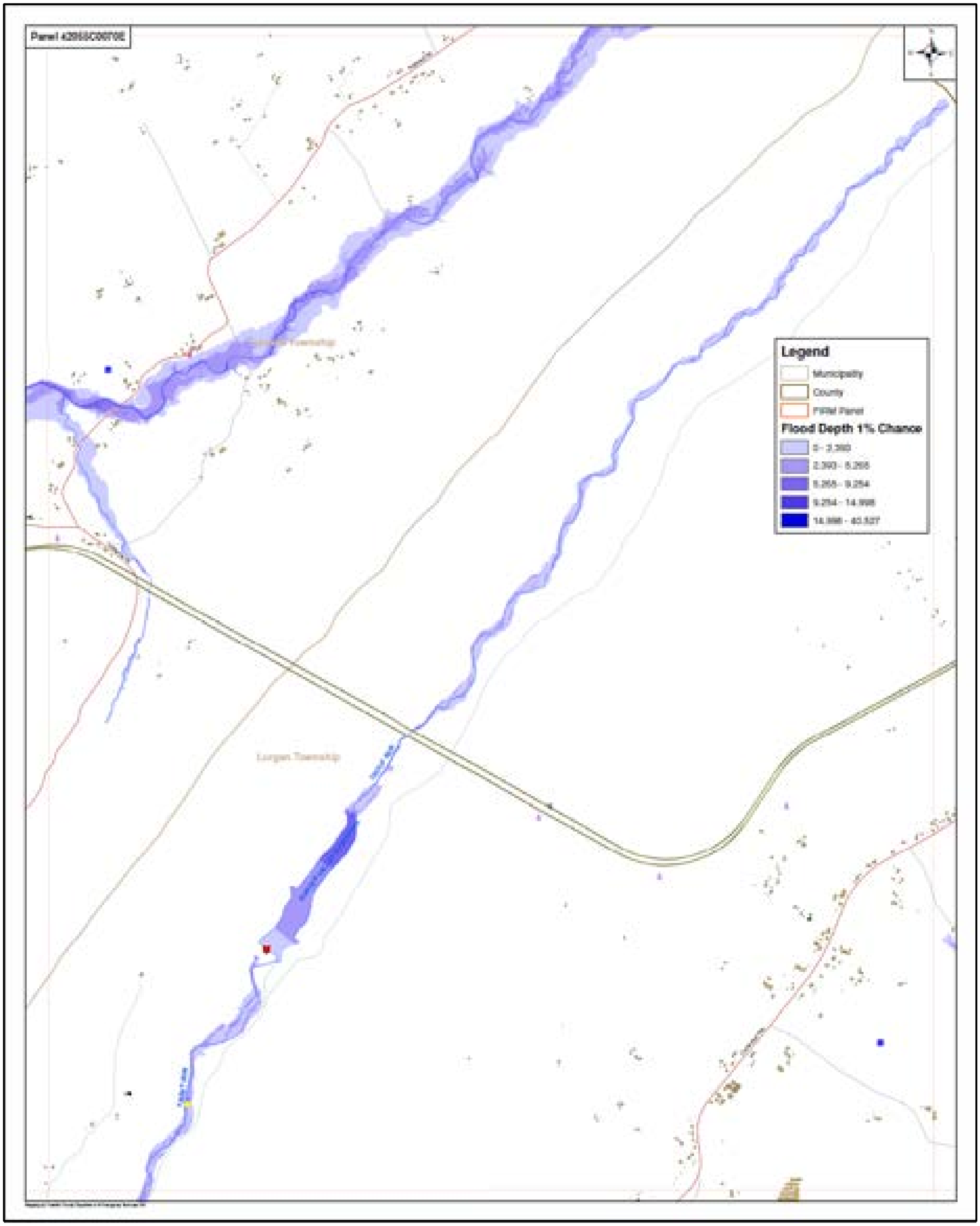


Figure D.16: Quadrant 2, Panel Number 42055C0070E

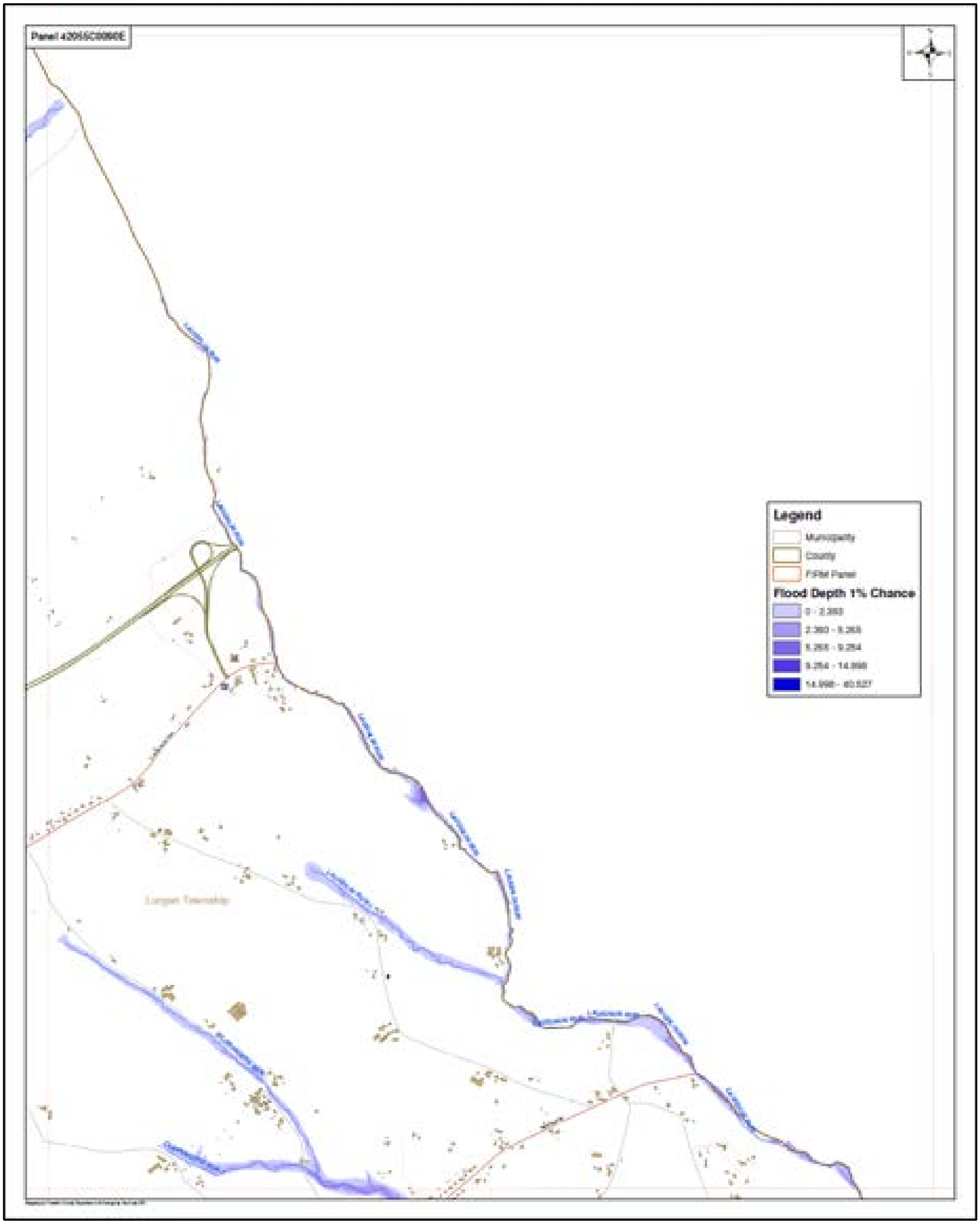


Figure D.17: Quadrant 2, Panel Number 42055C0090E

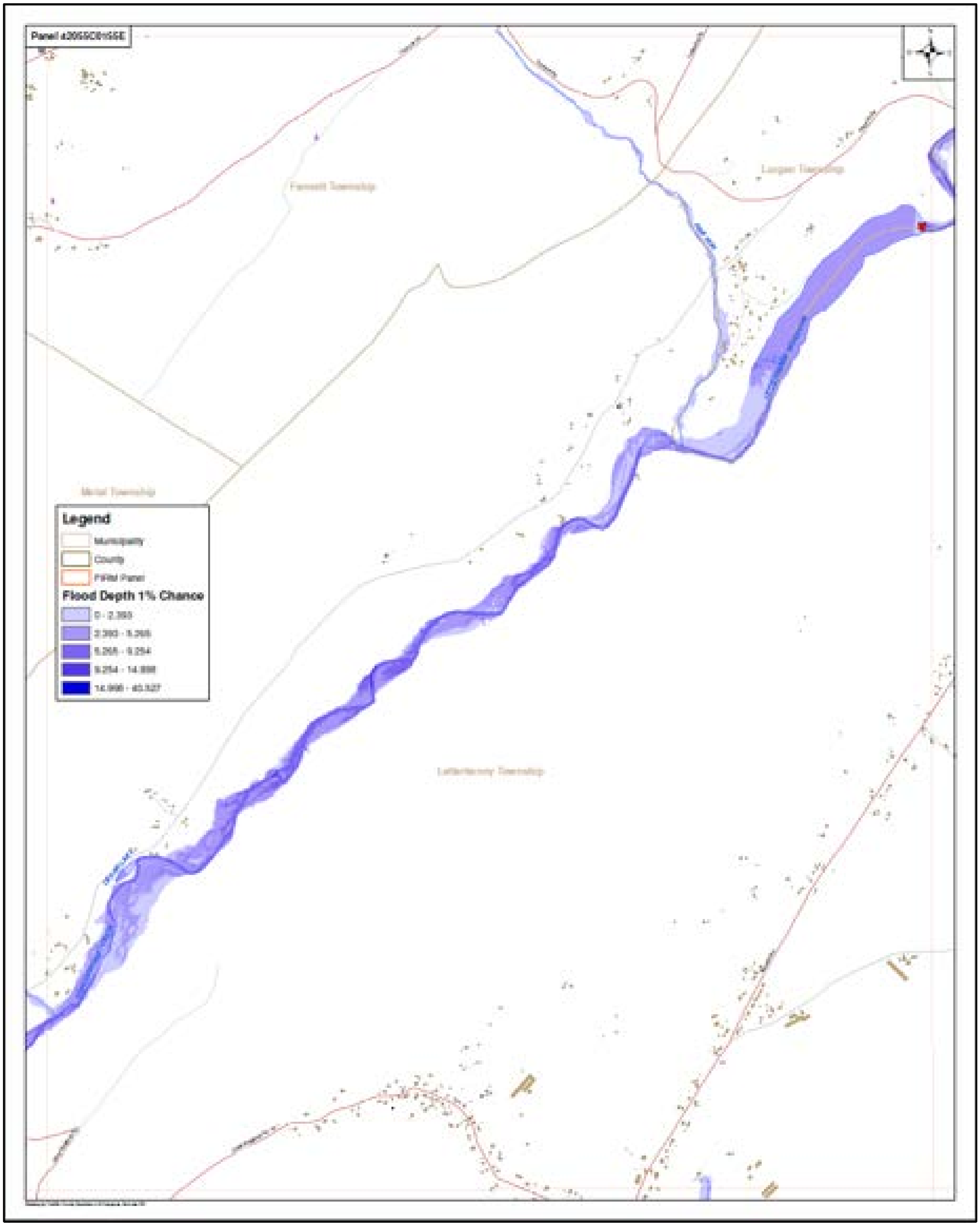


Figure D.18: Quadrant 2, Panel Number 42055C0155E

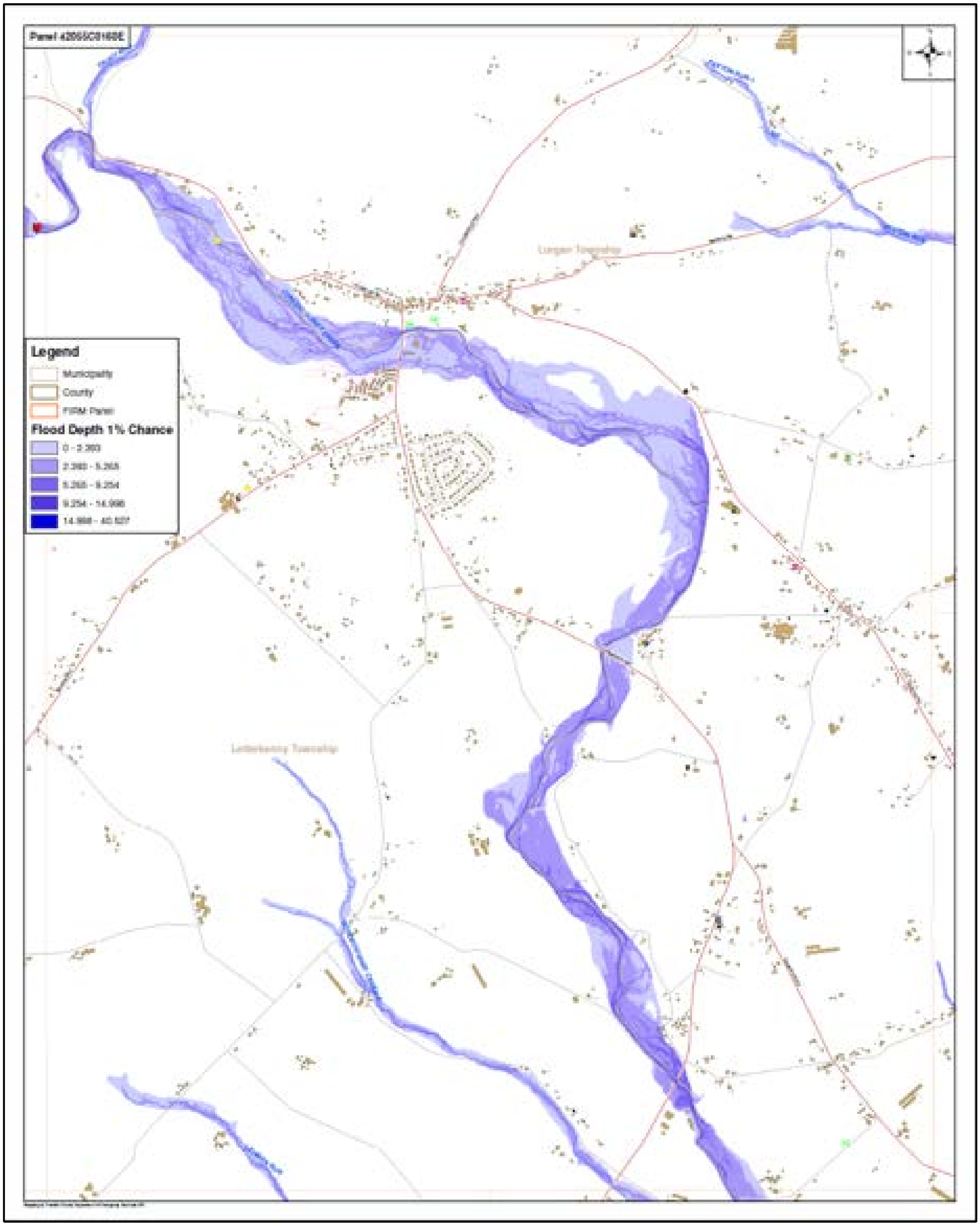


Figure D.19: Quadrant 2, Panel Number 42055C0160E

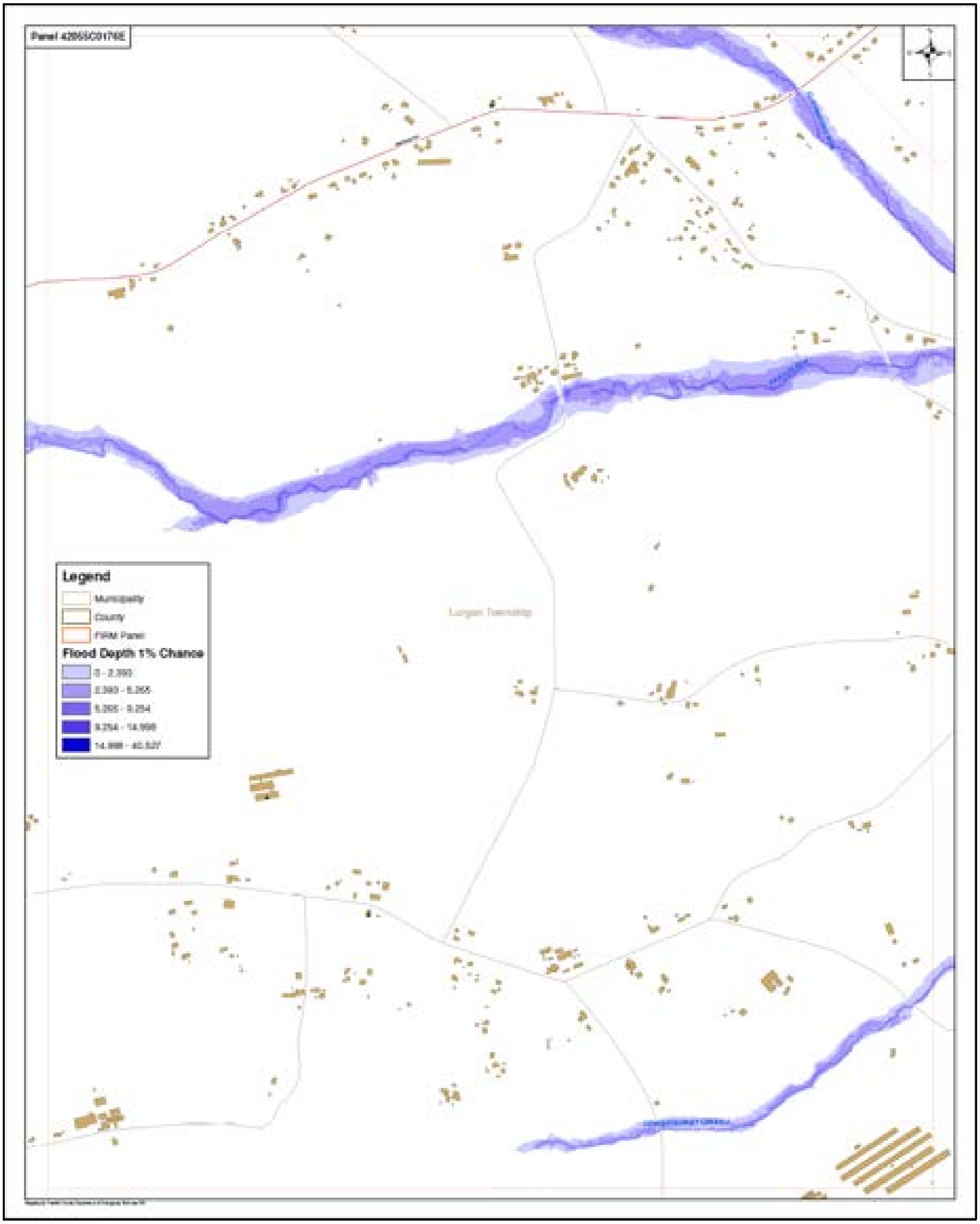


Figure D.20: Quadrant 2, Panel Number 42055C0176E

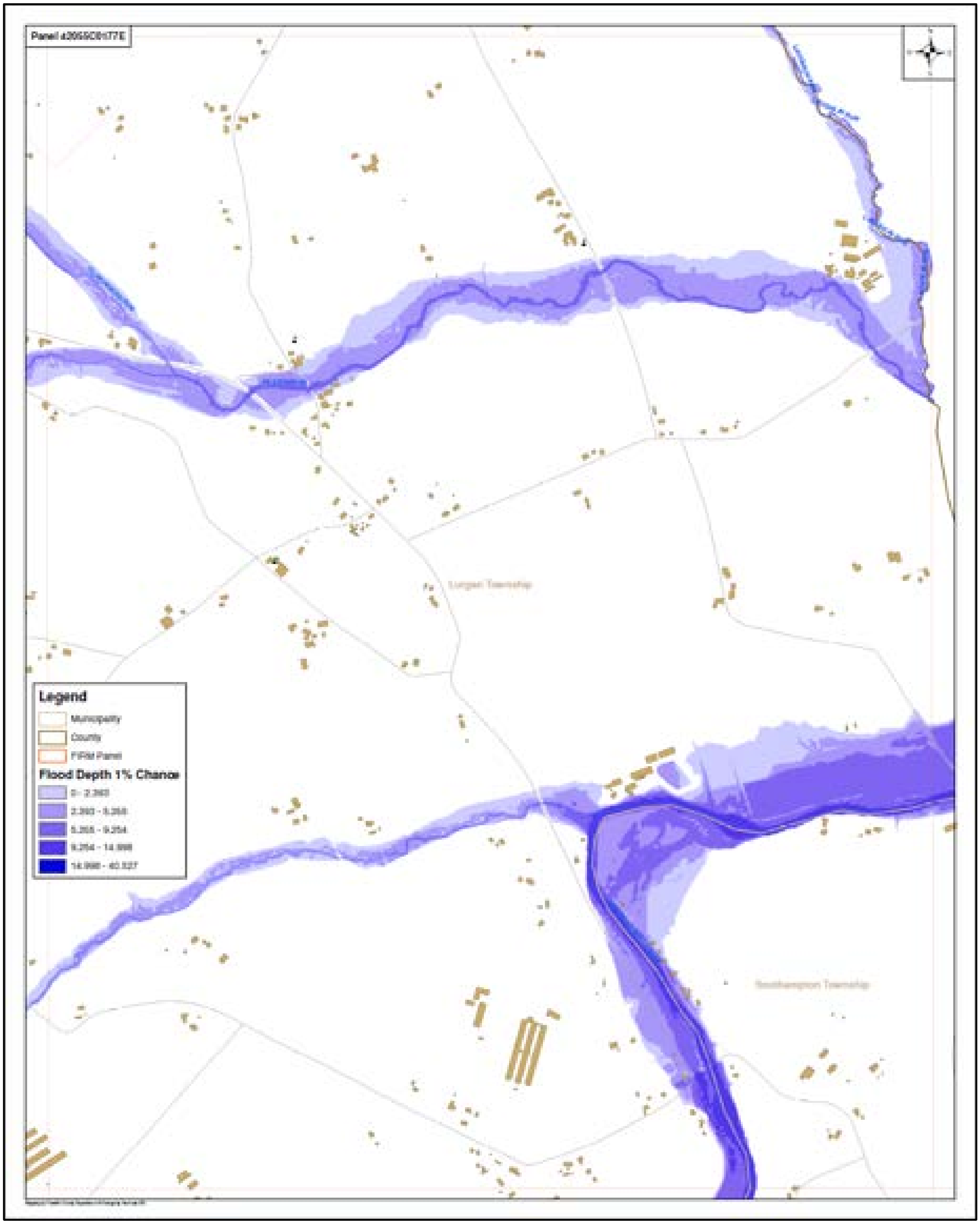


Figure D.21: Quadrant 2, Panel Number 42055C0177E

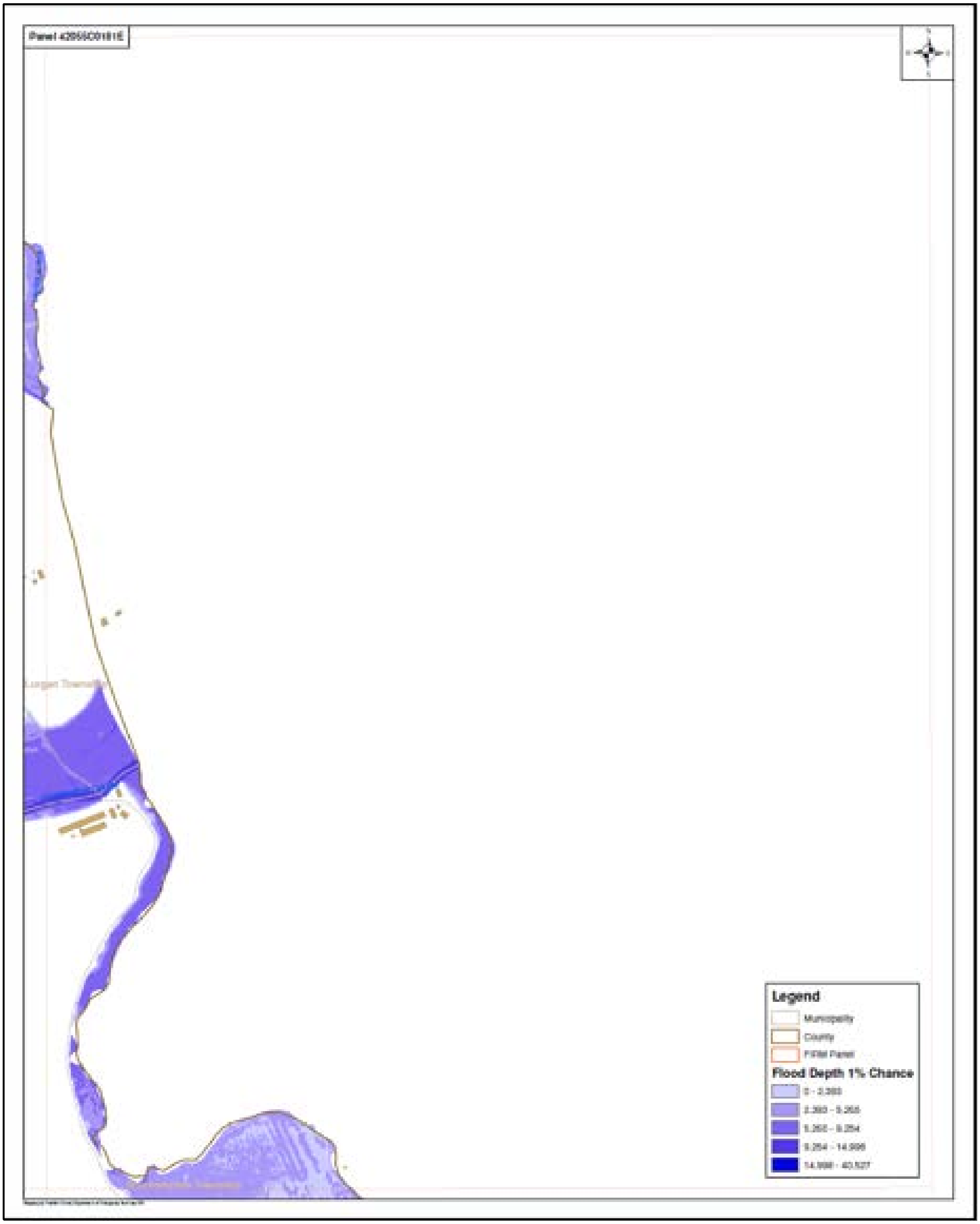


Figure D.22: Quadrant 2, Panel Number 42055C0181E

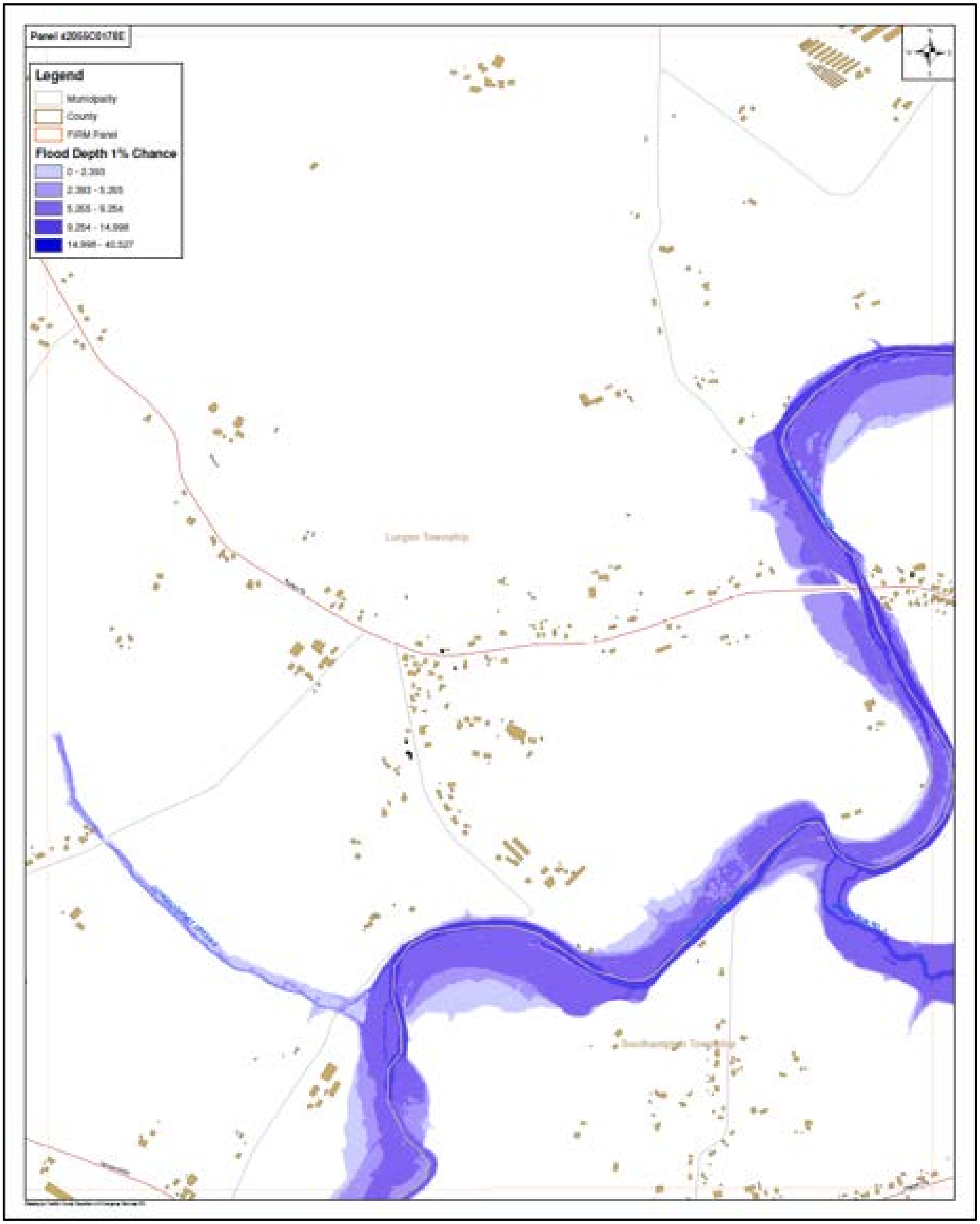


Figure D.23: Quadrant 2, Panel Number 42055C0178E

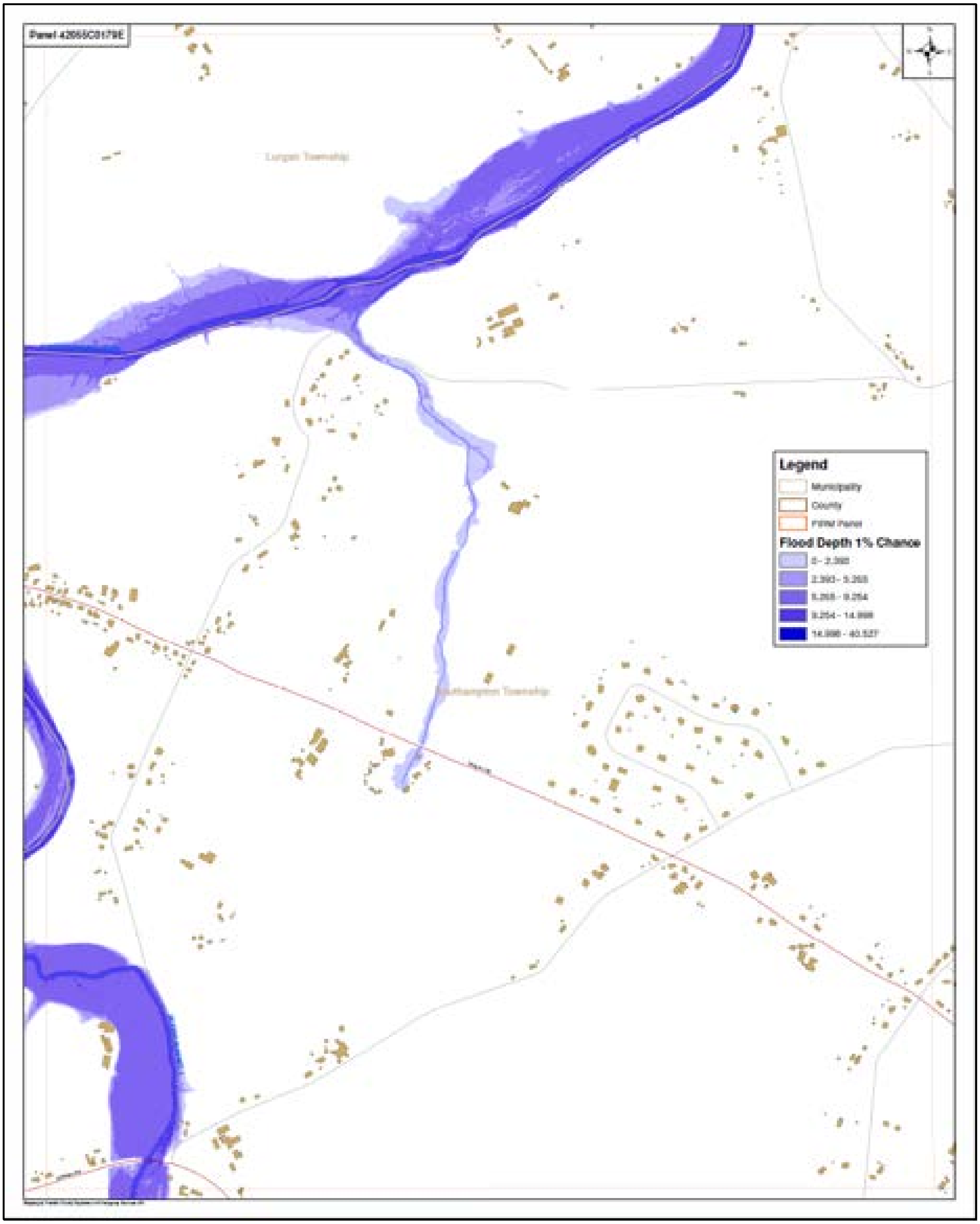


Figure D.24: Quadrant 2, Panel Number 42055C0179E

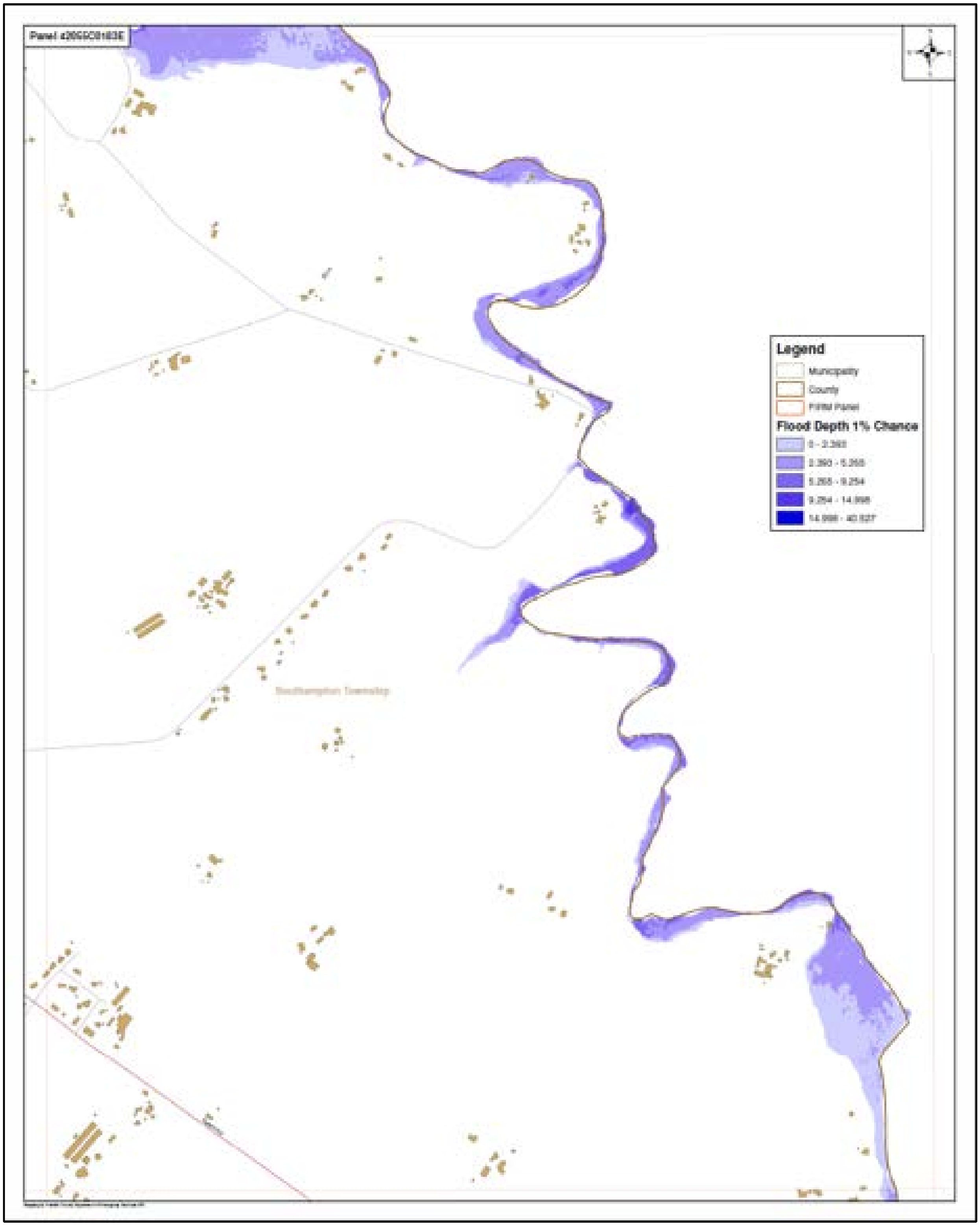


Figure D.25: Quadrant 2, Panel Number 42055C0183E

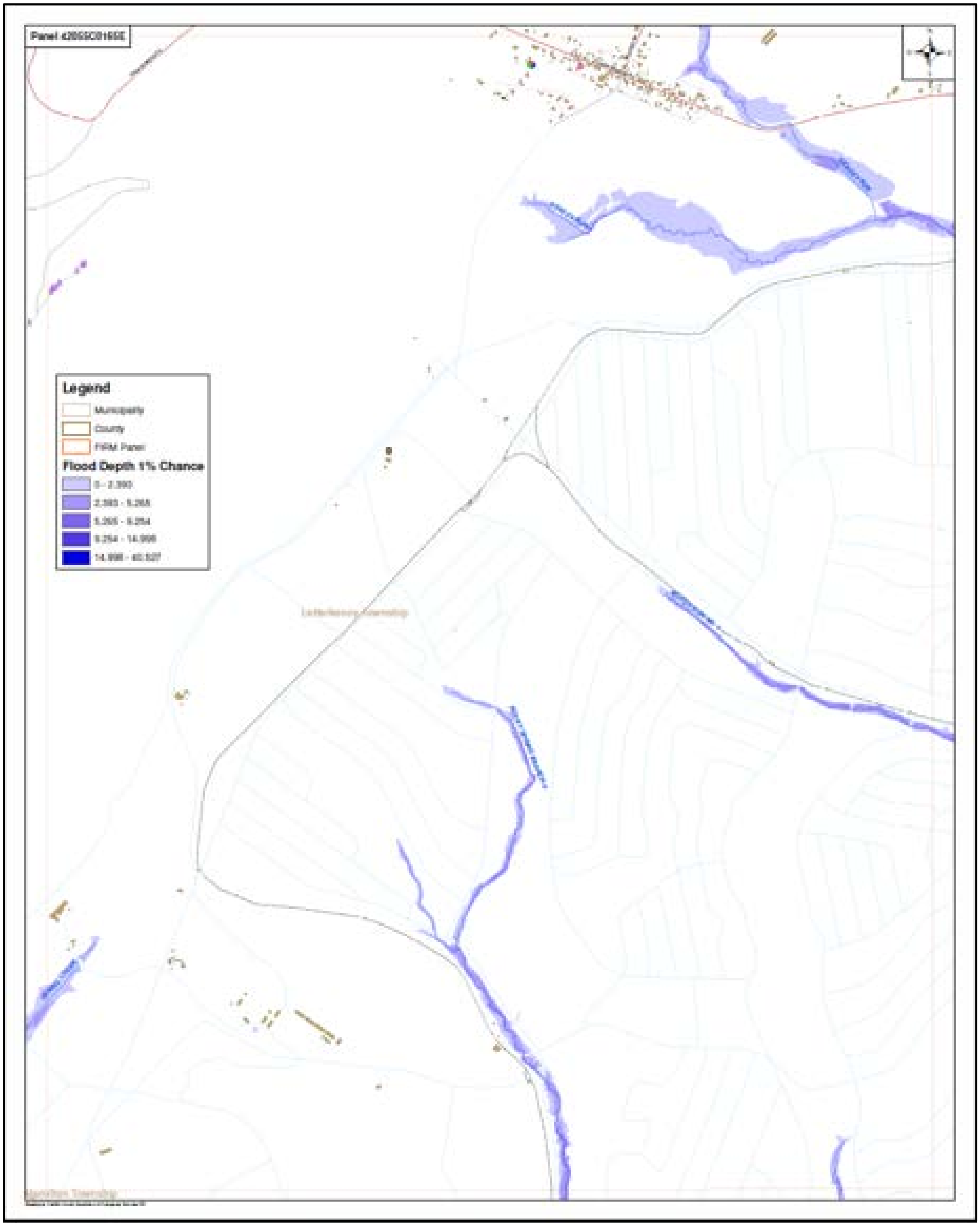


Figure D.26: Quadrant 2, Panel Number 42055C0165E

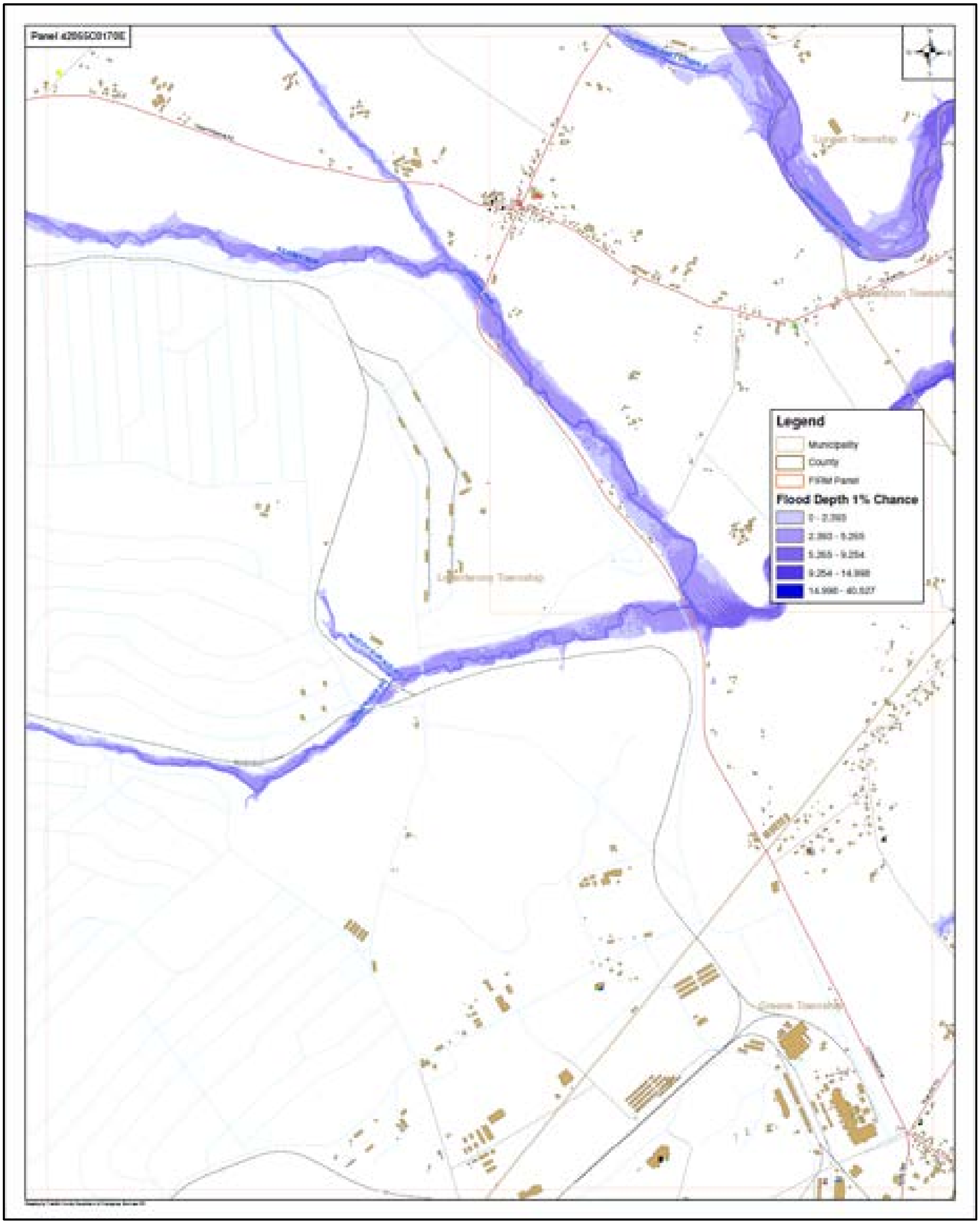


Figure D.27: Quadrant 2, Panel Number 42055C0170E

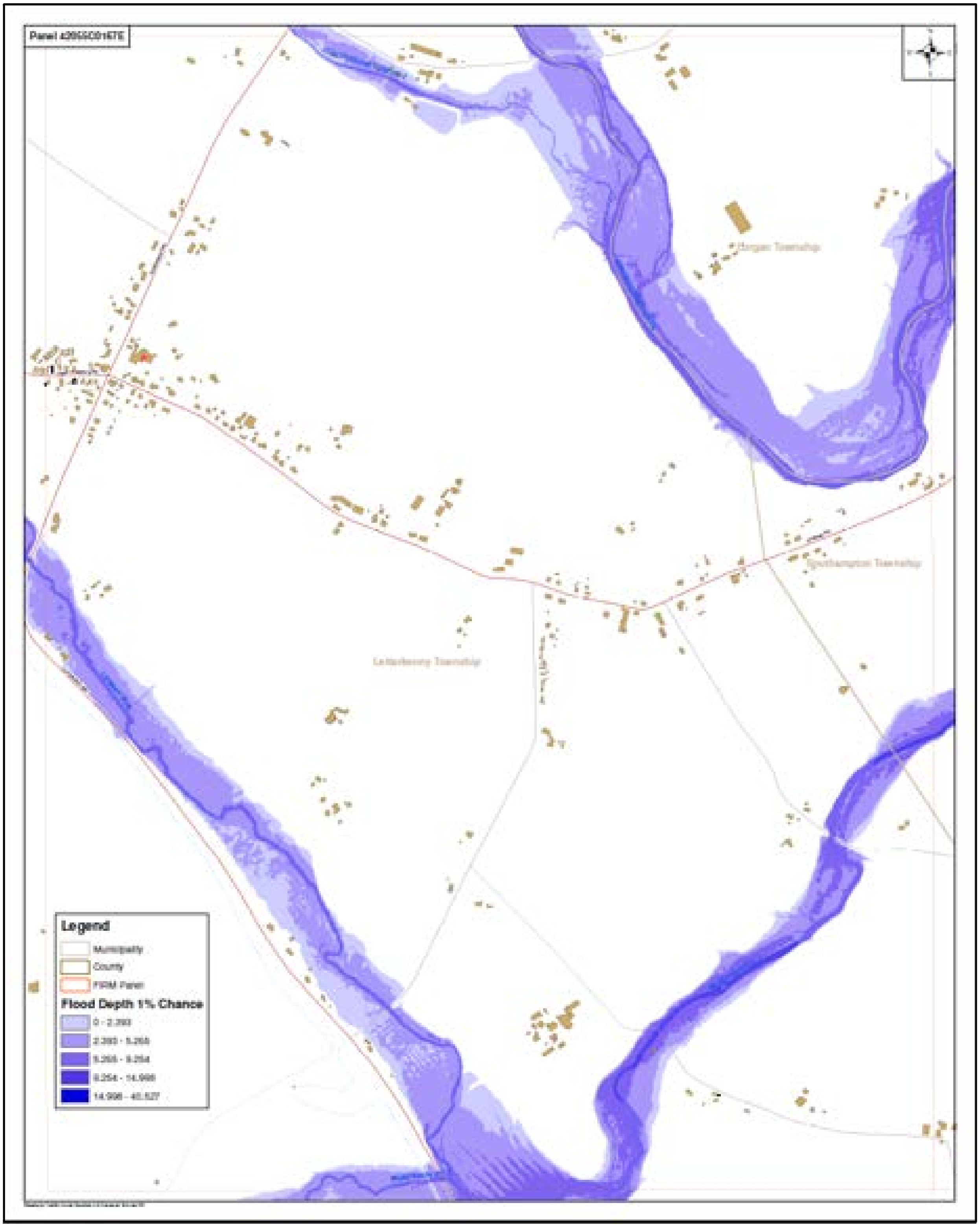


Figure D.28: Quadrant 2, Panel Number 42055C0167E

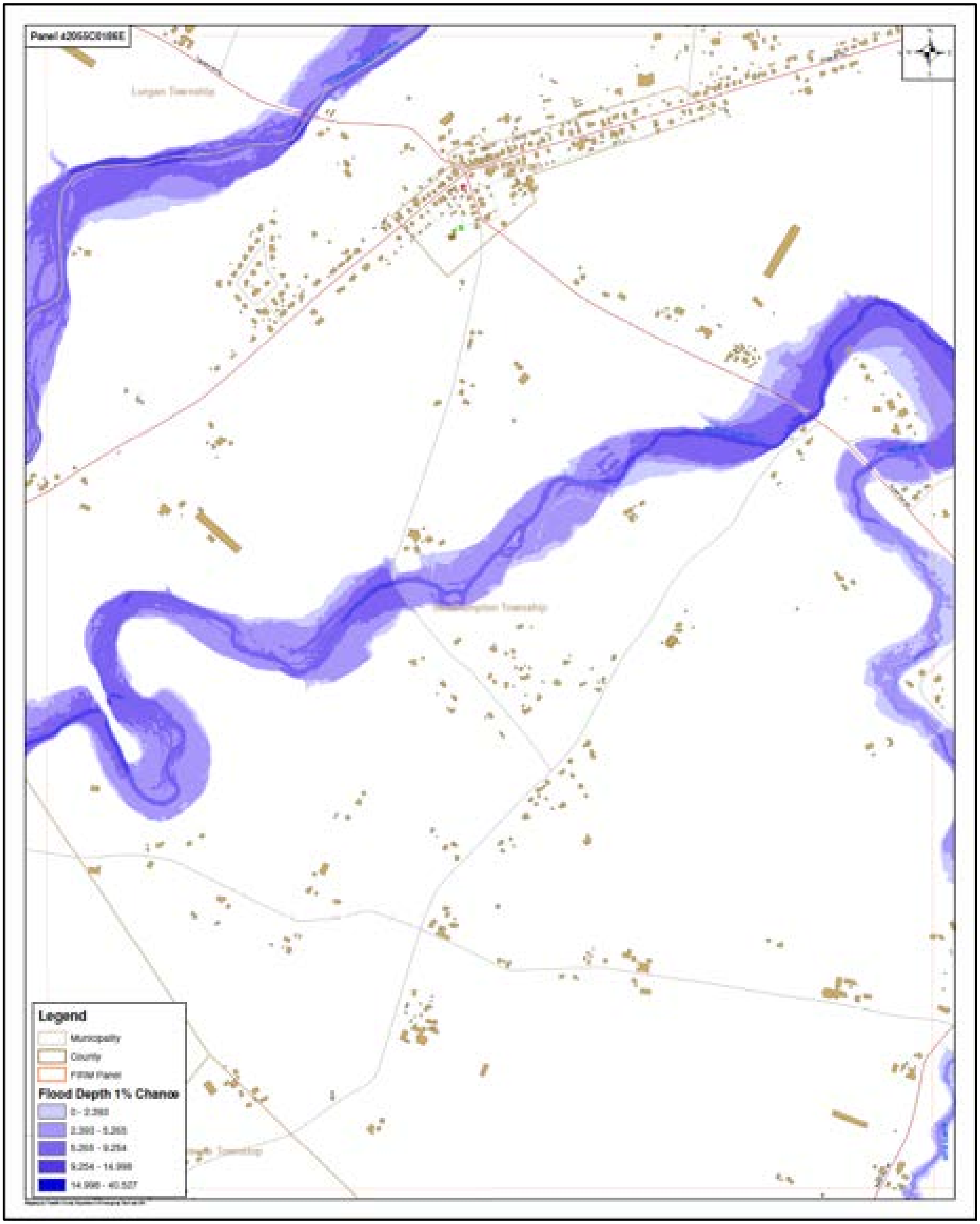


Figure D.29: Quadrant 2, Panel Number 42055C0186E

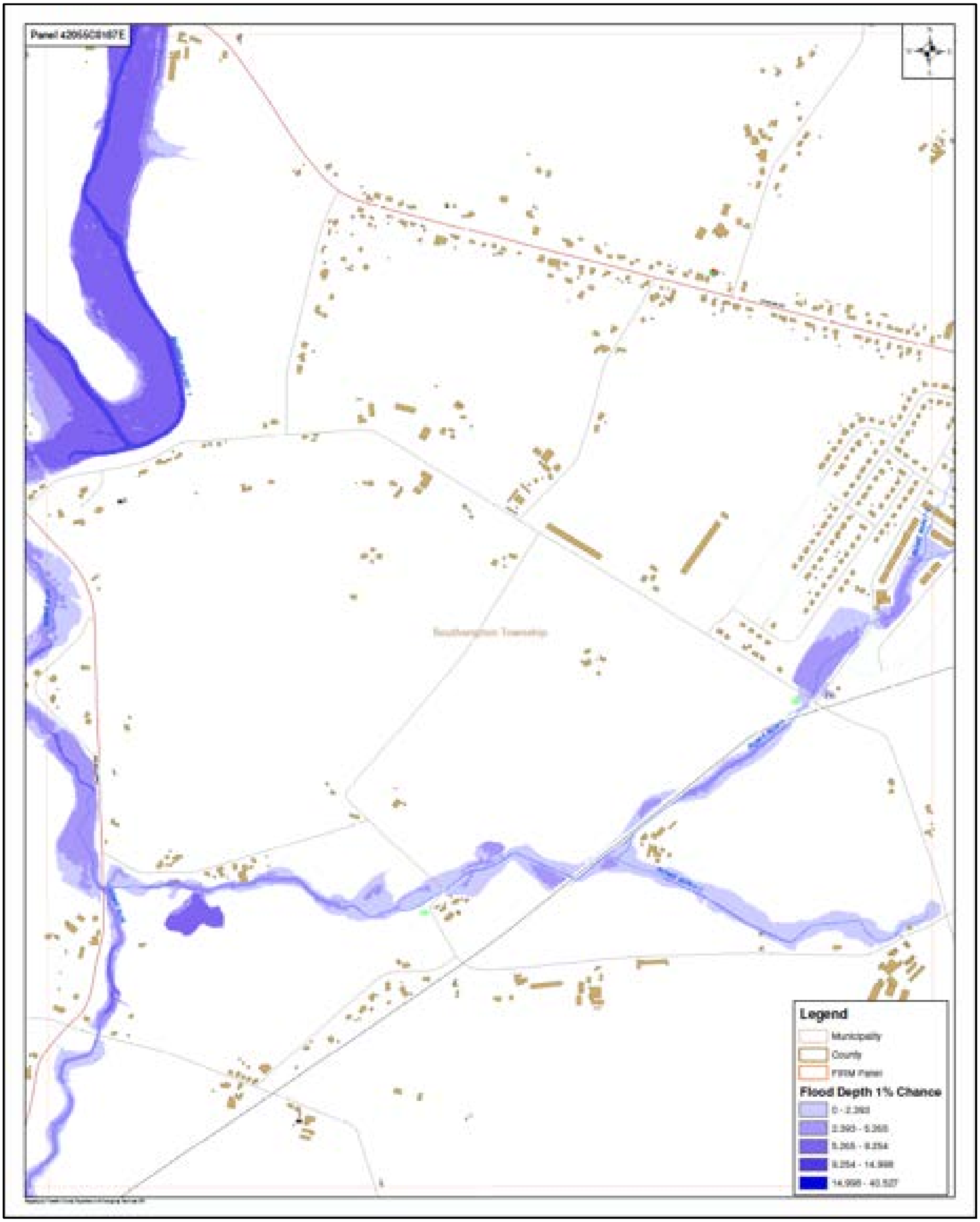


Figure D.30: Quadrant 2, Panel Number 42055C0187E

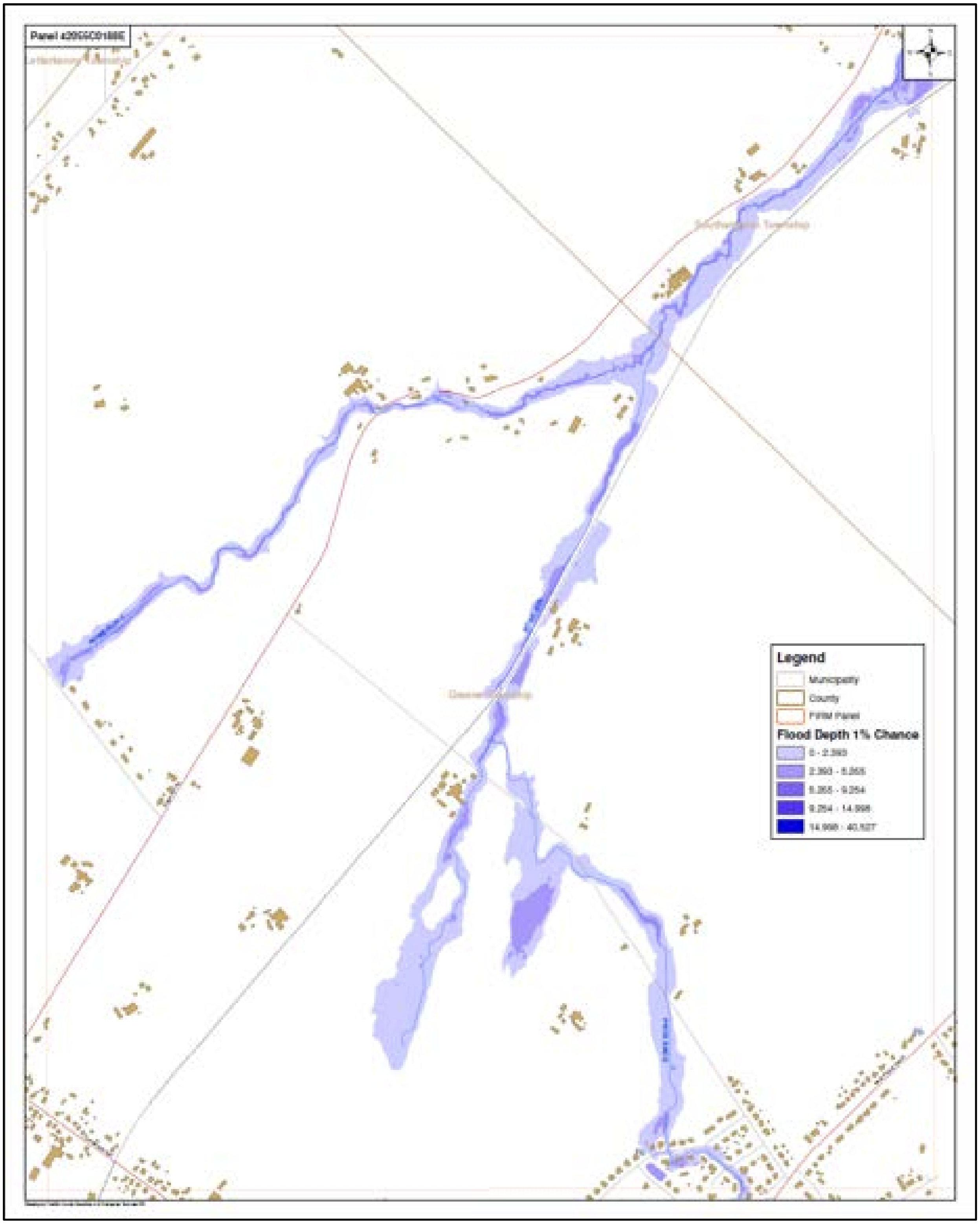


Figure D.31: Quadrant 2, Panel Number 42055C0188E

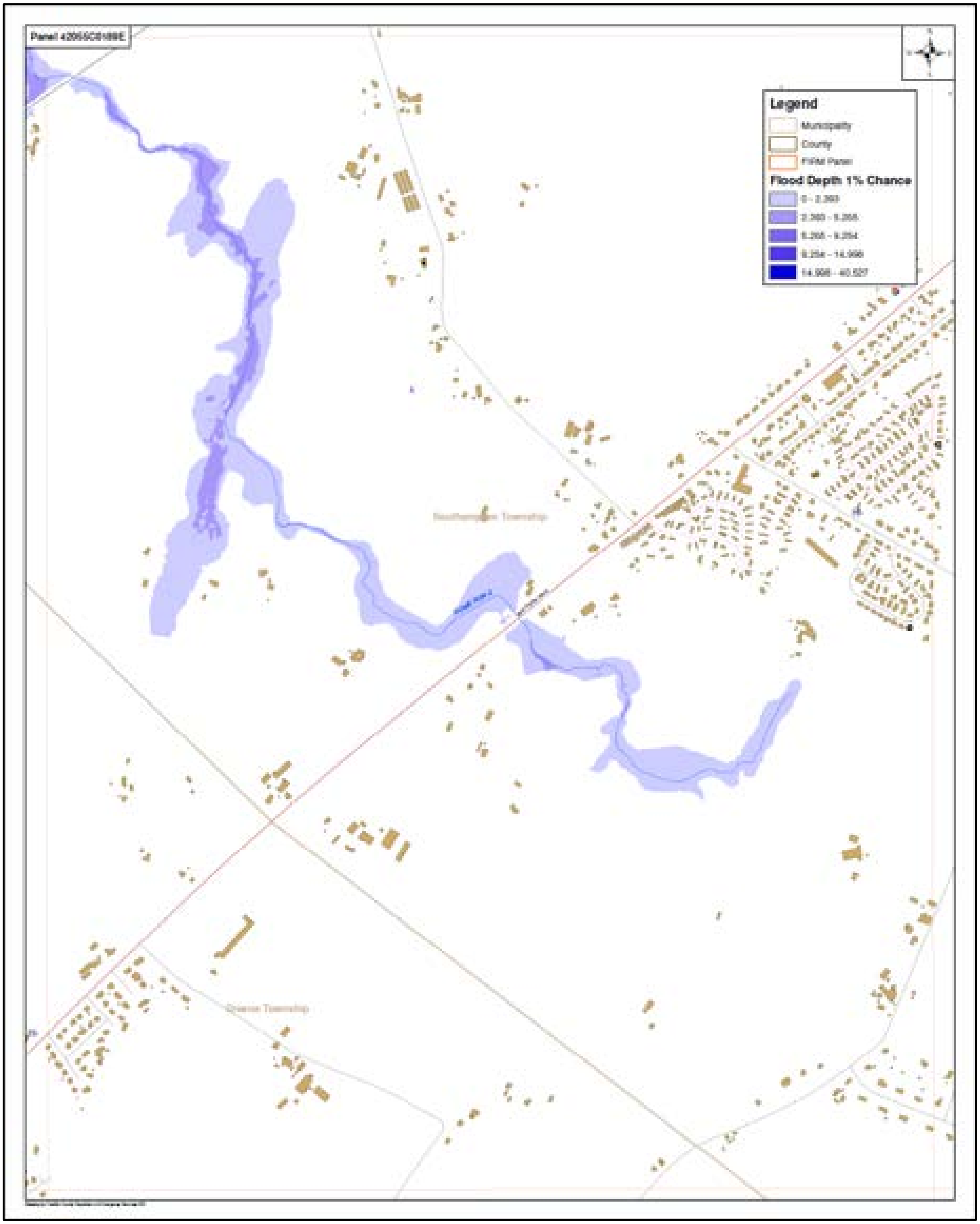


Figure D.32: Quadrant 2, Panel Number 42055C0189E

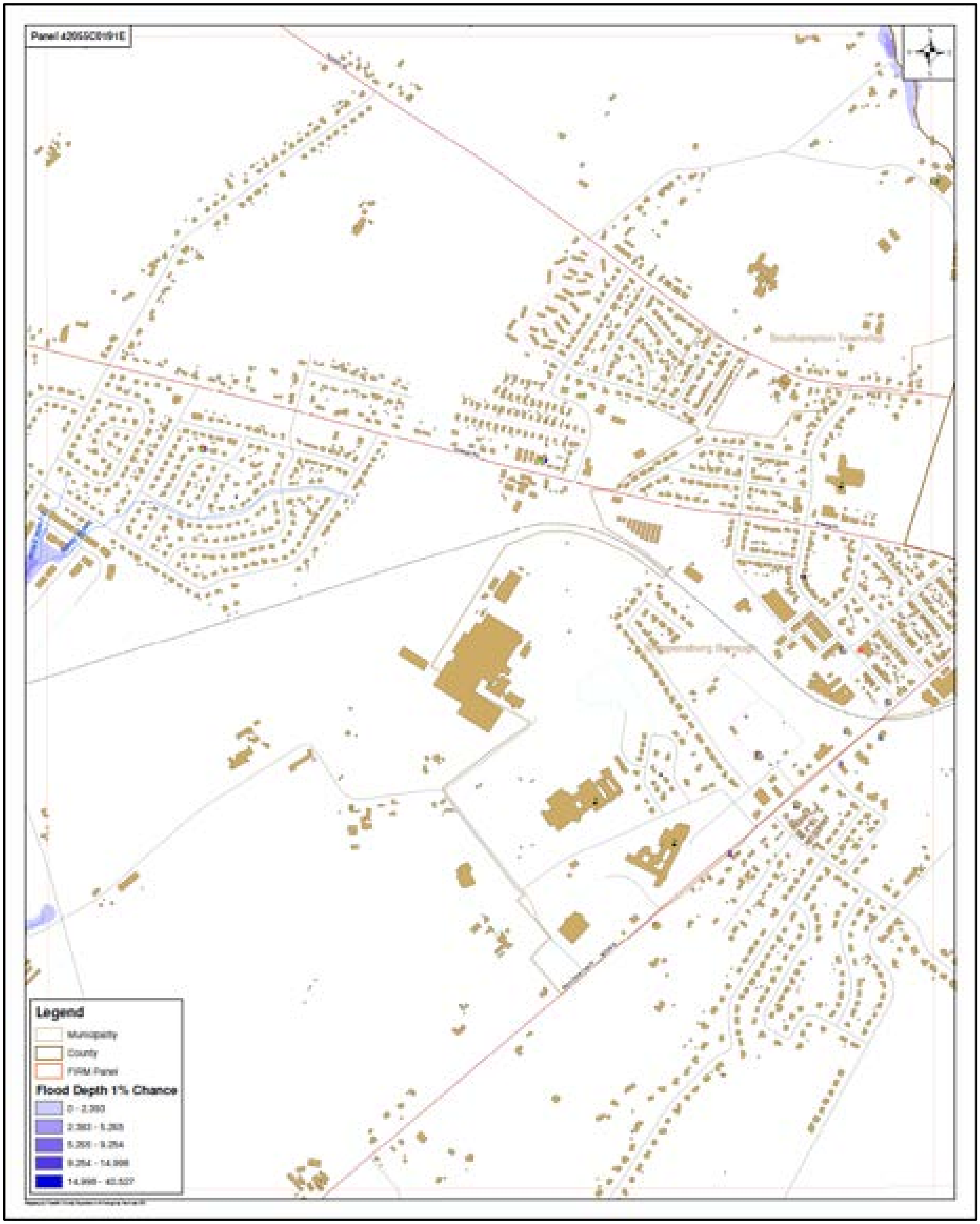
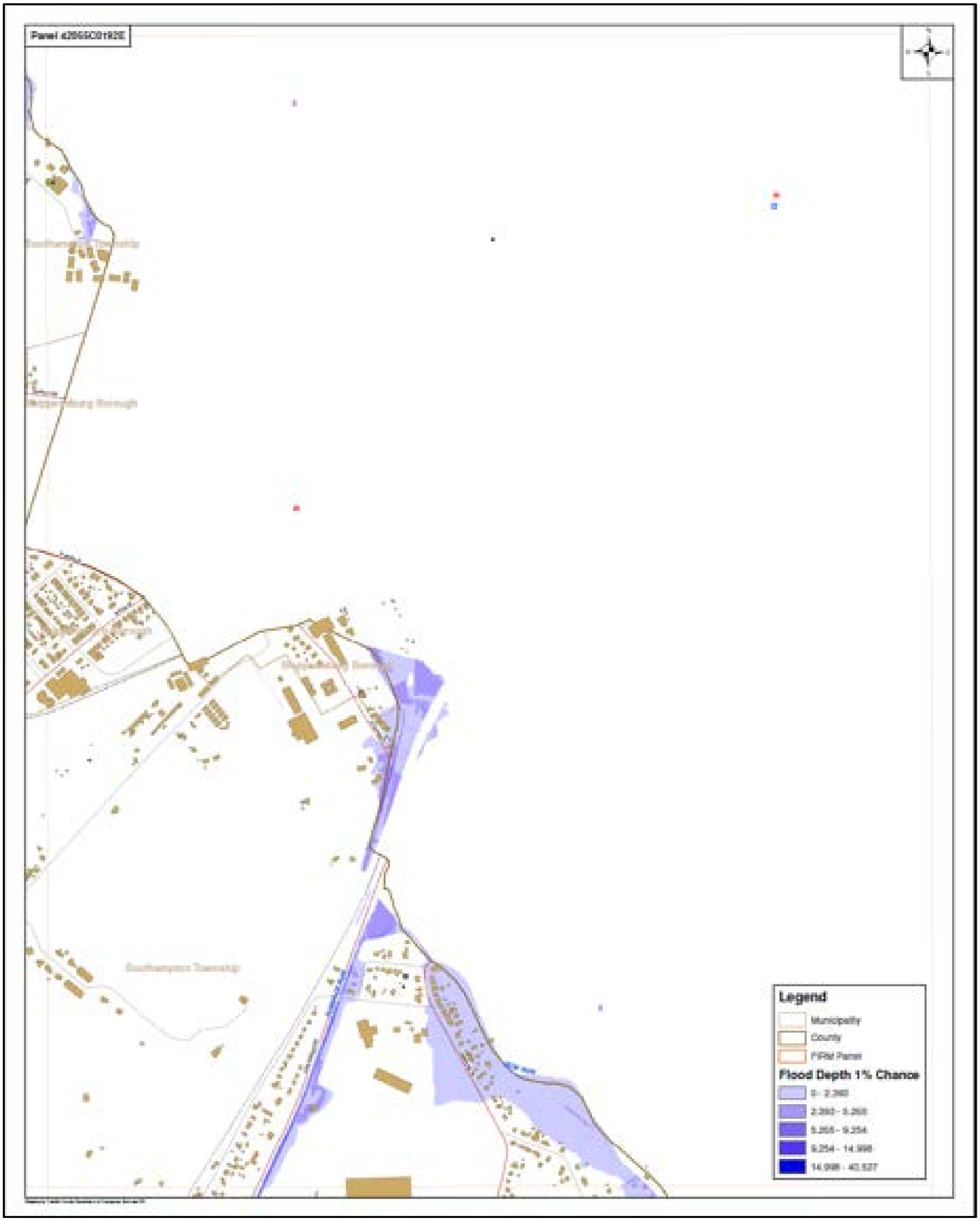


Figure D.33: Quadrant 2, Panel Number 42055C0191E



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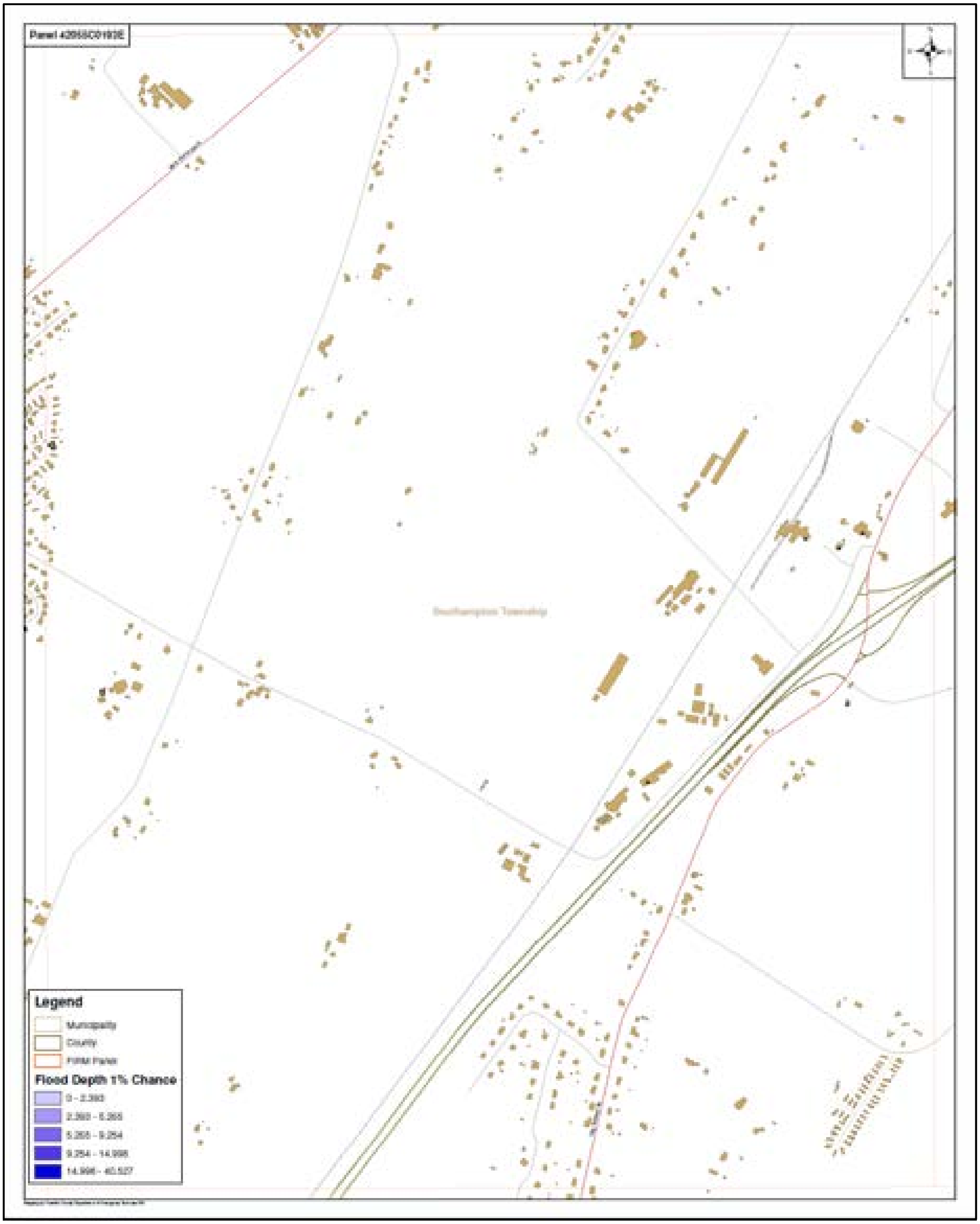

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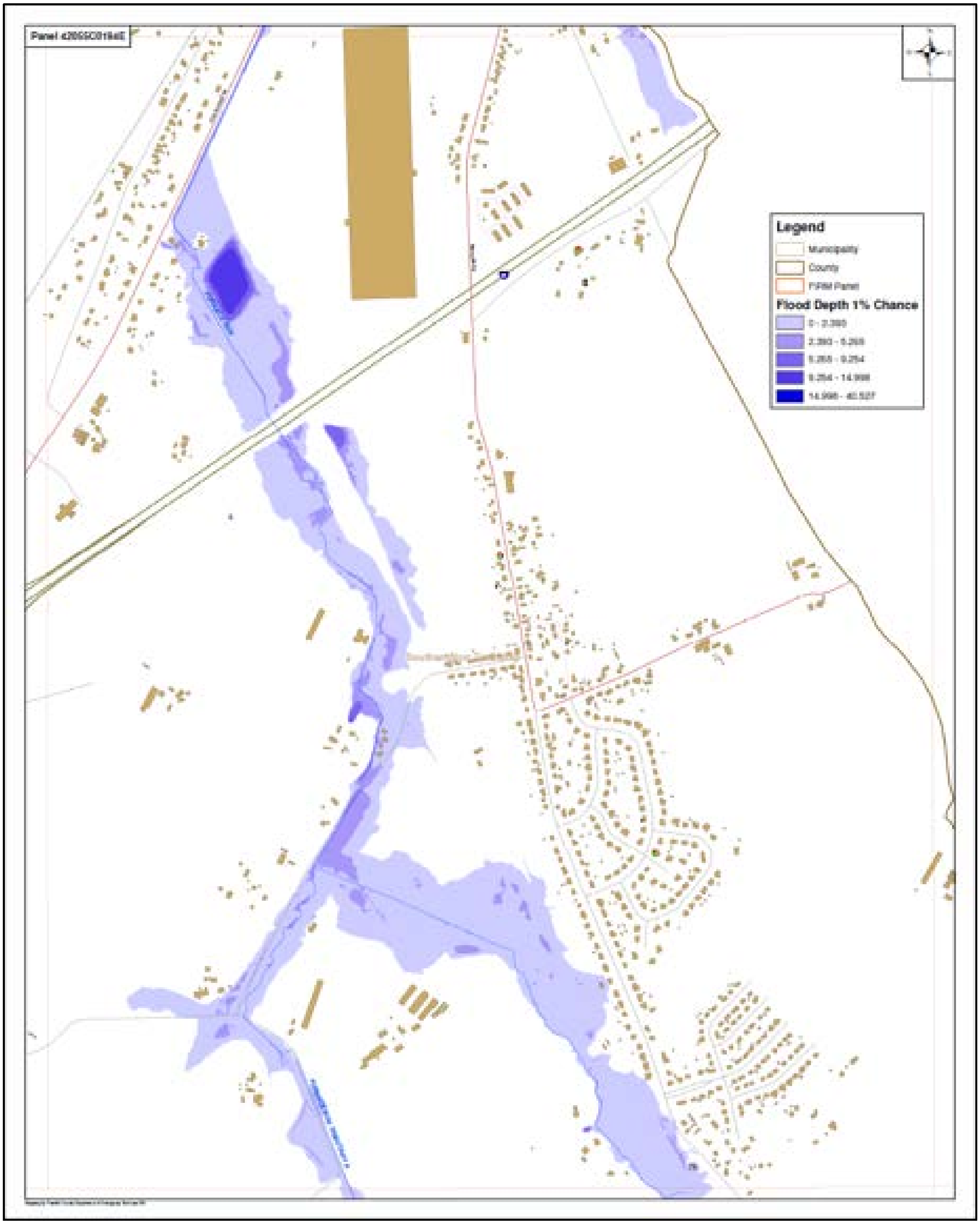


Figure D.36: Quadrant 2, Panel Number 42055C0194E

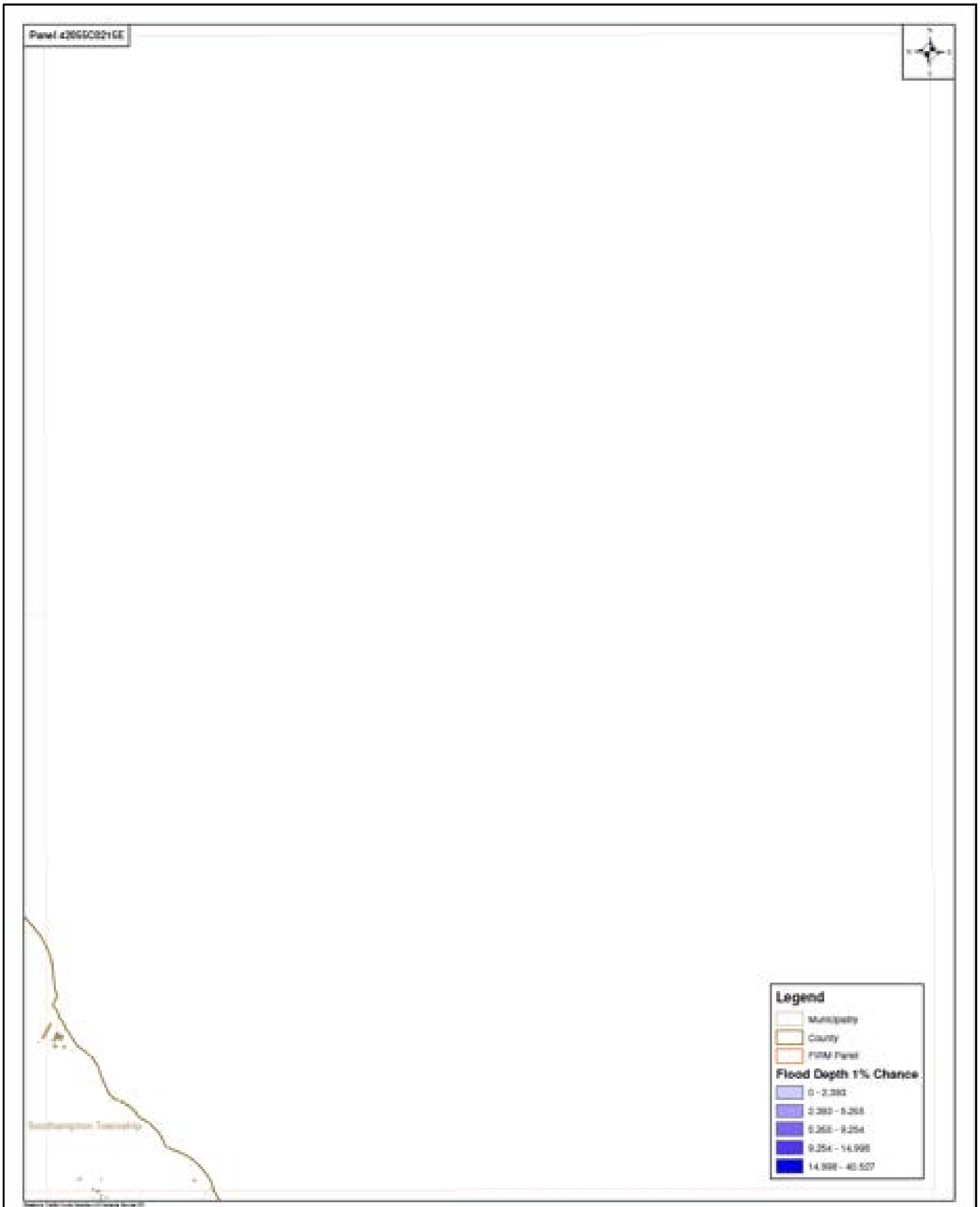


Figure D.37: Quadrant 2, Panel Number 42055C0215E

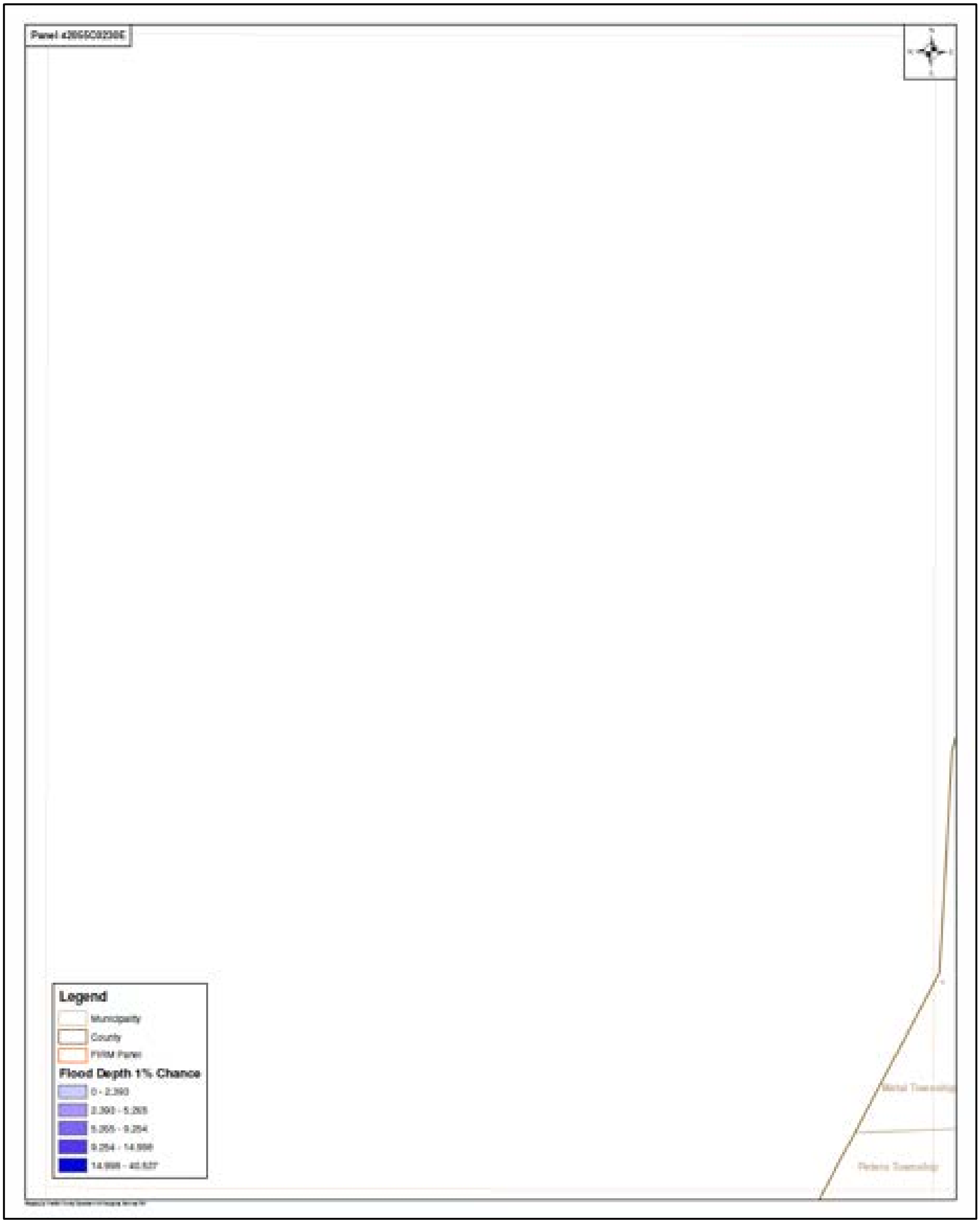


Figure D.38: Quadrant 3, Panel Number 42055C0230E

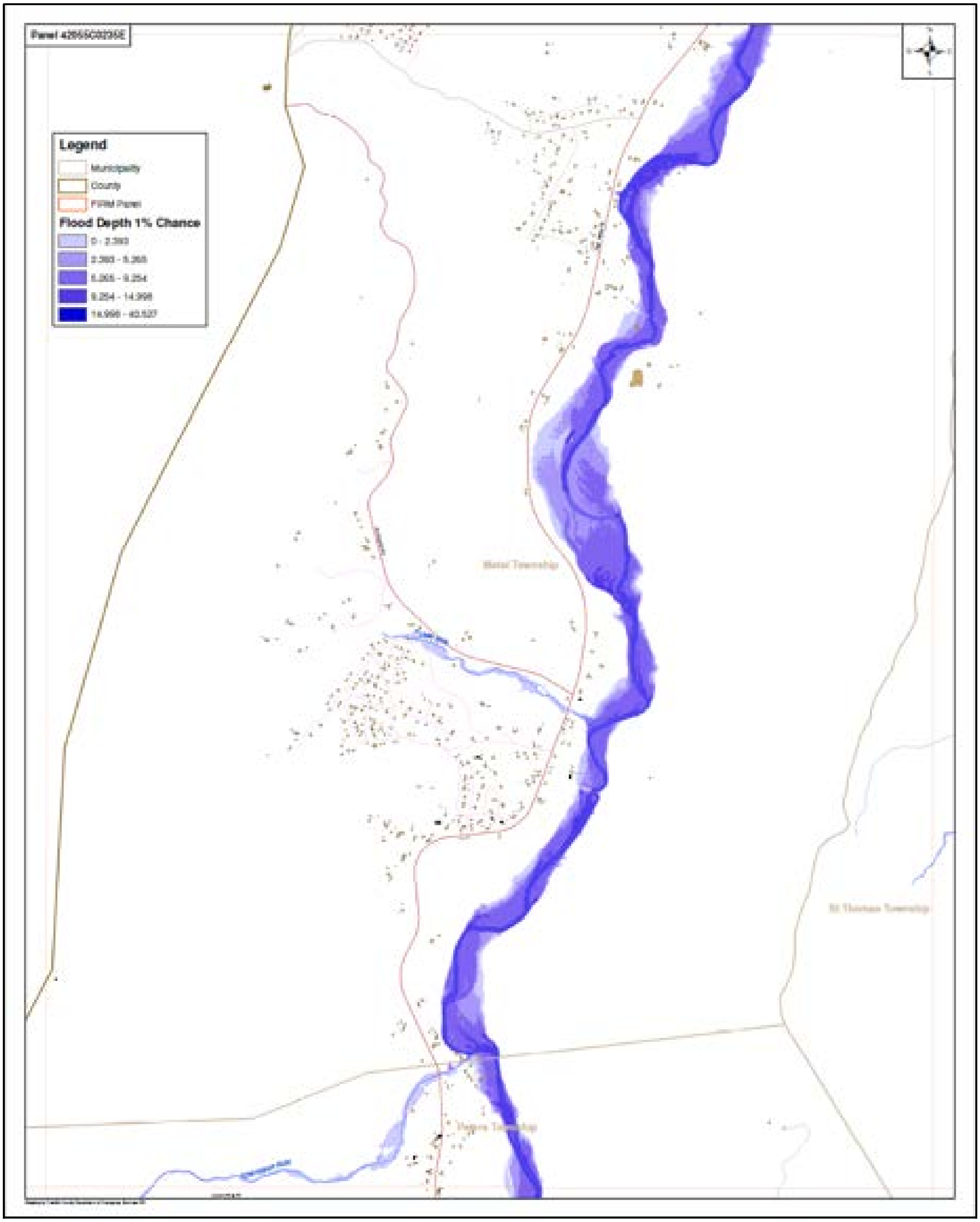


Figure D.39: Quadrant 3, Panel Number 42055C0235E

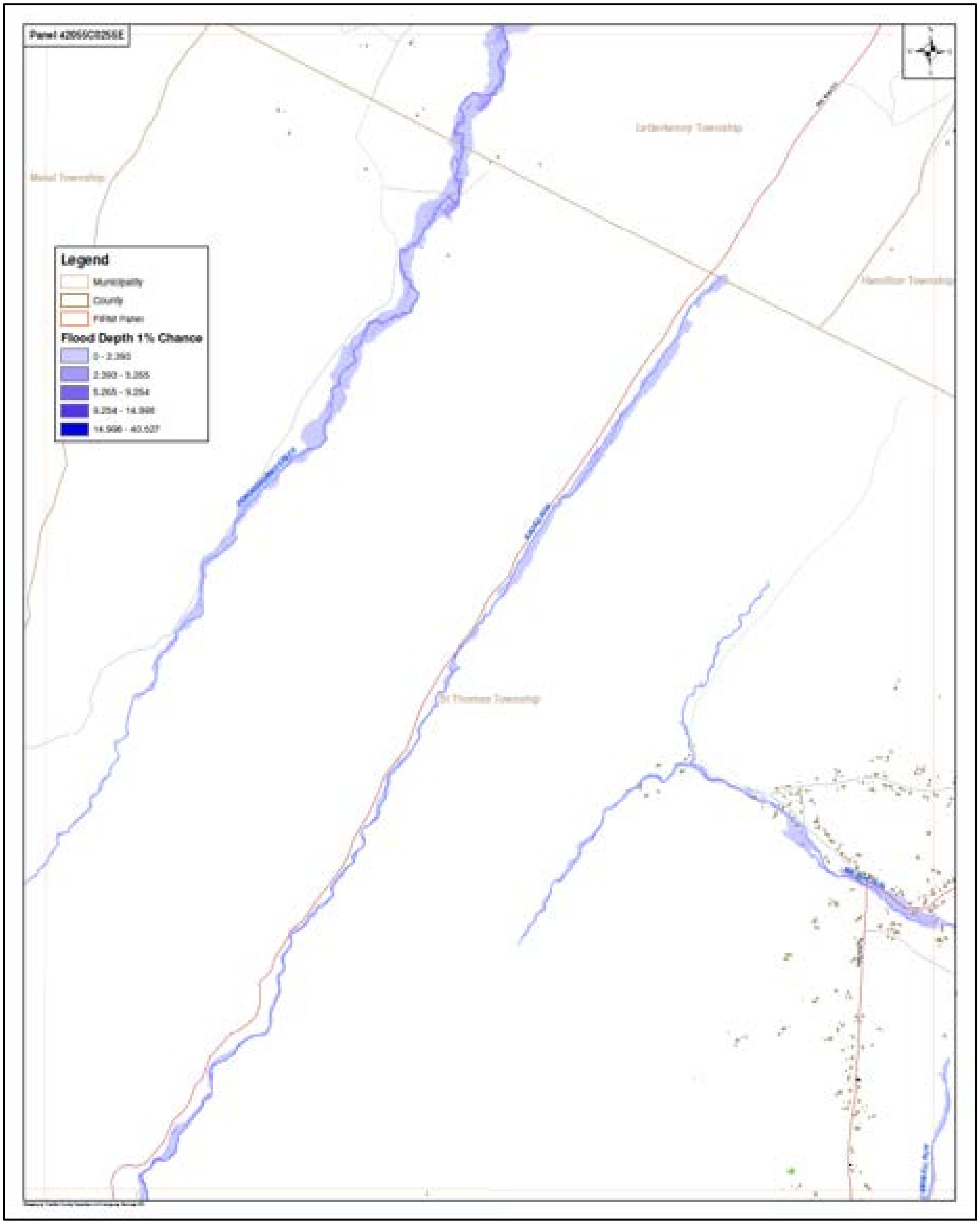


Figure D.40: Quadrant 3, Panel Number 42055C0255E

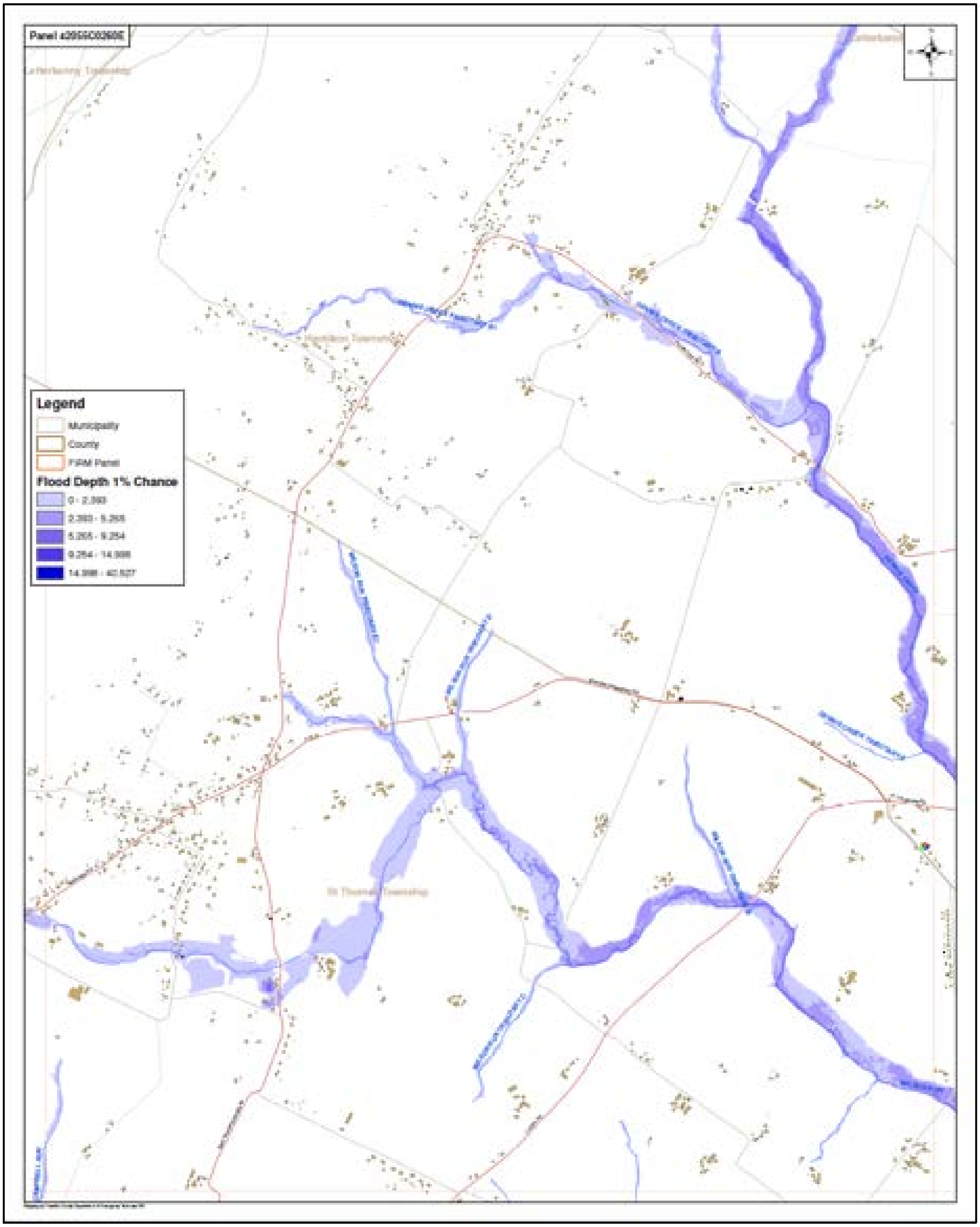
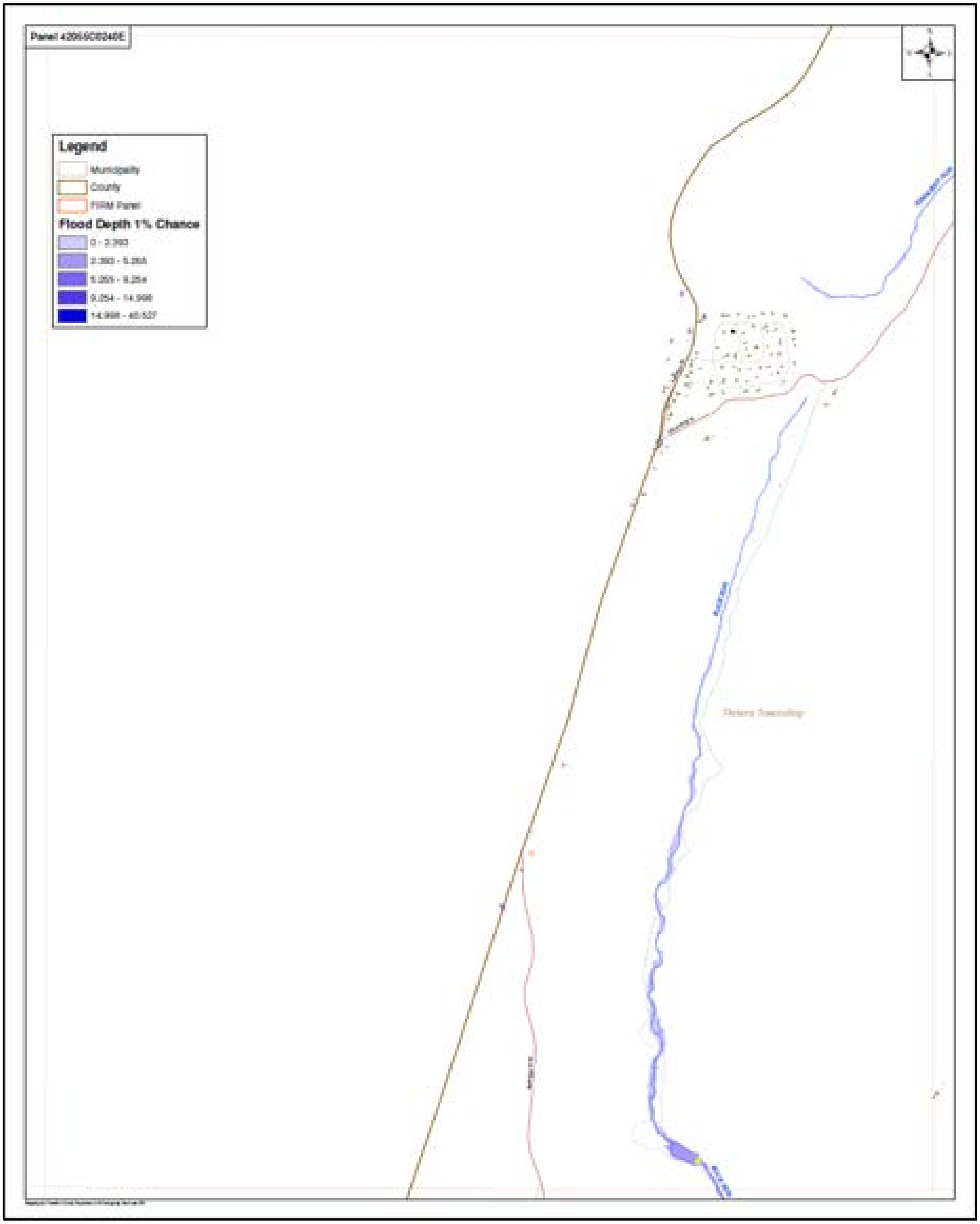


Figure D.41: Quadrant 3, Panel Number 42055C0260E



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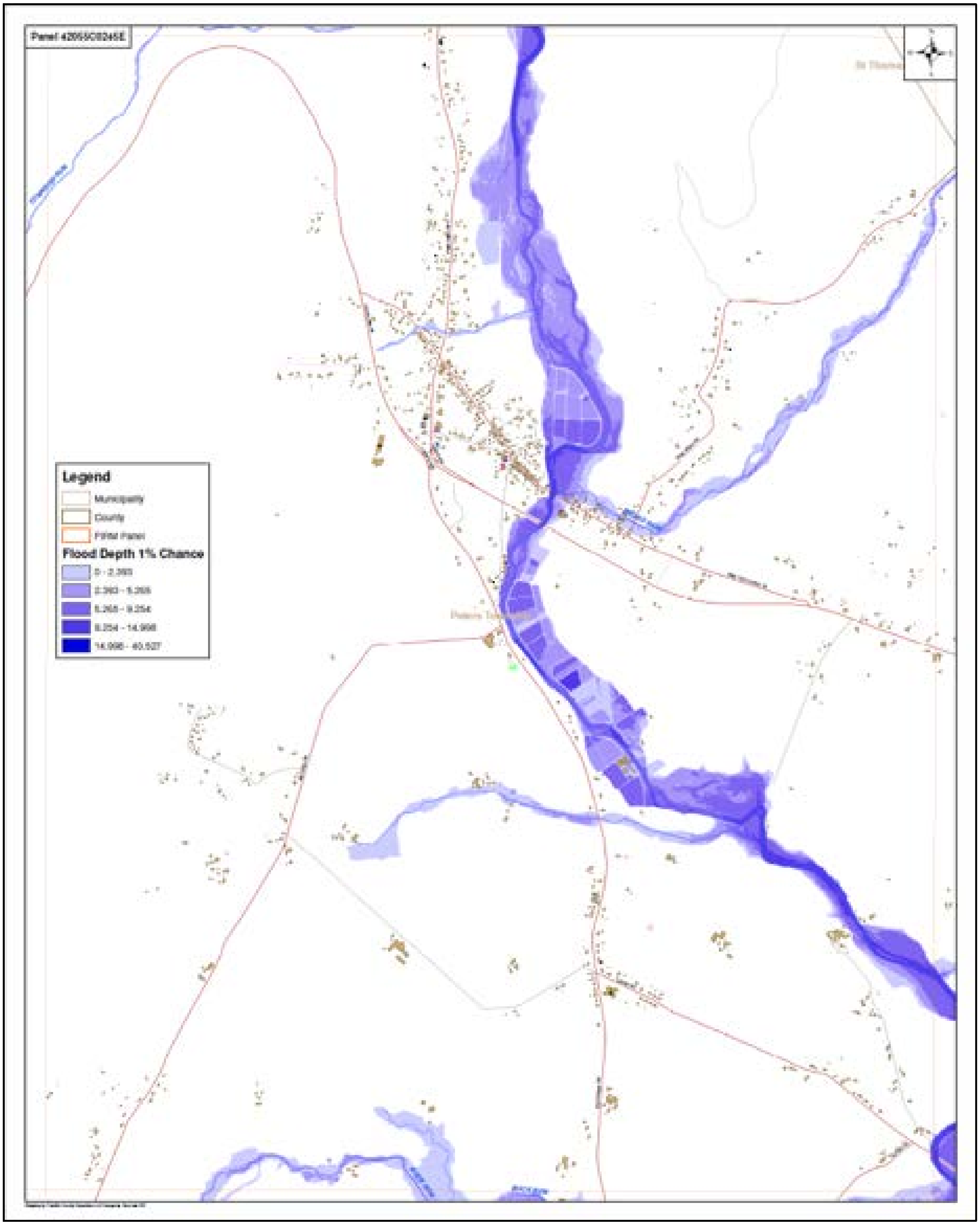

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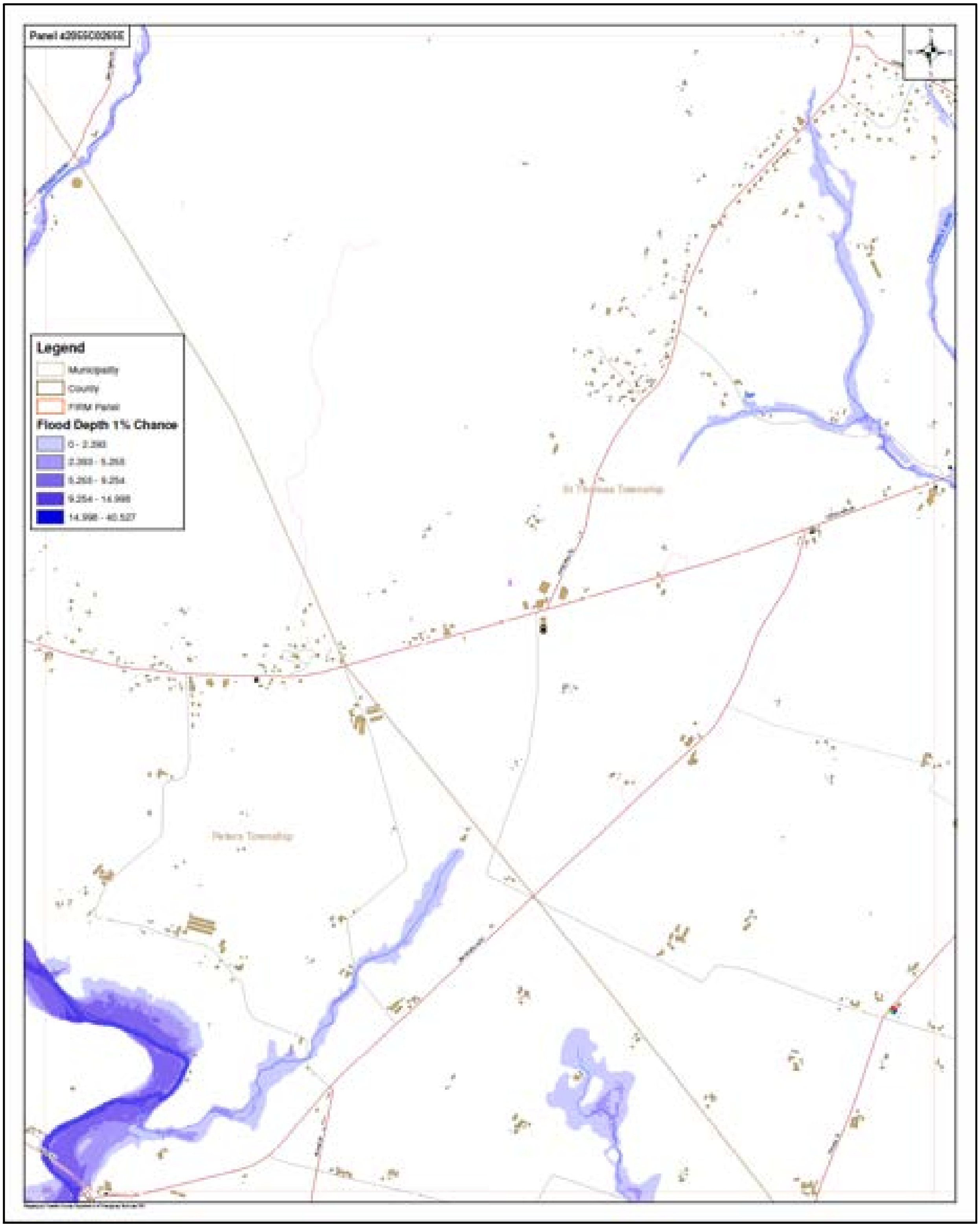

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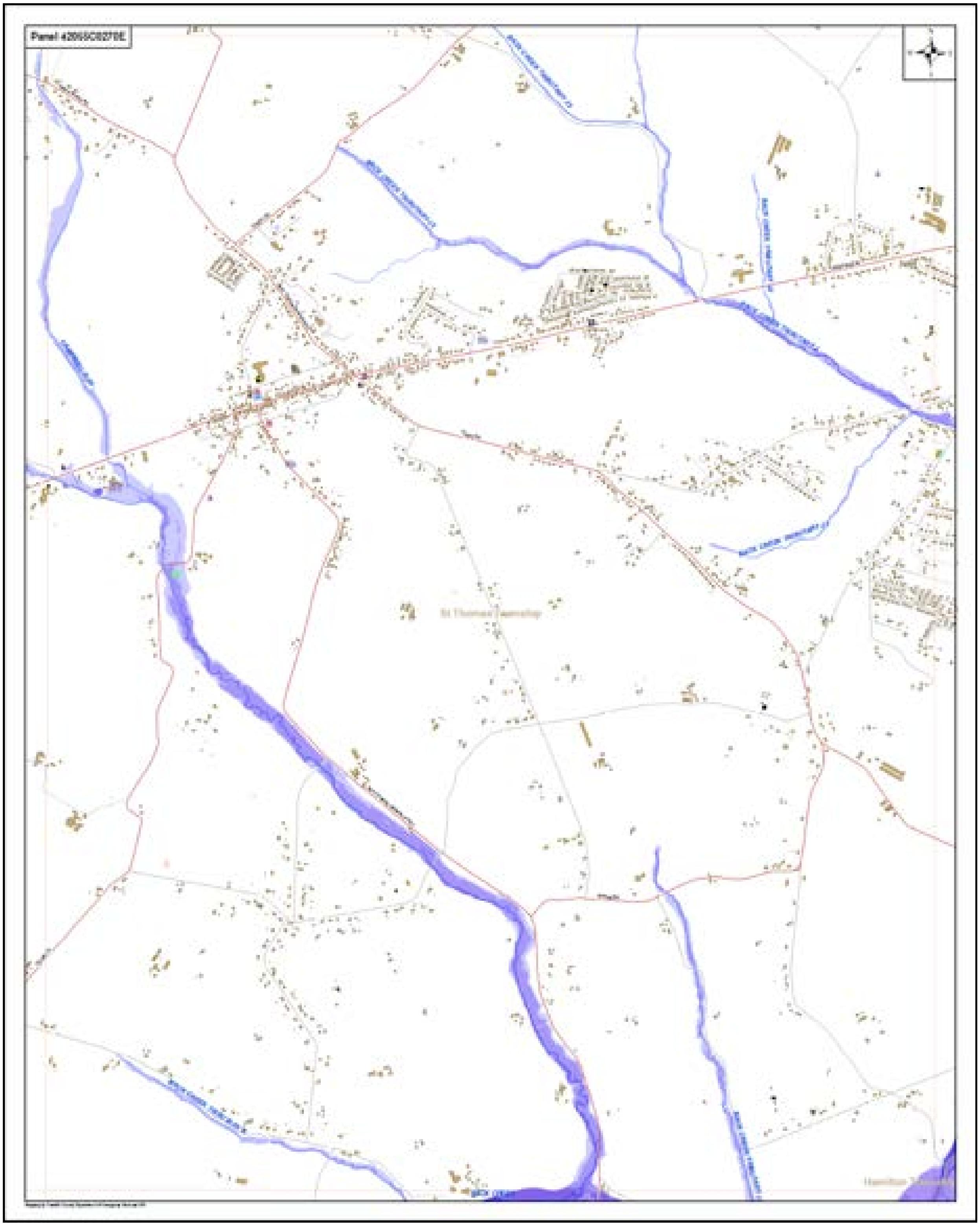


Figure D.45: Quadrant 3, Panel Number 42055C0270E

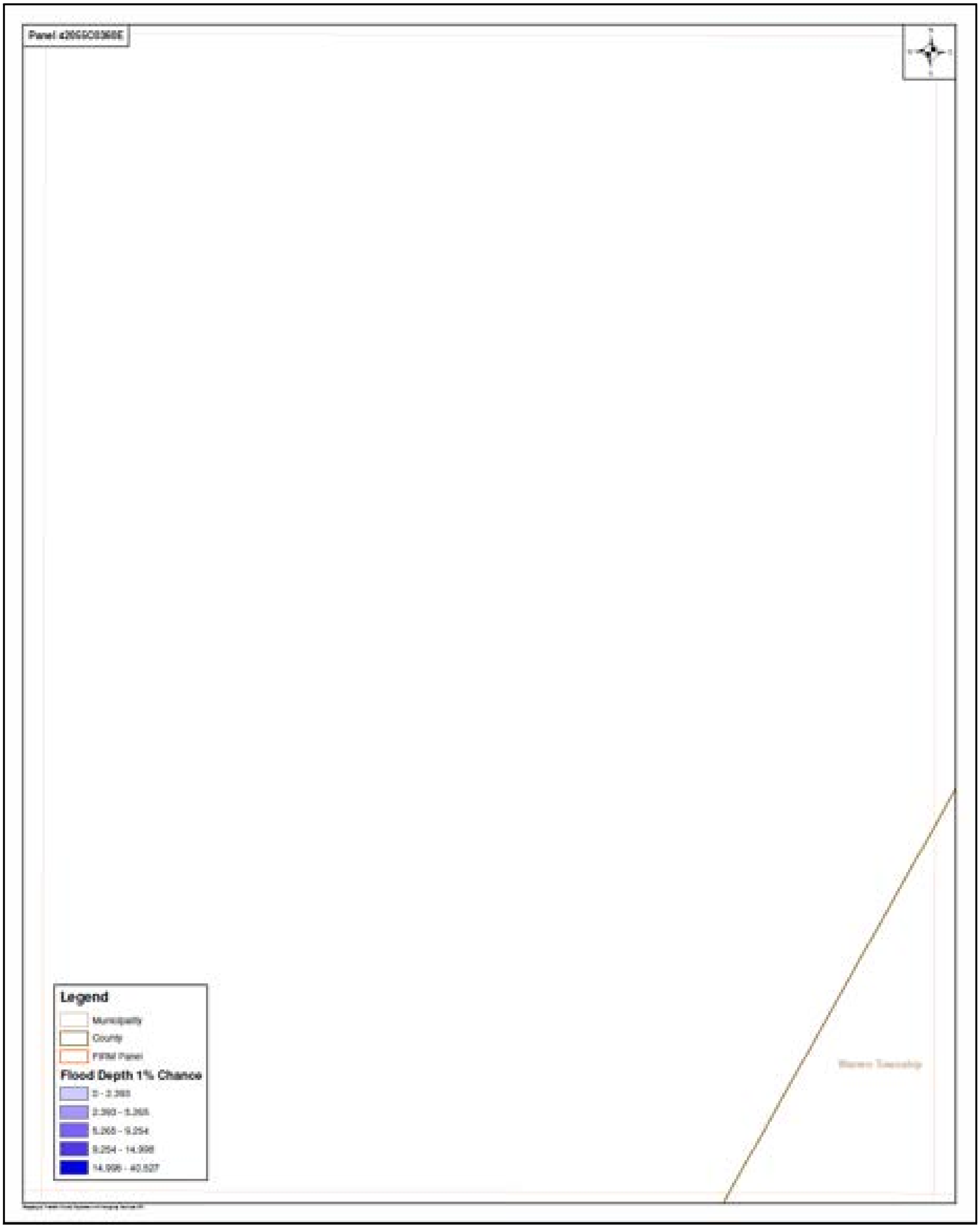


Figure D.46: Quadrant 3, Panel Number 42055C0360E

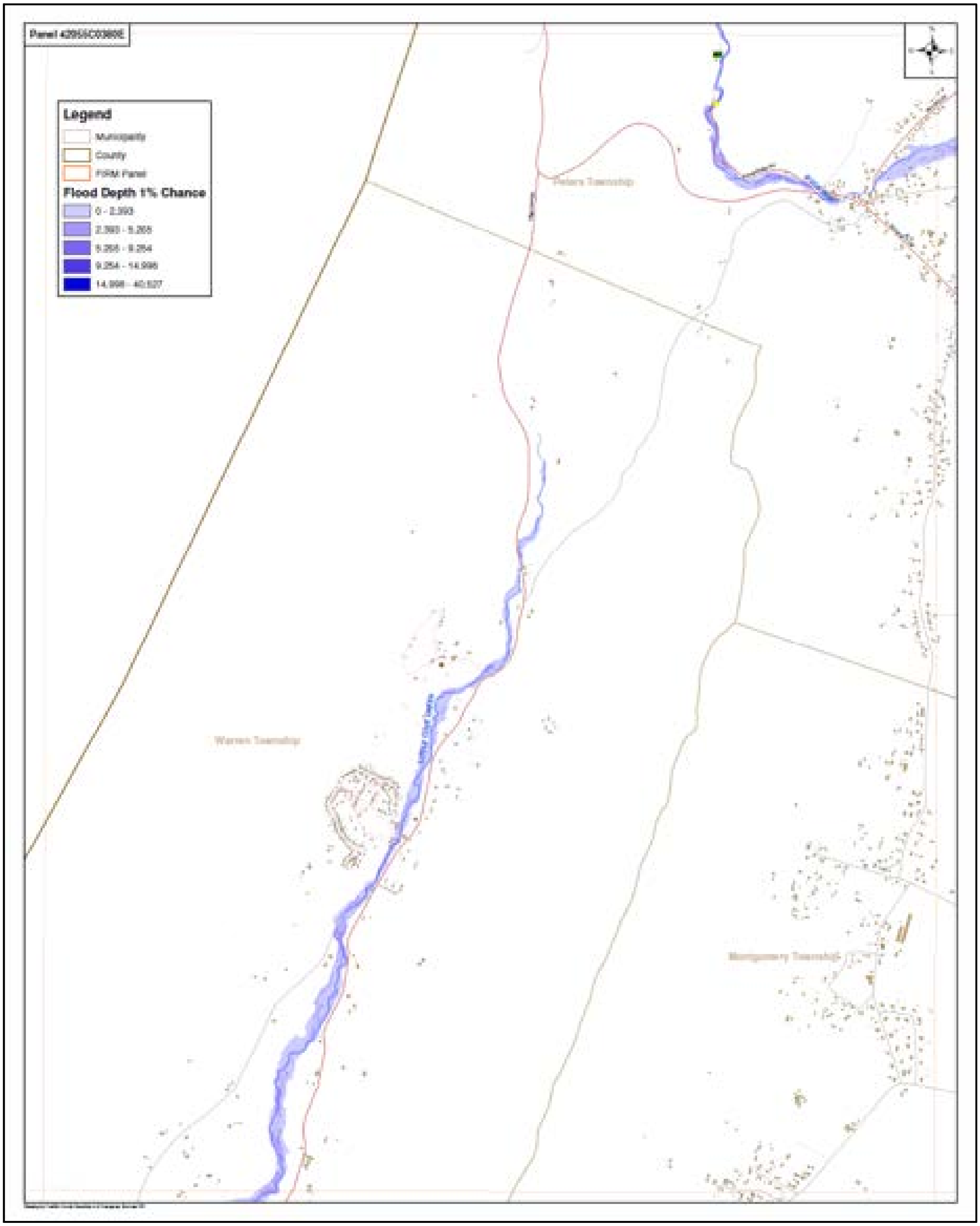


Figure D.47: Quadrant 3, Panel Number 42055C0380E

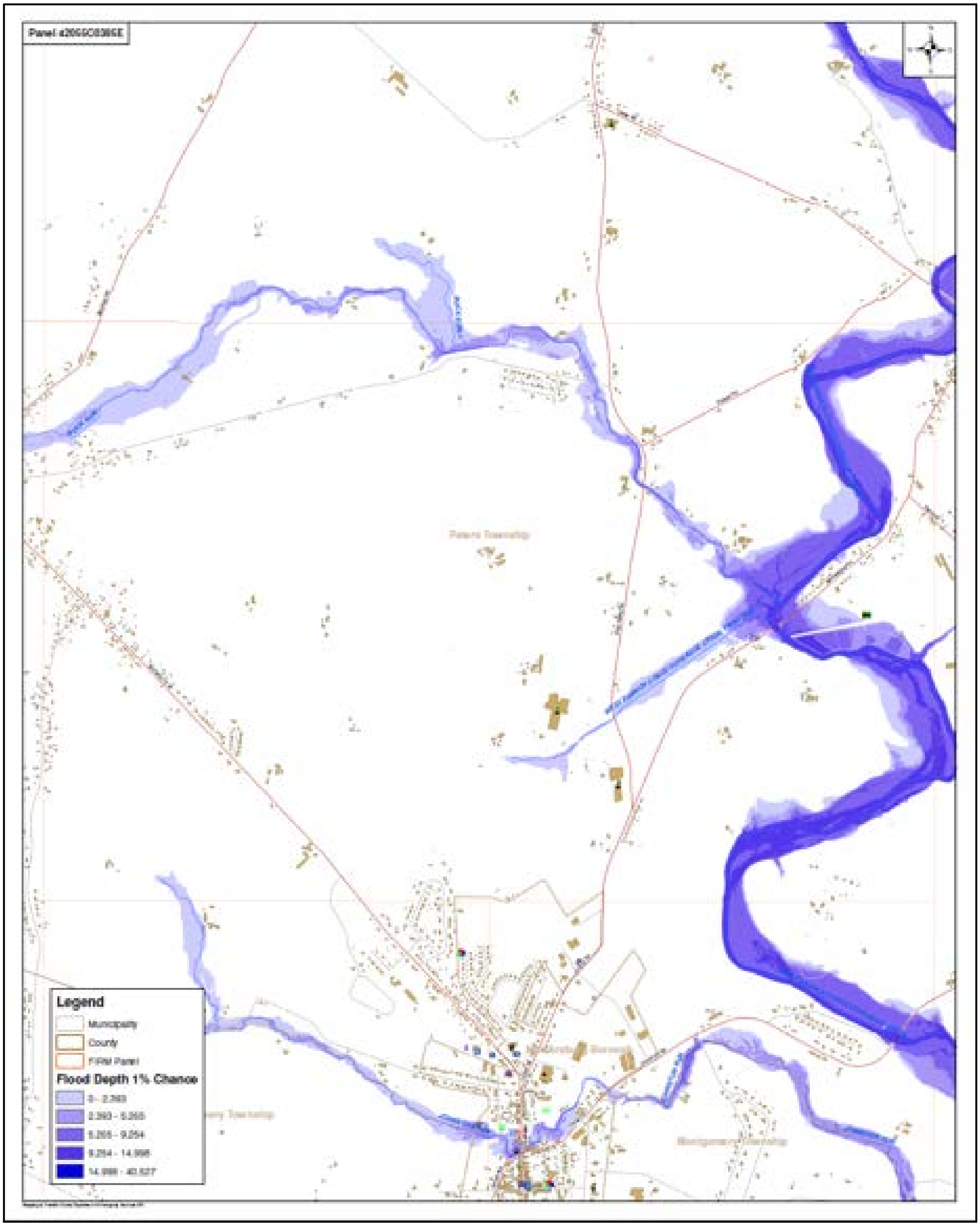
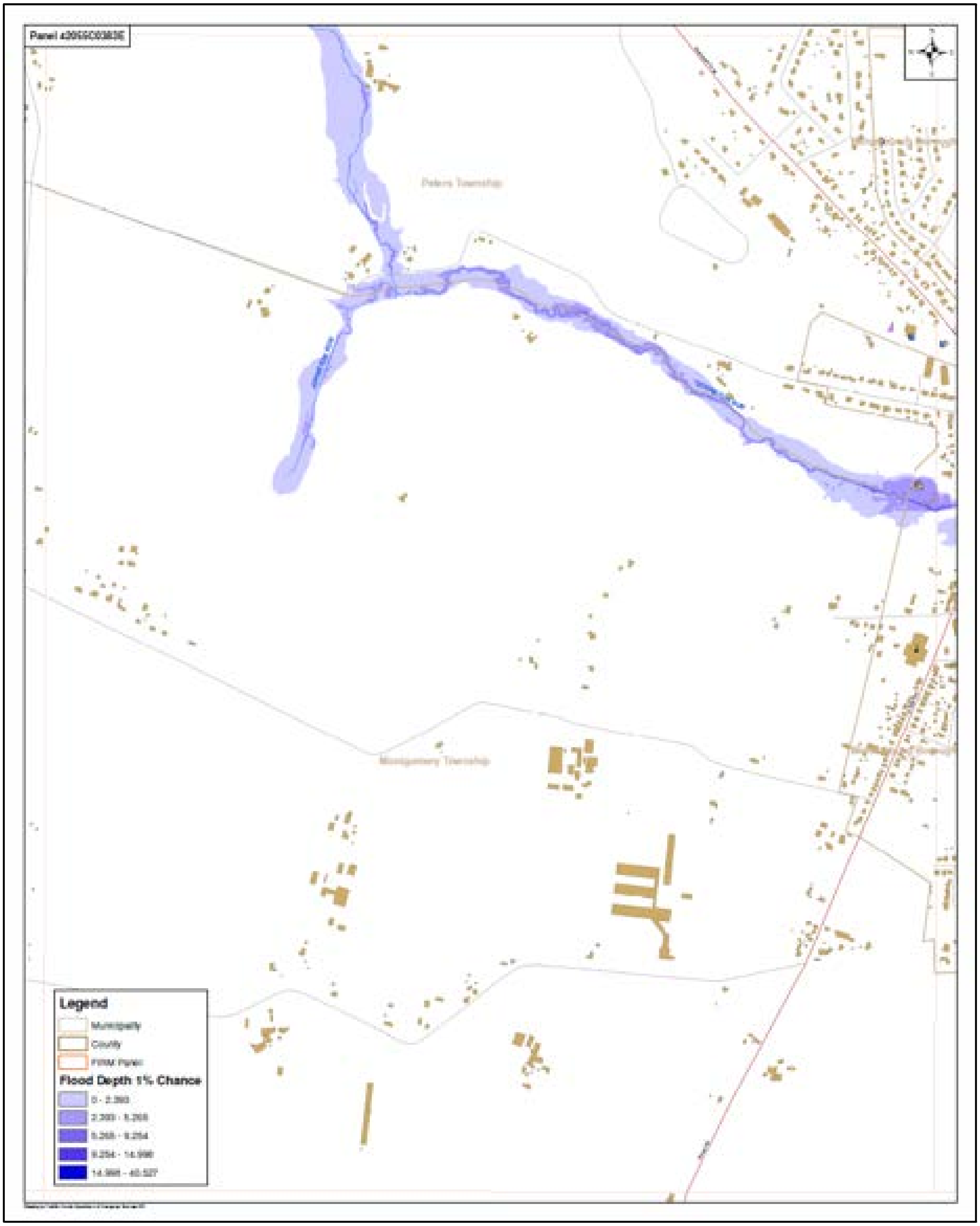


Figure D.48: Quadrant 3, Panel Number 42055C0385E



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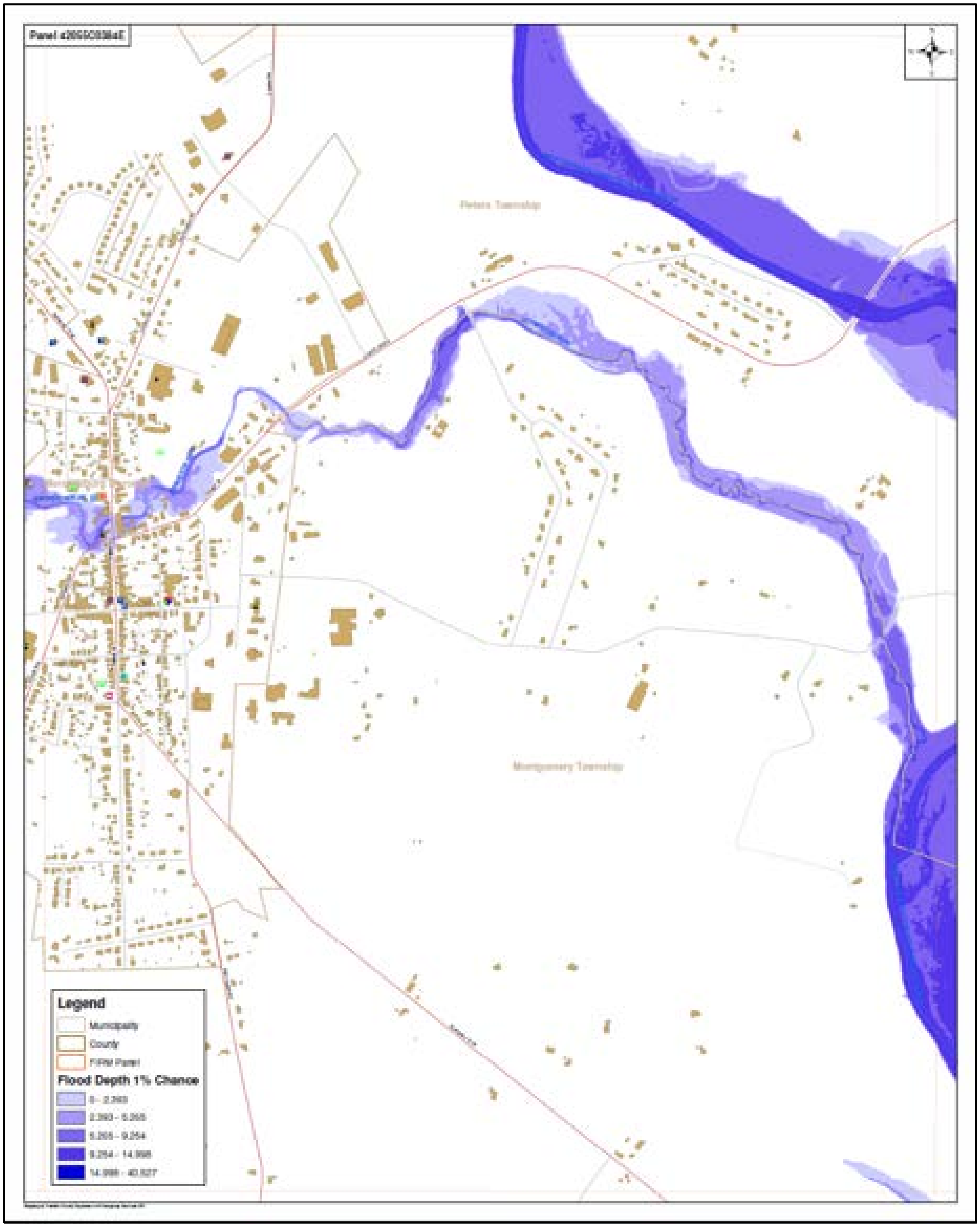


Figure D.50: Quadrant 3, Panel Number 42055C0384E

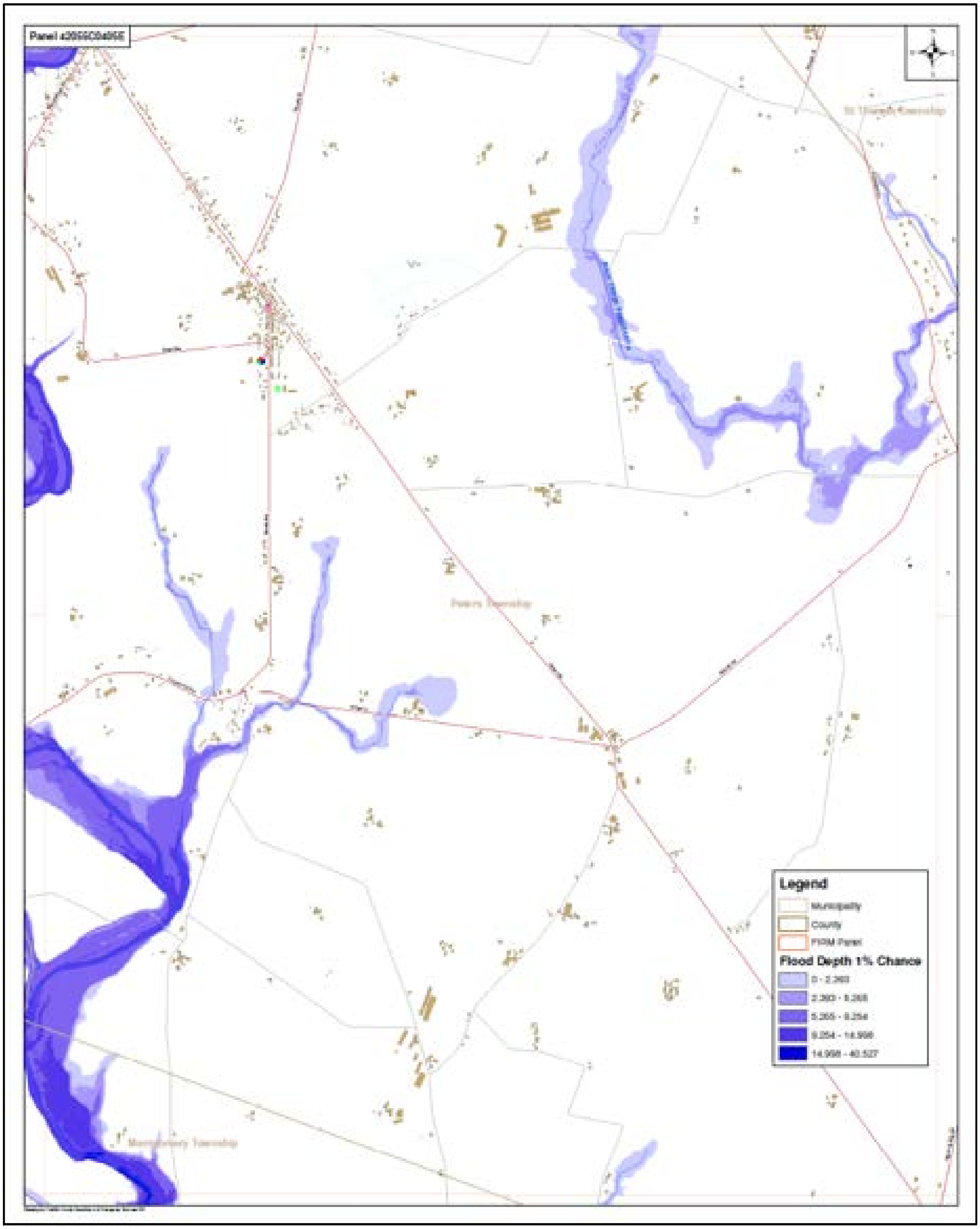
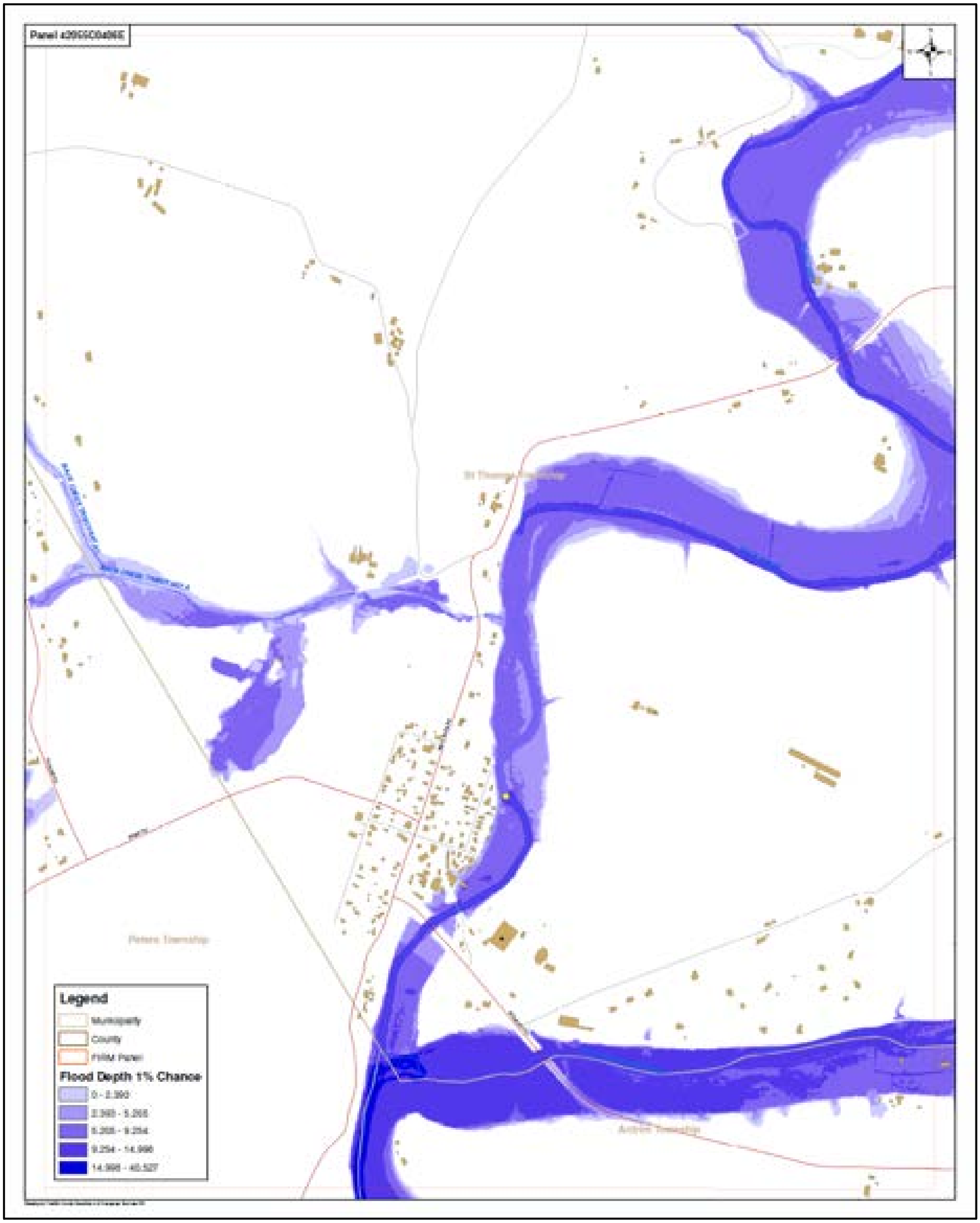


Figure D.51: Quadrant 3, Panel Number 42055C0405E



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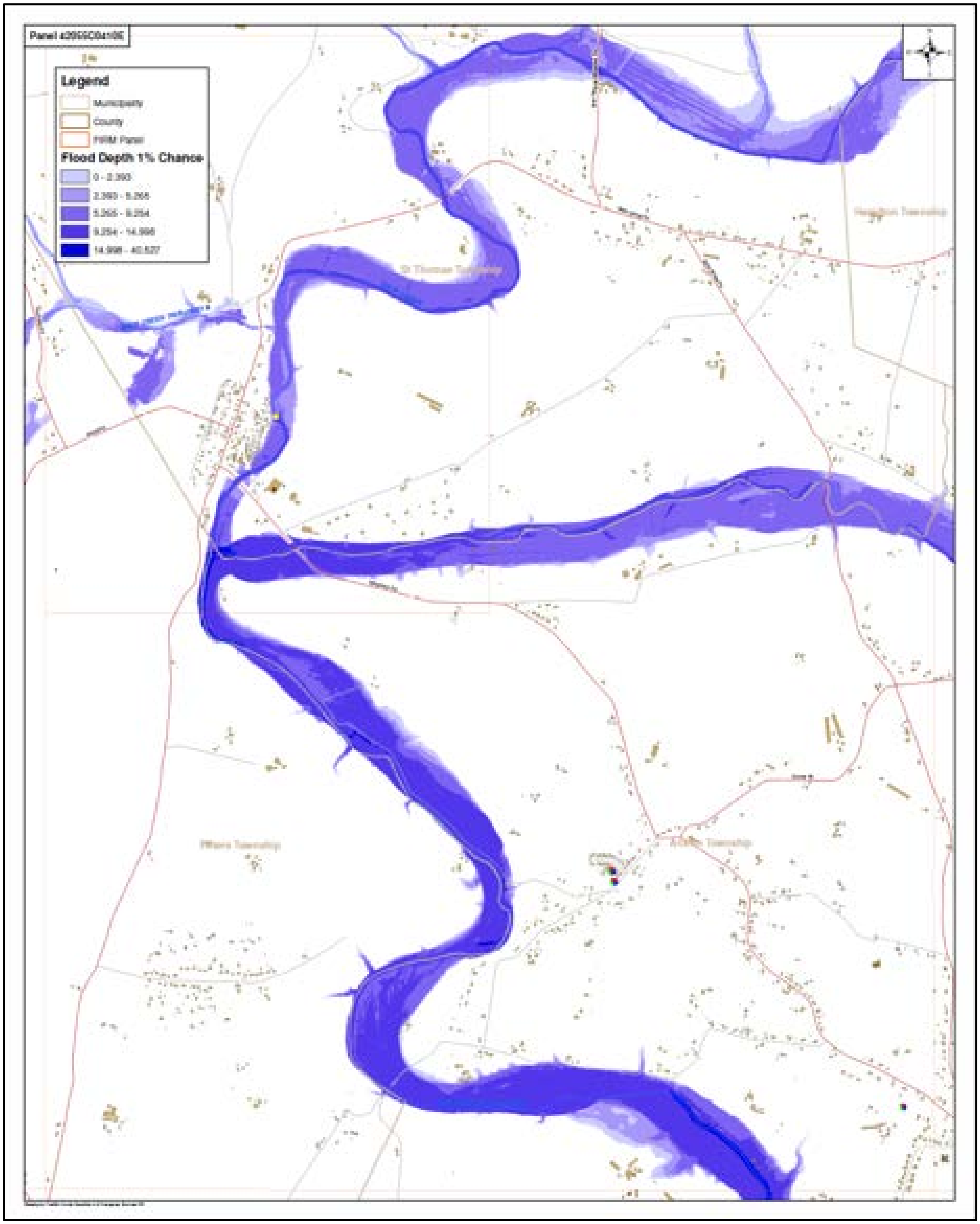
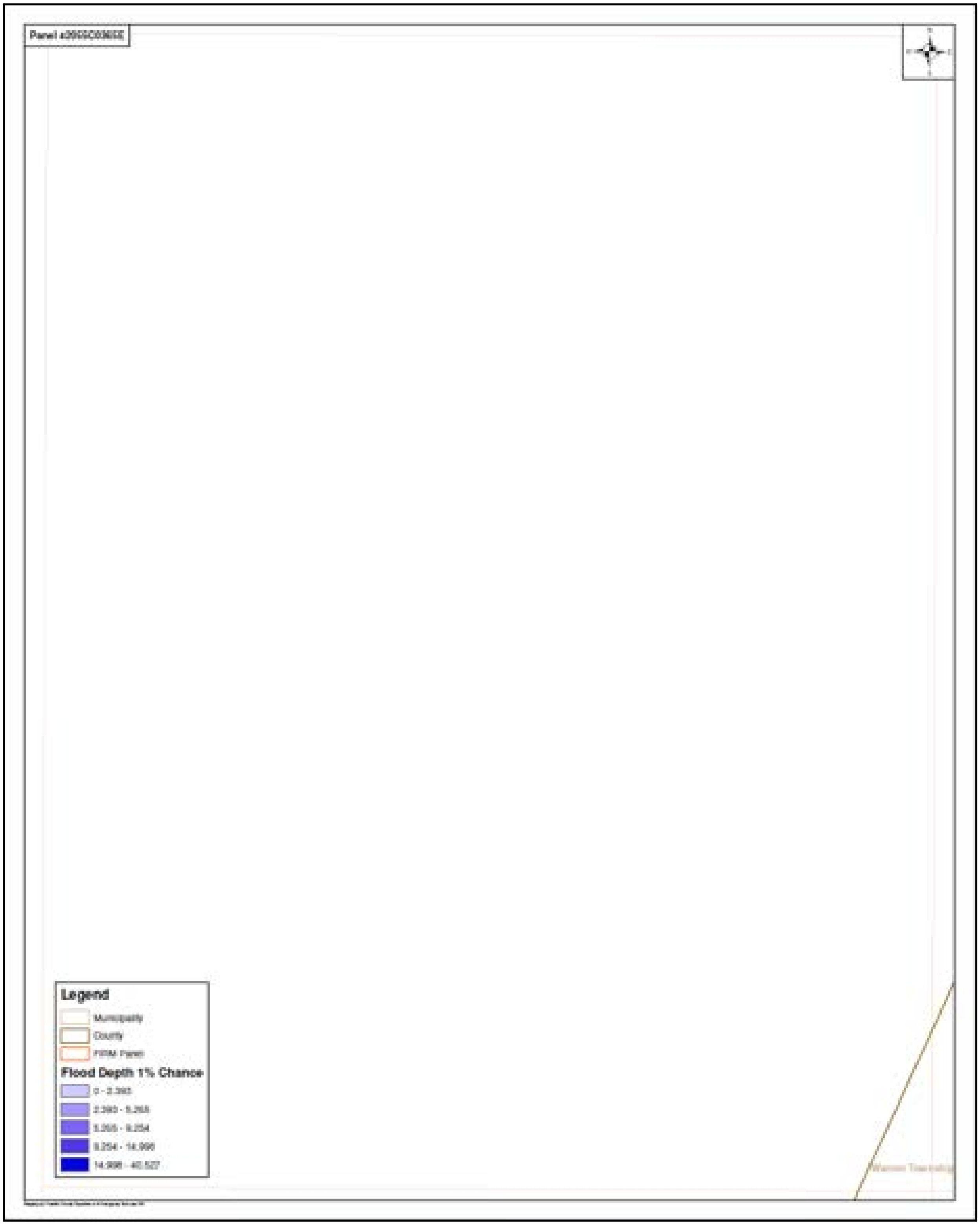


Figure D.53: Quadrant 3, Panel Number 42055C0410E



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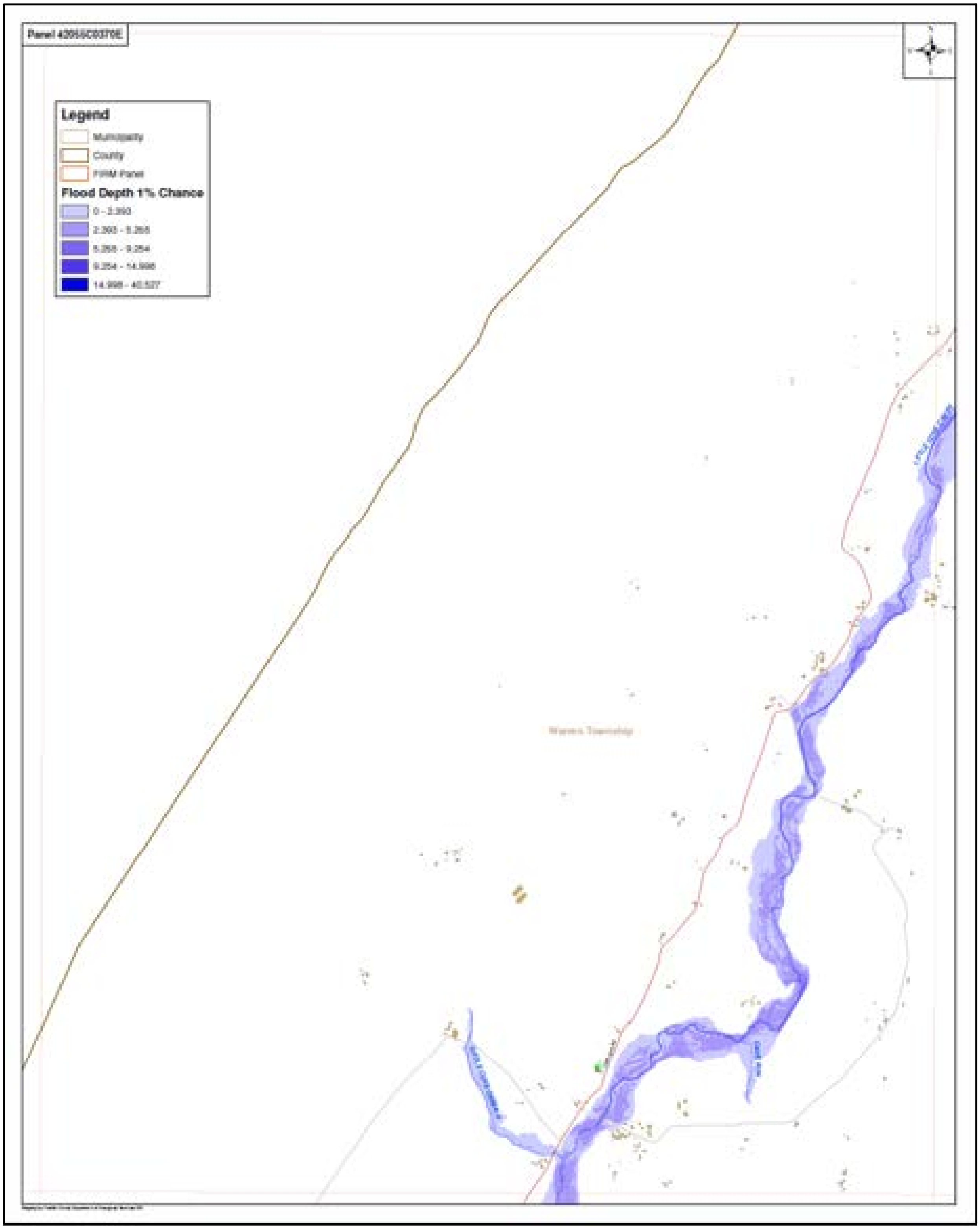

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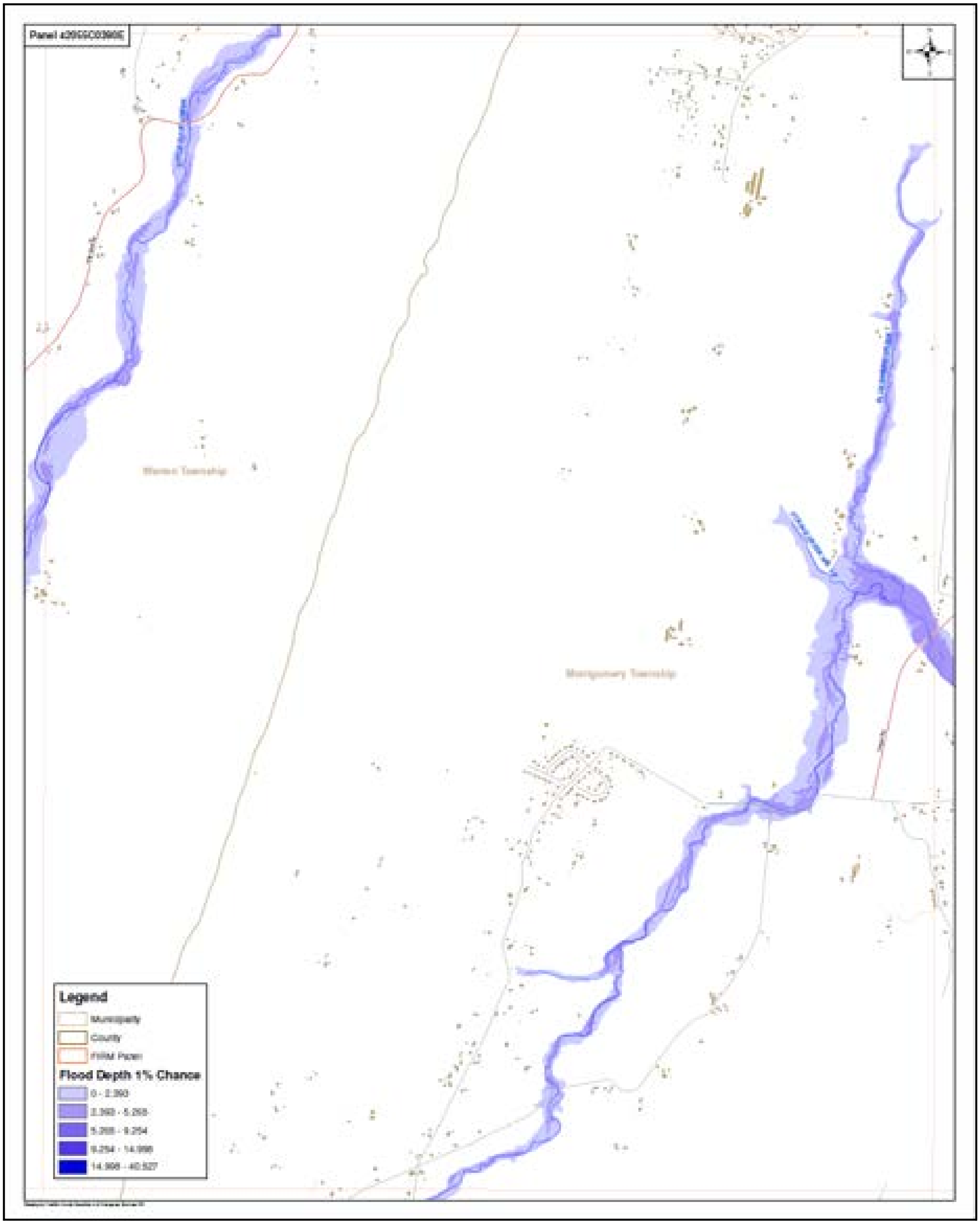
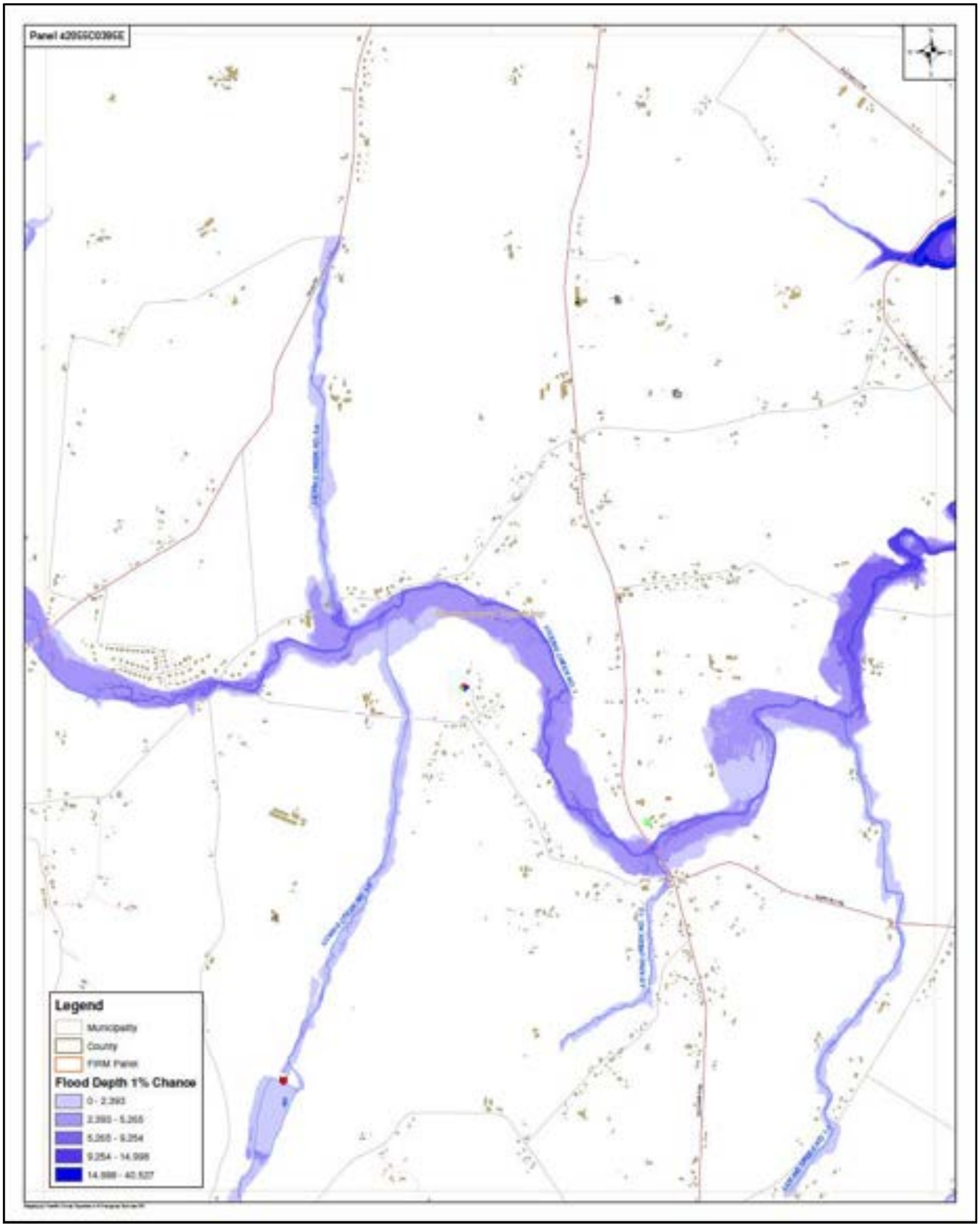


Figure D.56: Quadrant 3, Panel Number 42055C0390E



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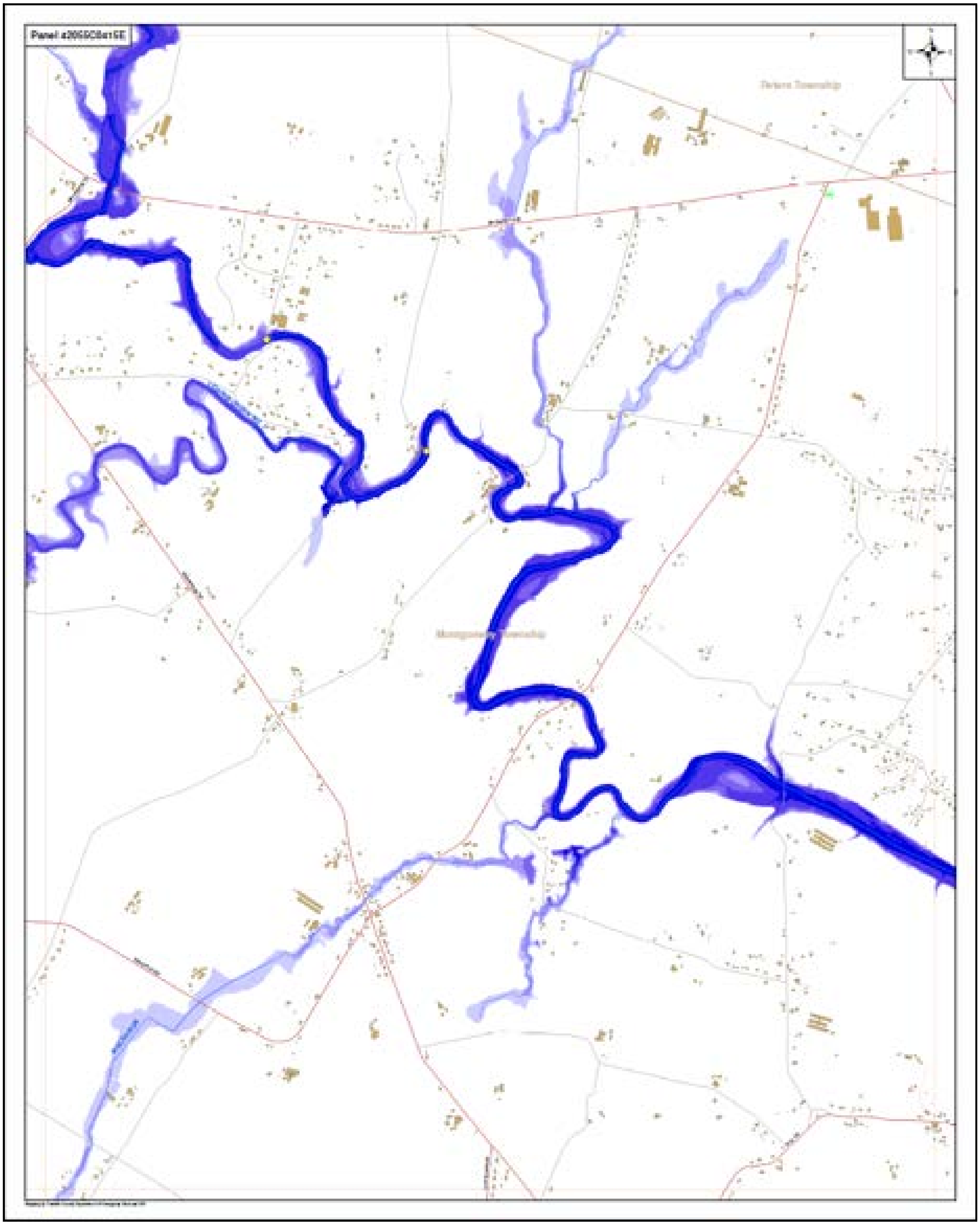


Figure D.58: Quadrant 3, Panel Number 42055C0415E

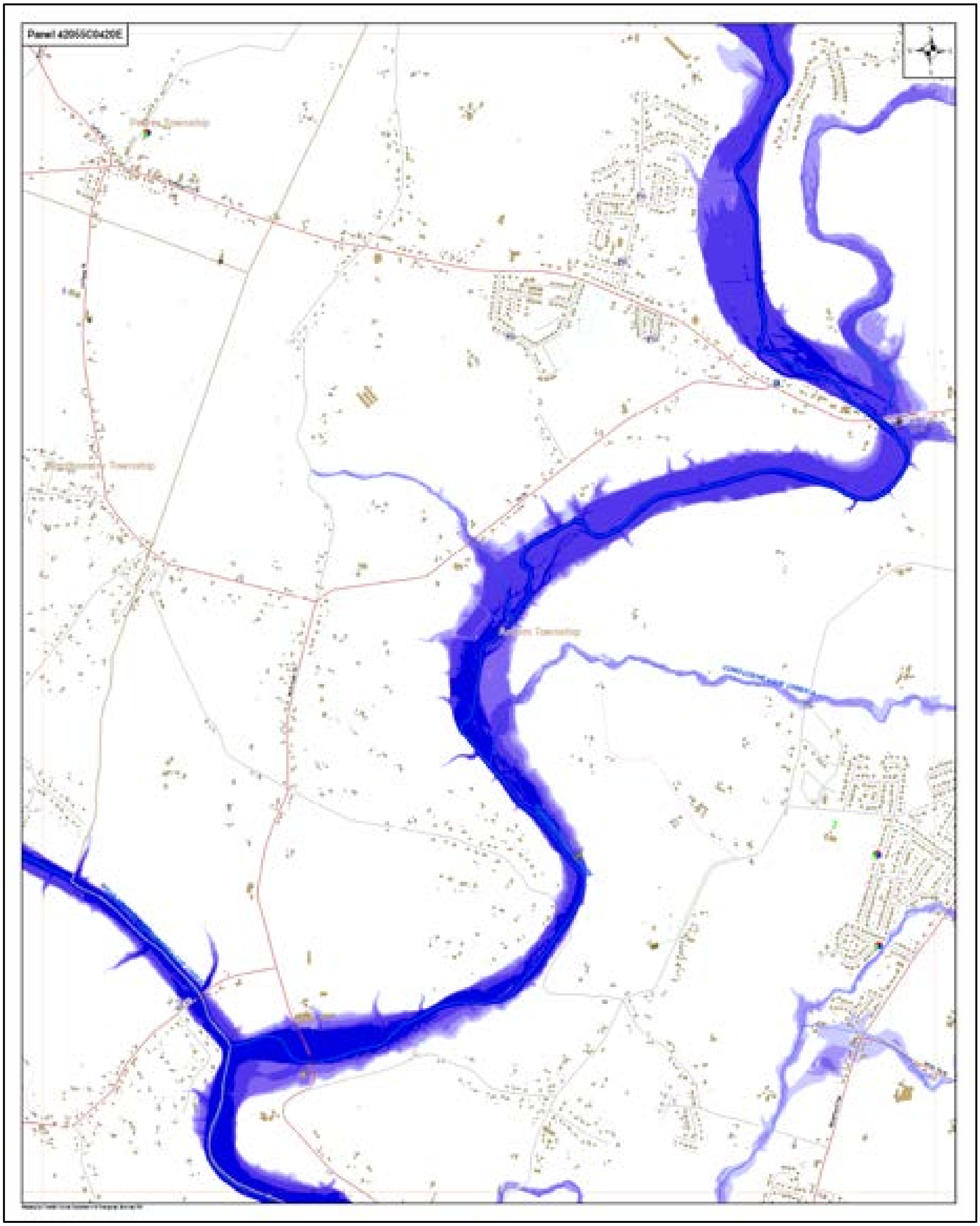


Figure D.59: Quadrant 3, Panel Number 42055C0420E

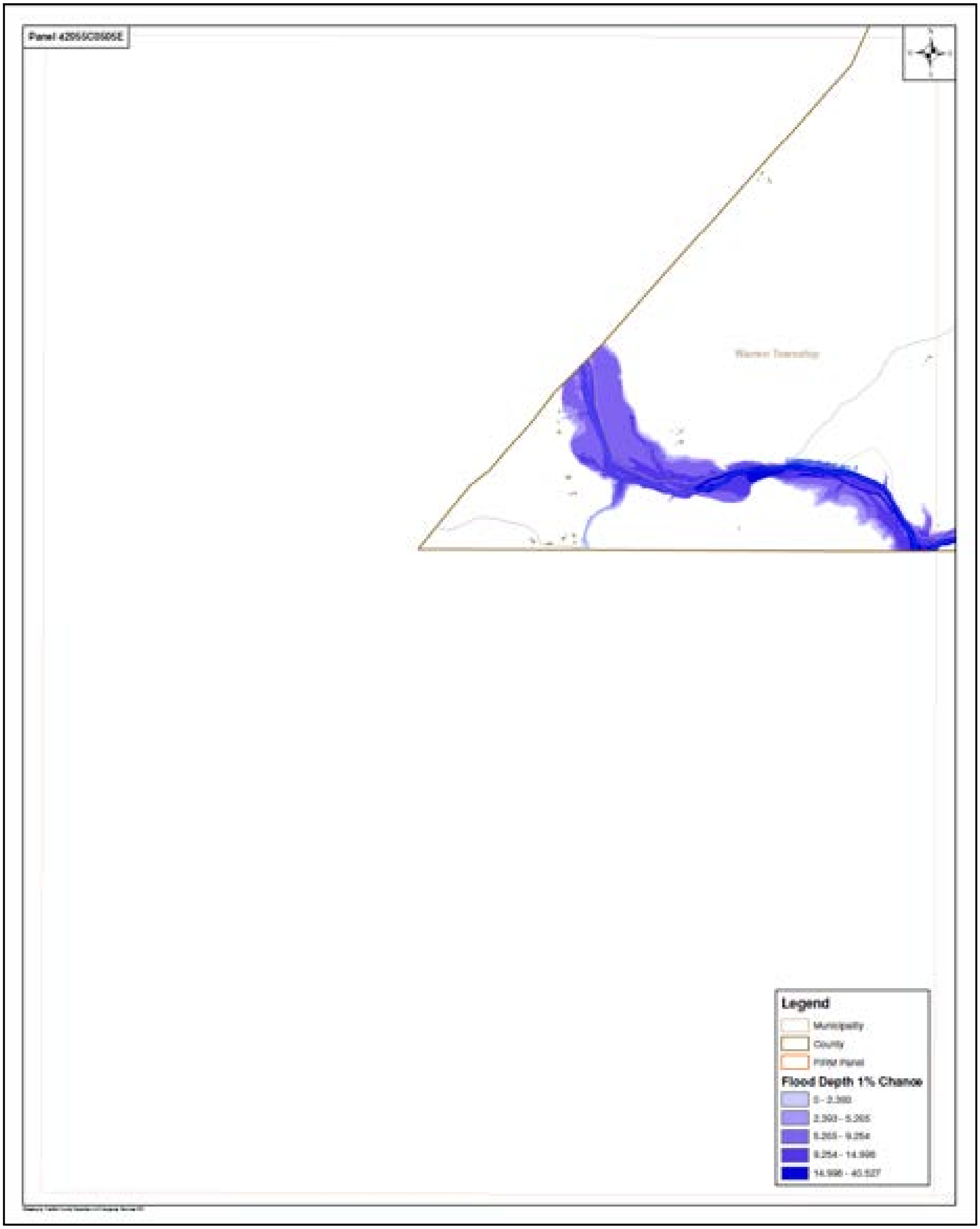


Figure D.60: Quadrant 3, Panel Number 42055C0505E

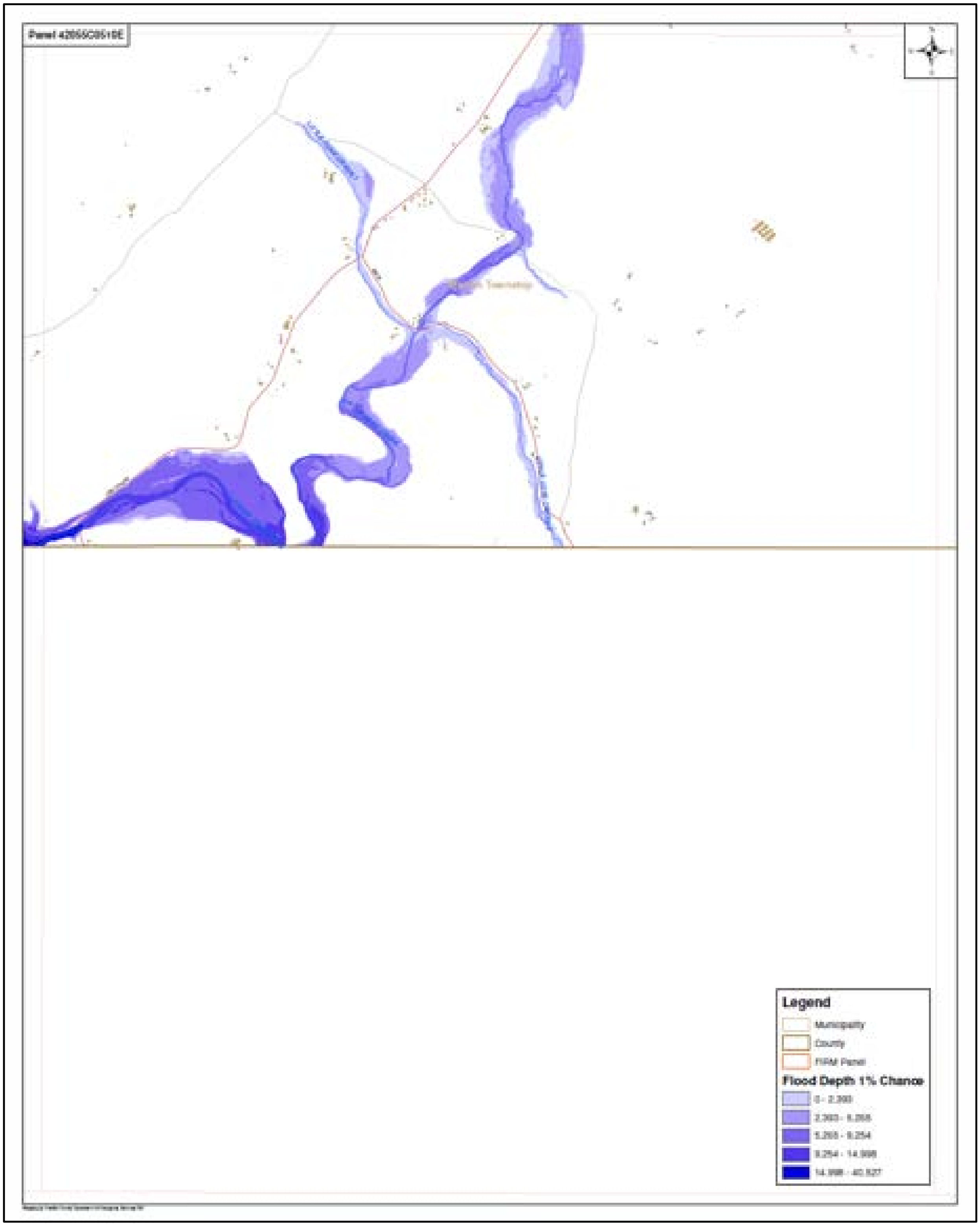


Figure D.61: Quadrant 3, Panel Number 42055C0510E

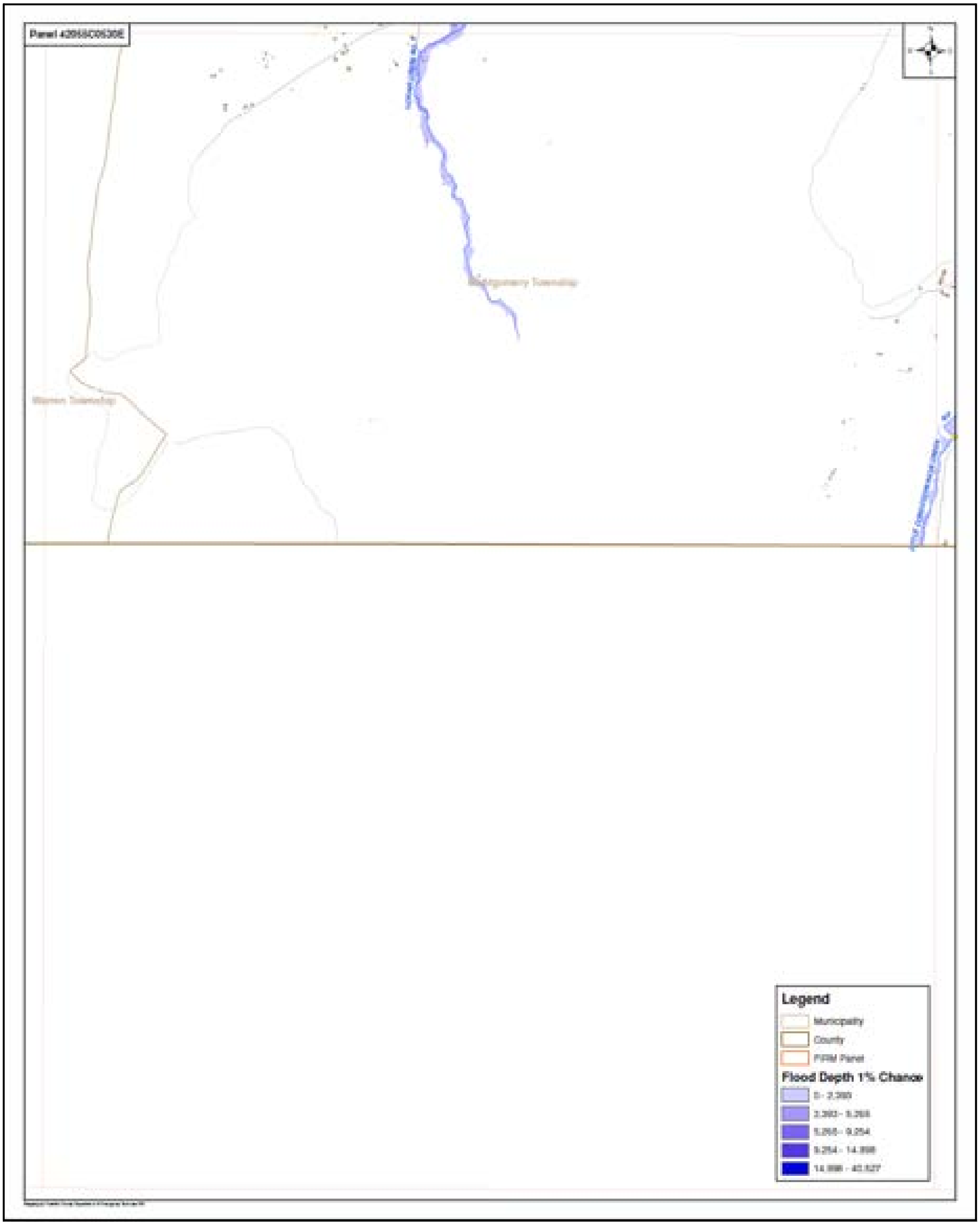


Figure D.62: Quadrant 3, Panel Number 42055C0530E

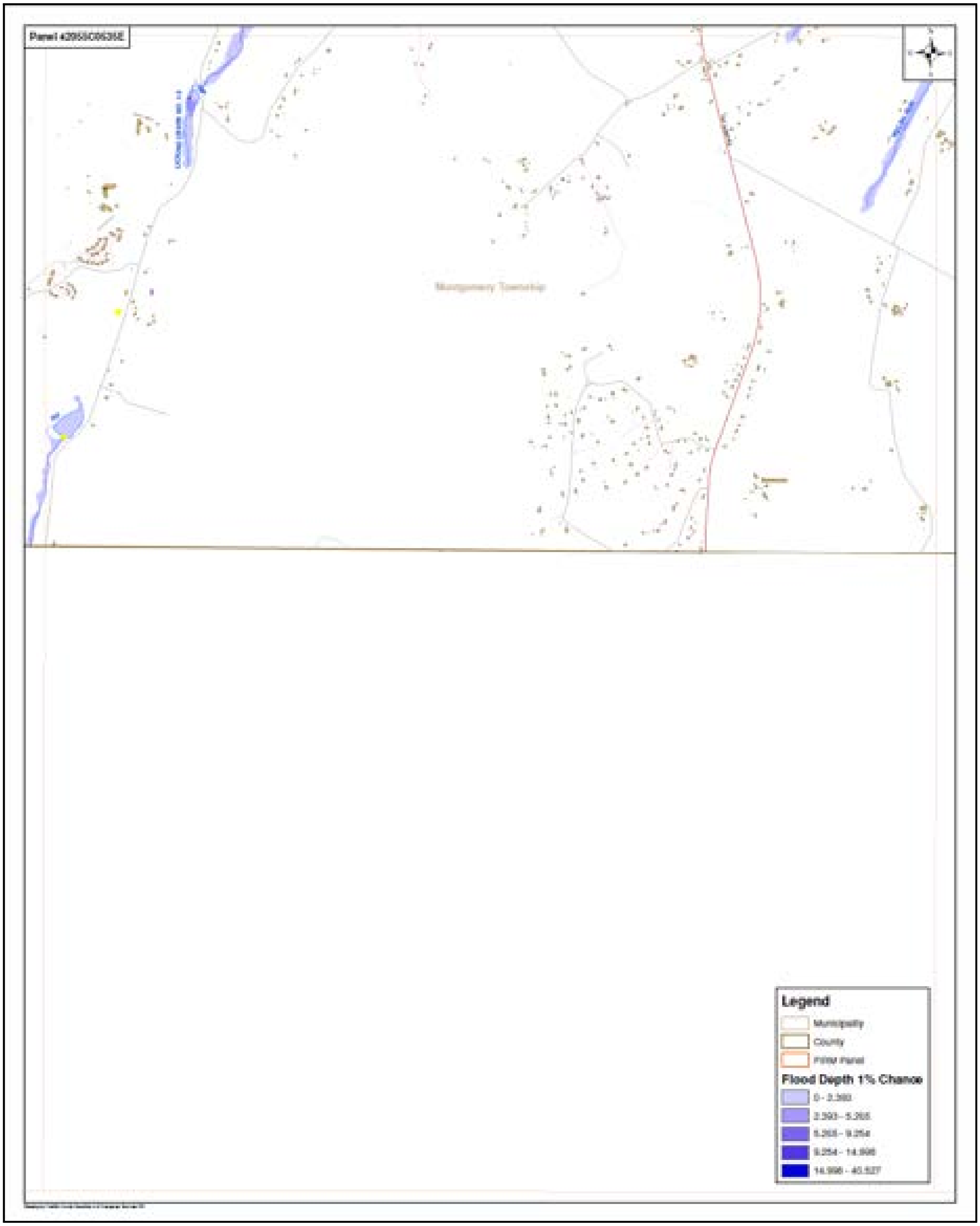
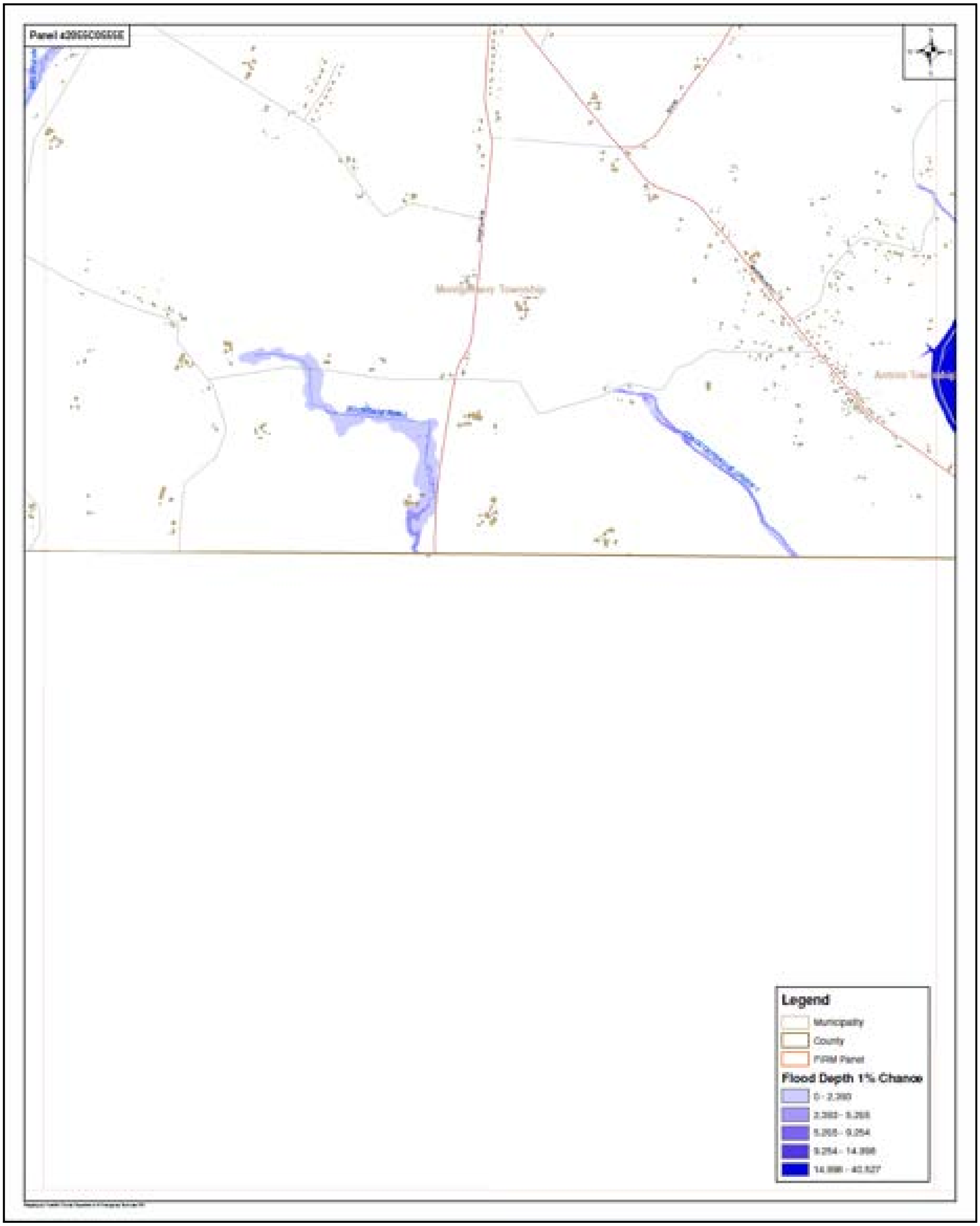


Figure D.63: Quadrant 3, Panel Number 42055C0535E



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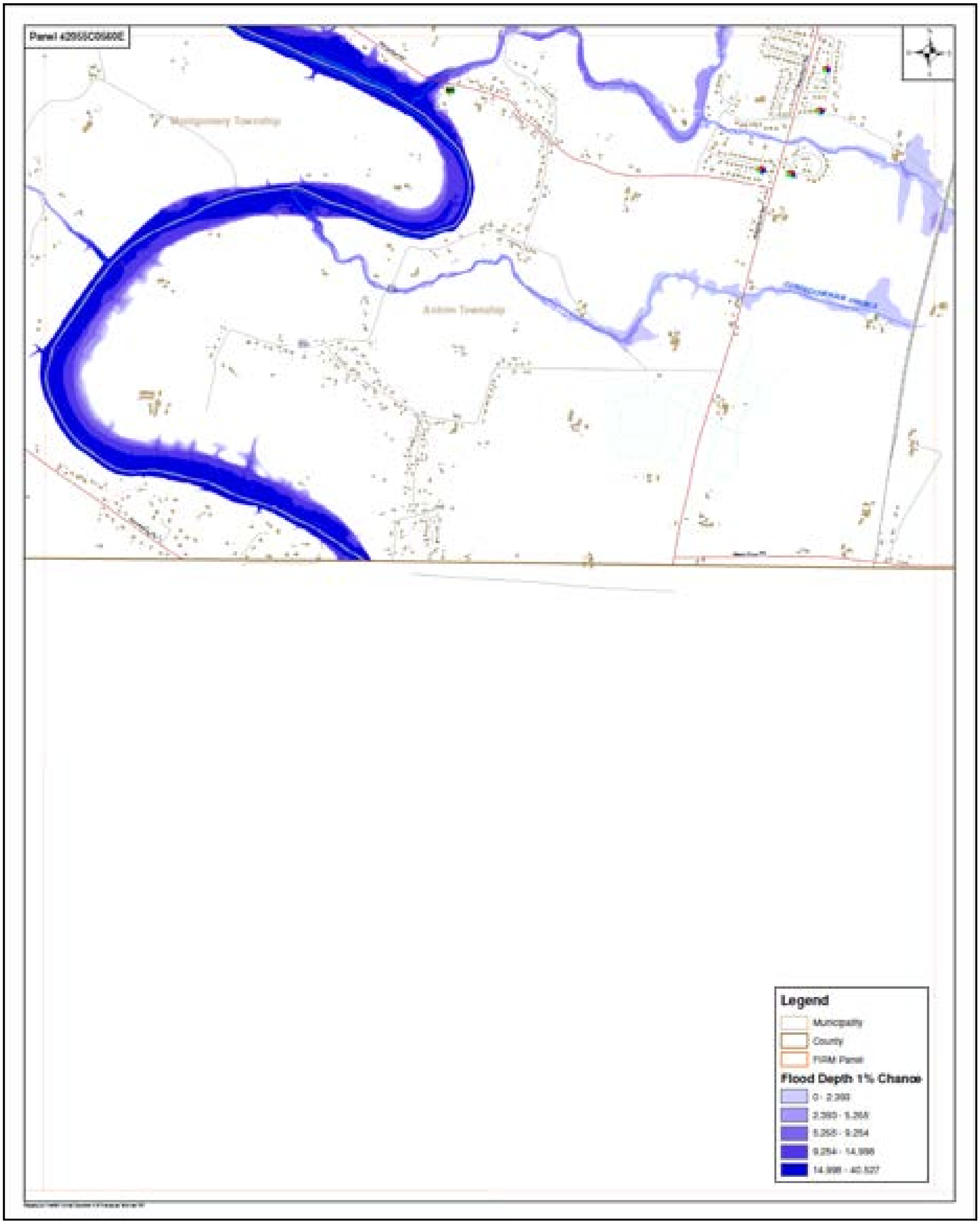


Figure D.65: Quadrant 3, Panel Number 42055C0560E

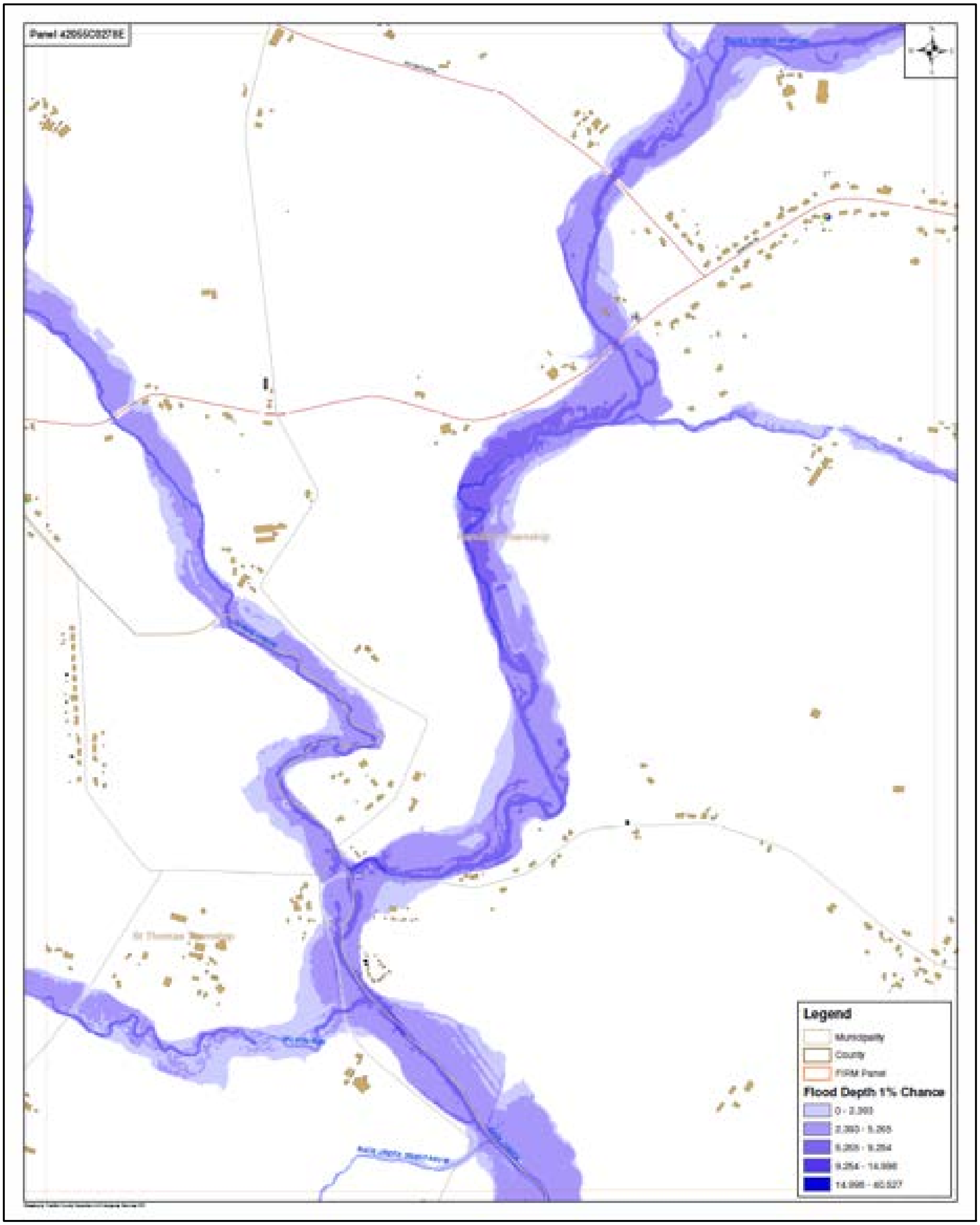


Figure D.66: Quadrant 4, Panel Number 42055C0278E

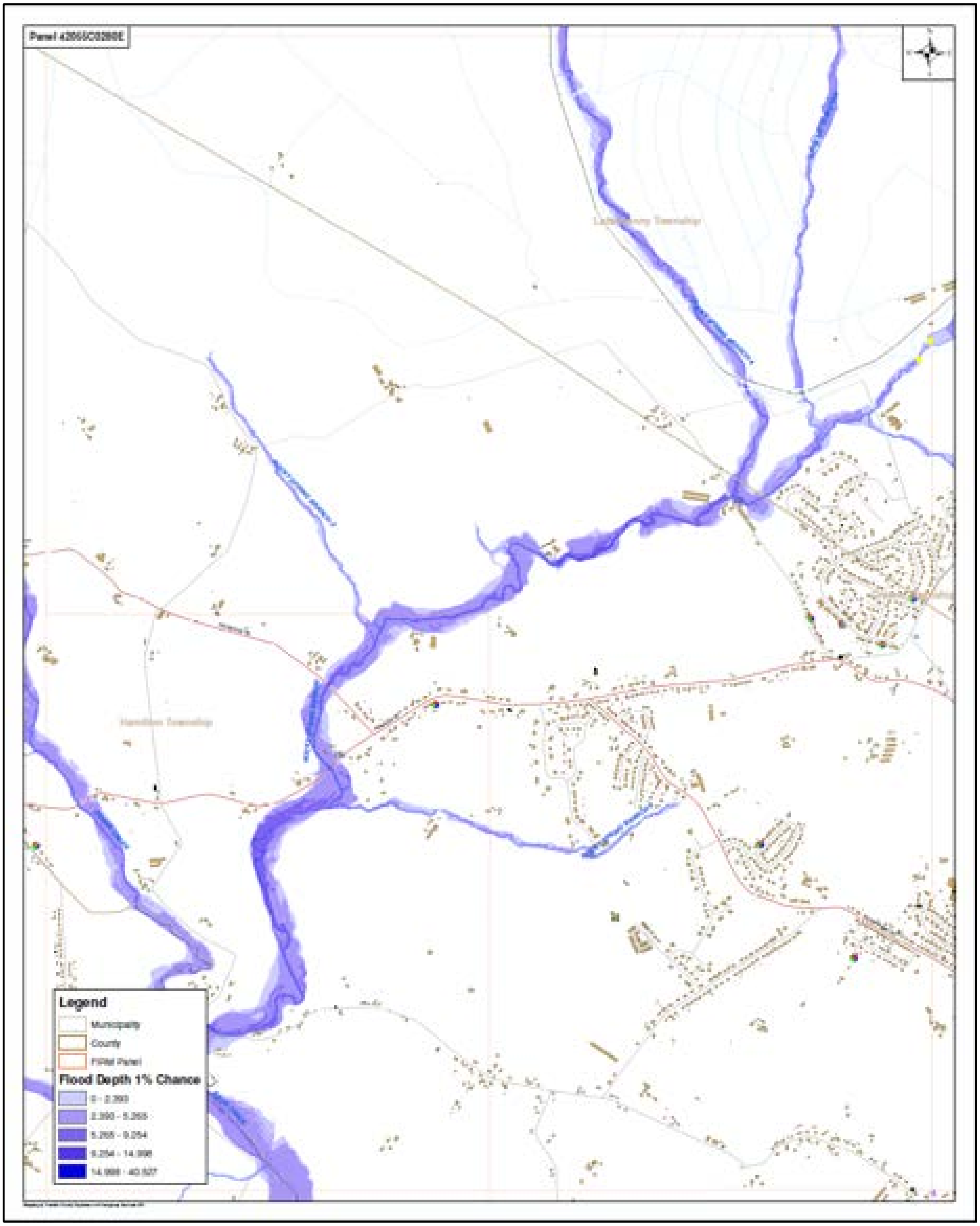


Figure D.67: Quadrant 4, Panel Number 42055C0280E

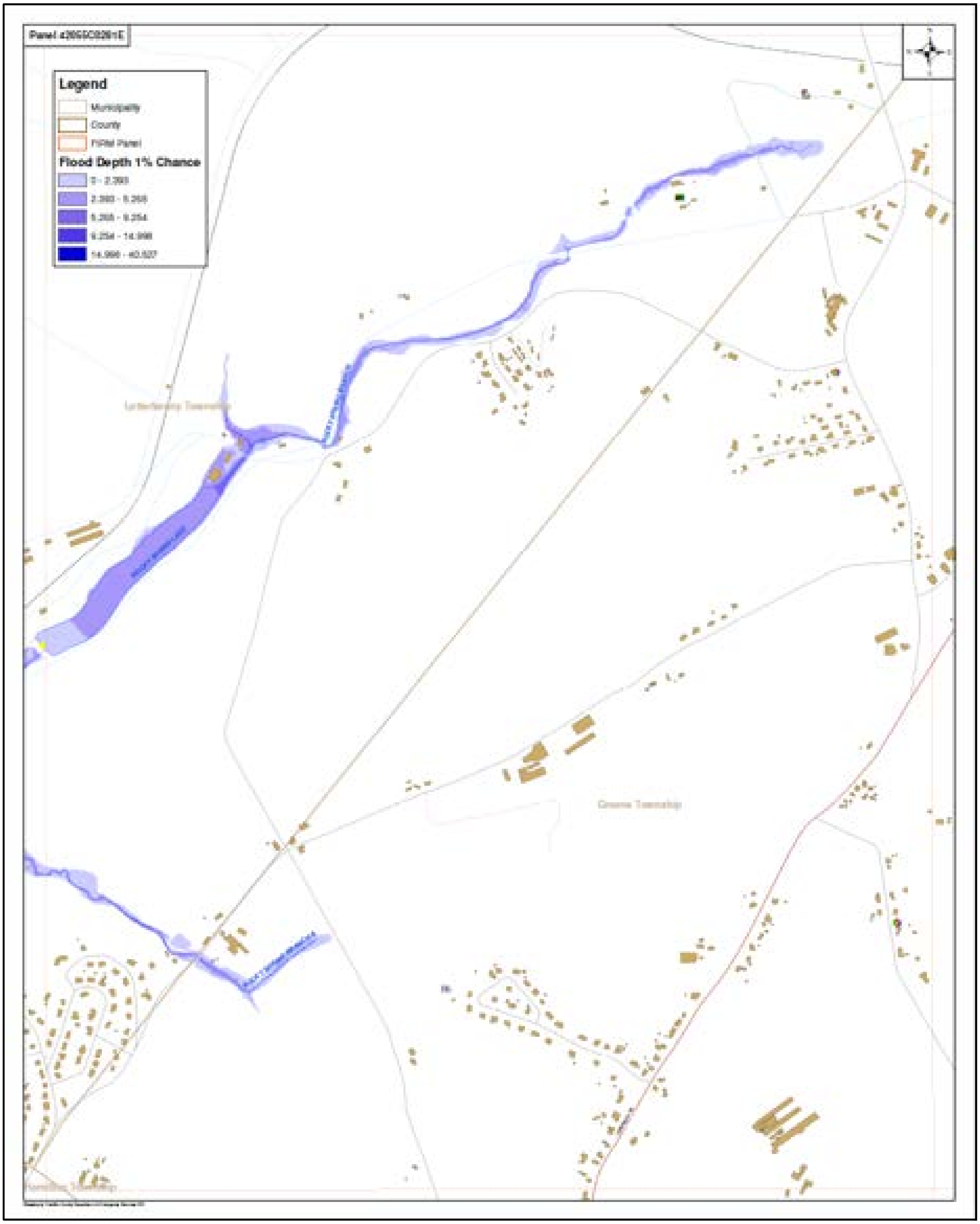


Figure D.68: Quadrant 4, Panel Number 42055C0281E

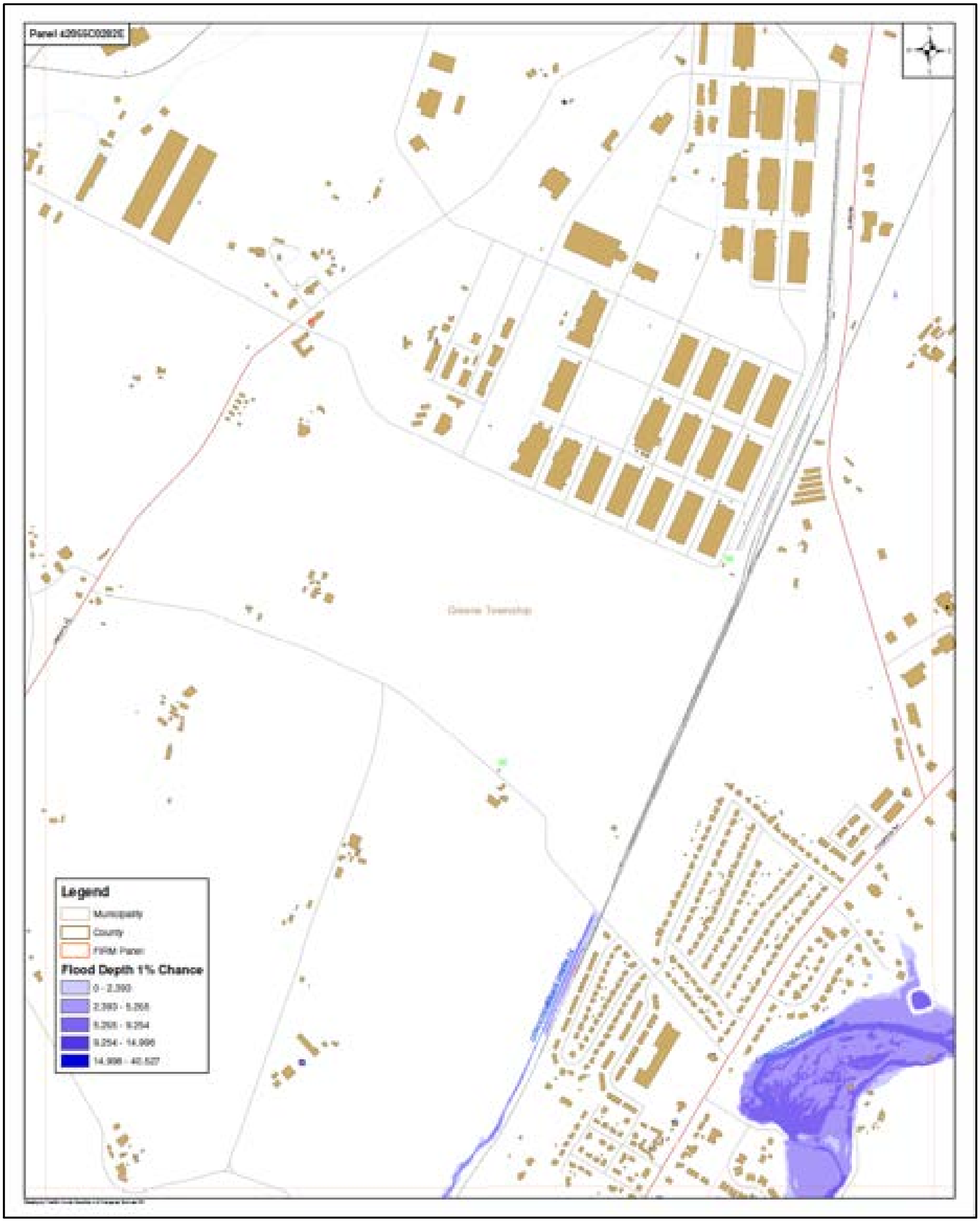


Figure D.69: Quadrant 4, Panel Number 42055C0282E

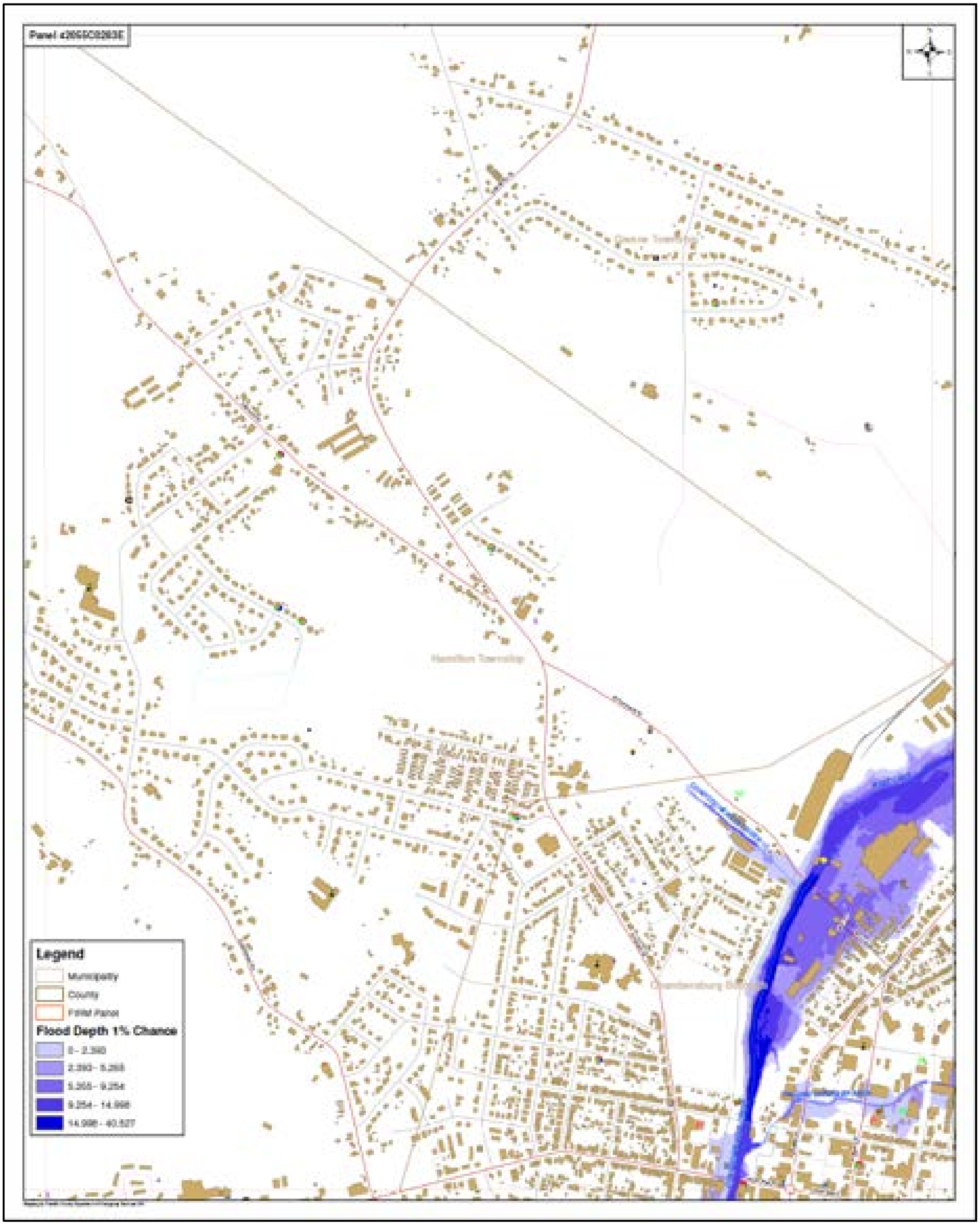
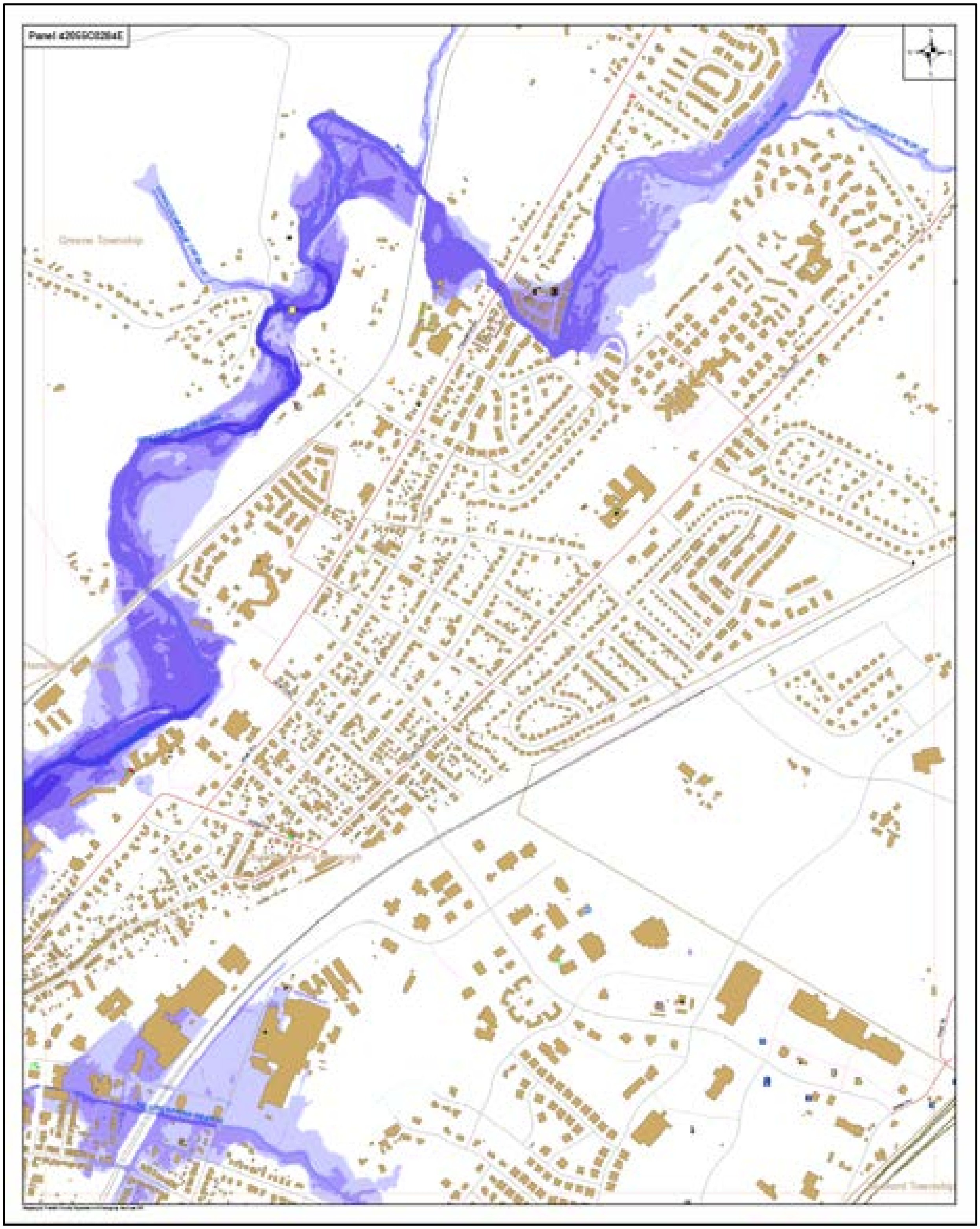


Figure D.70: Quadrant 4, Panel Number 42055C0283E



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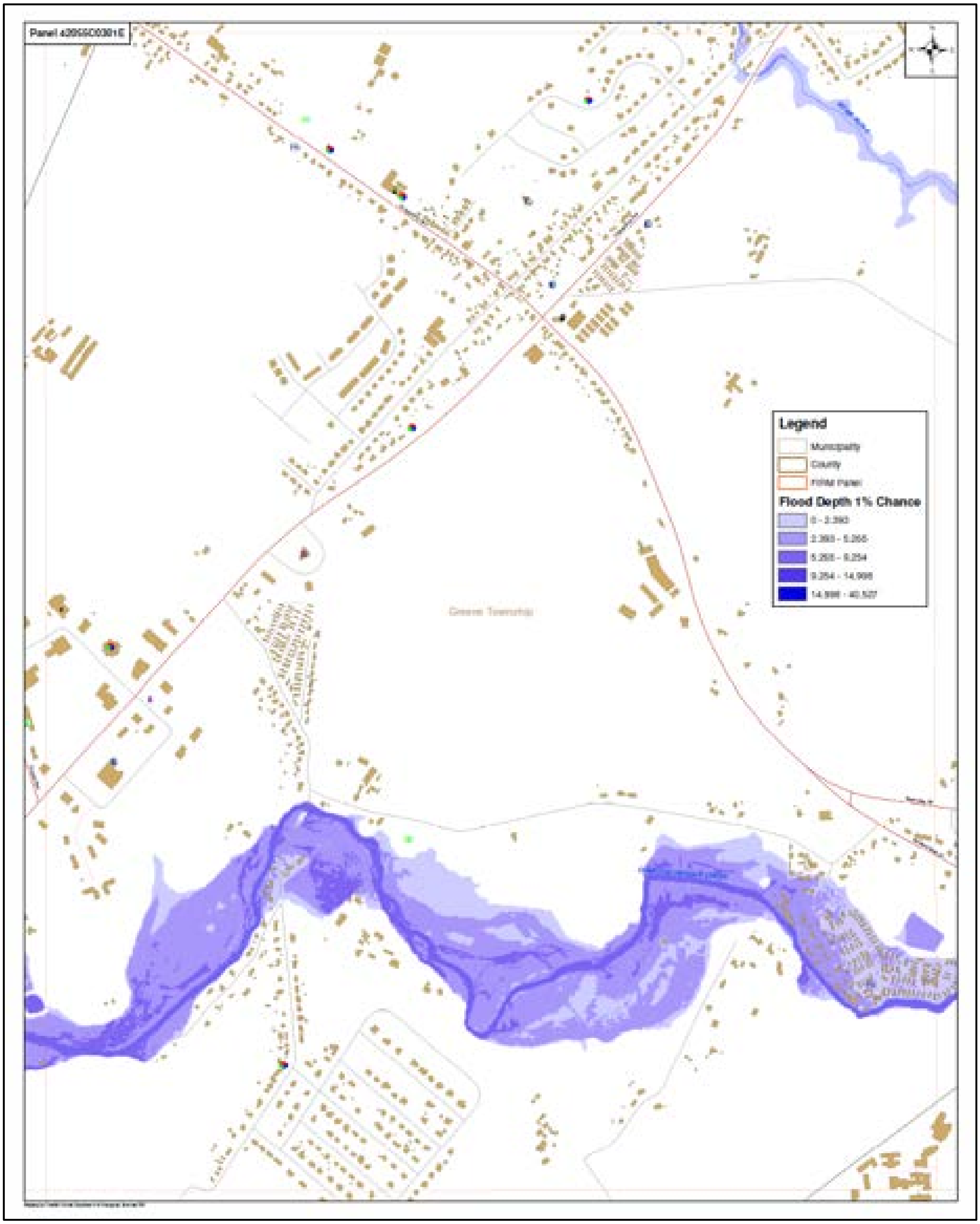


Figure D.72: Quadrant 4, Panel Number 42055C0301E

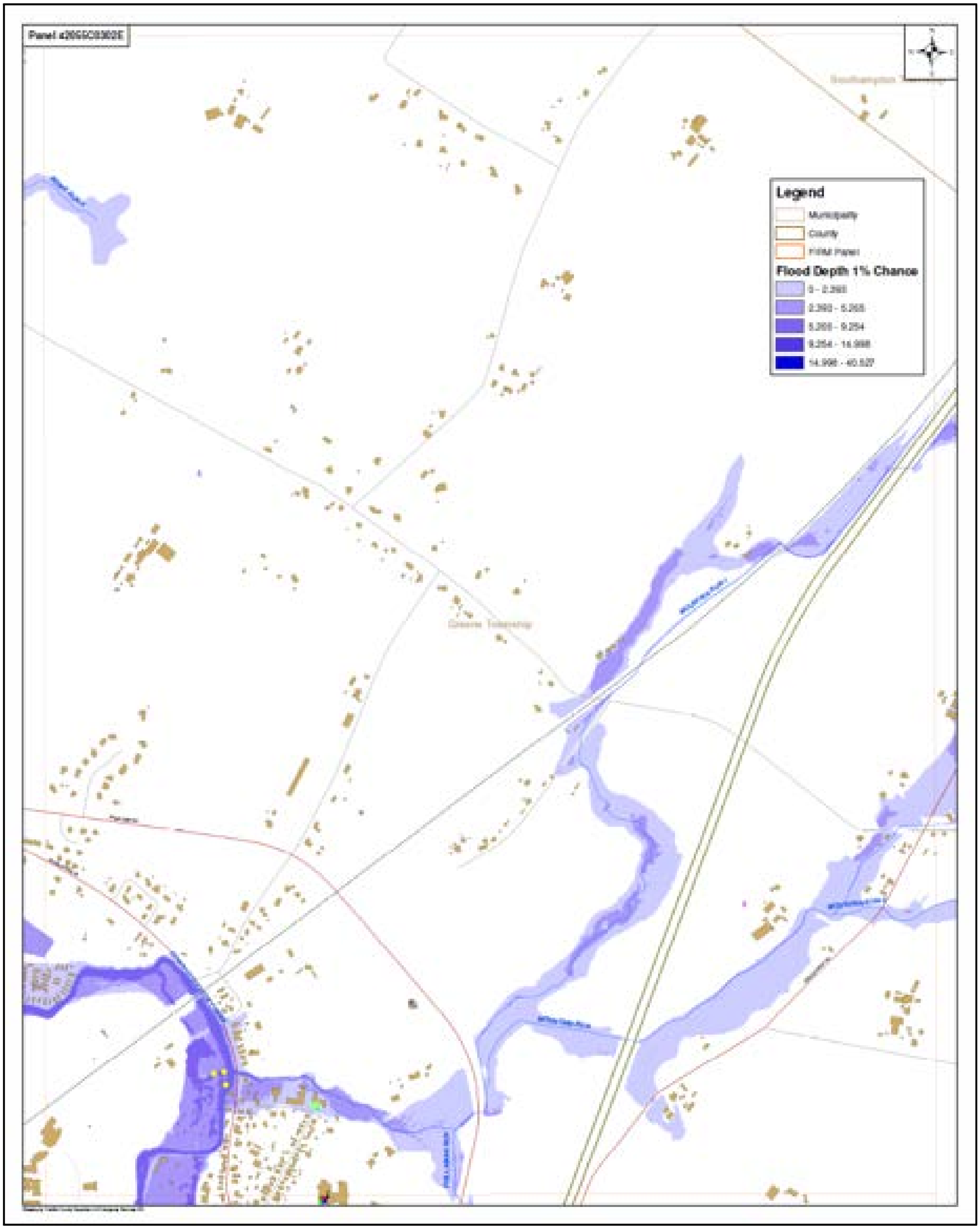
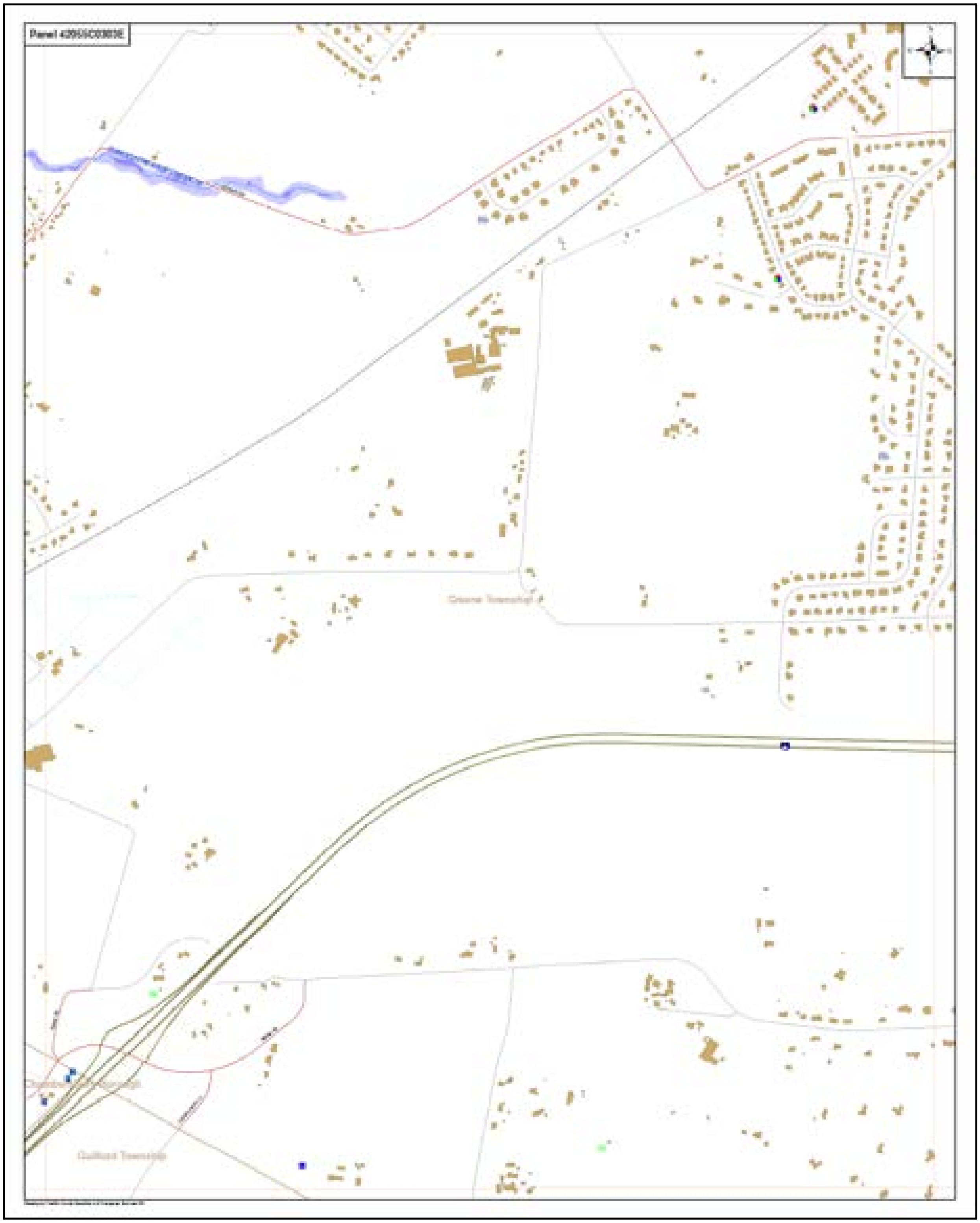


Figure D.73: Quadrant 4, Panel Number 42055C0302E



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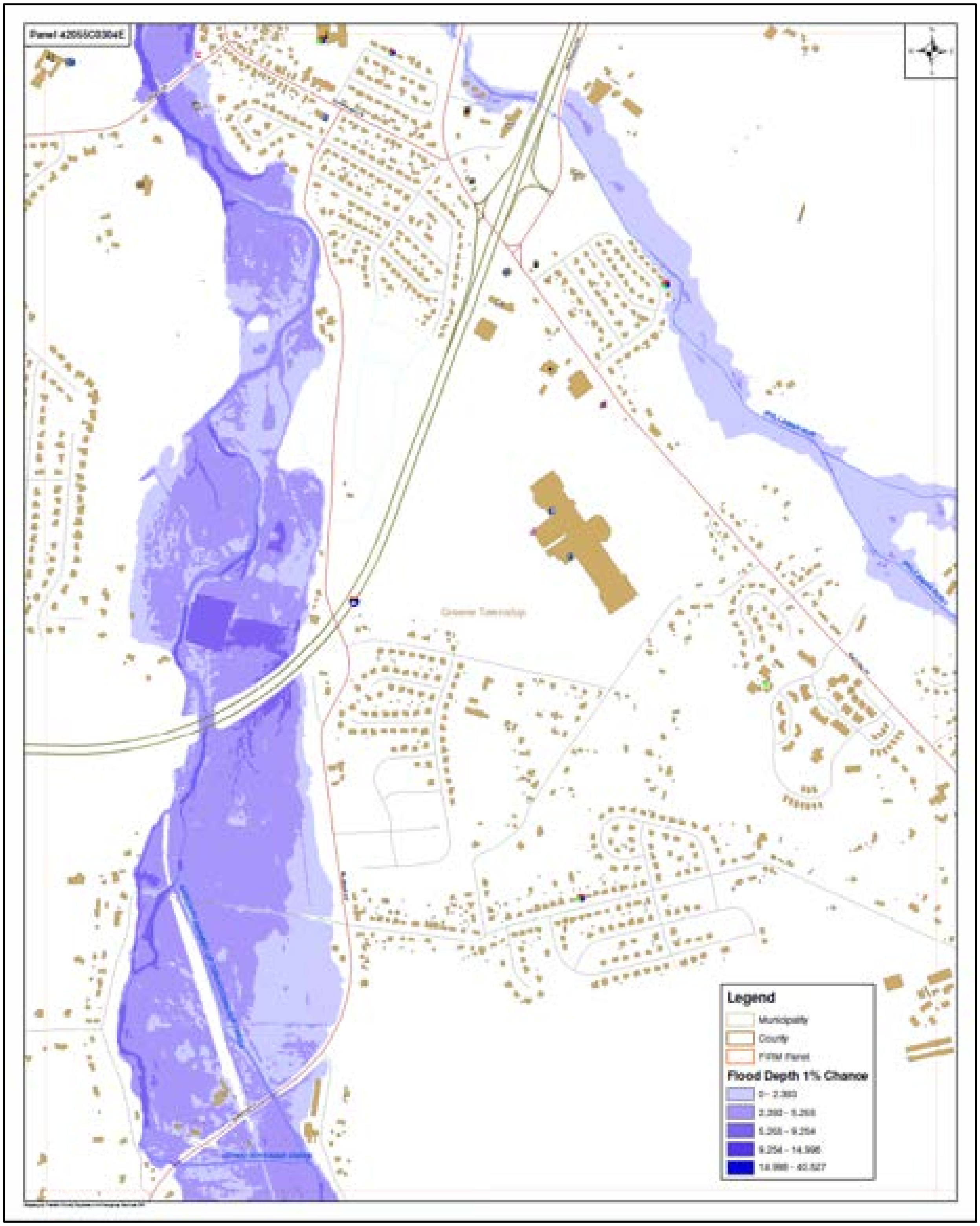

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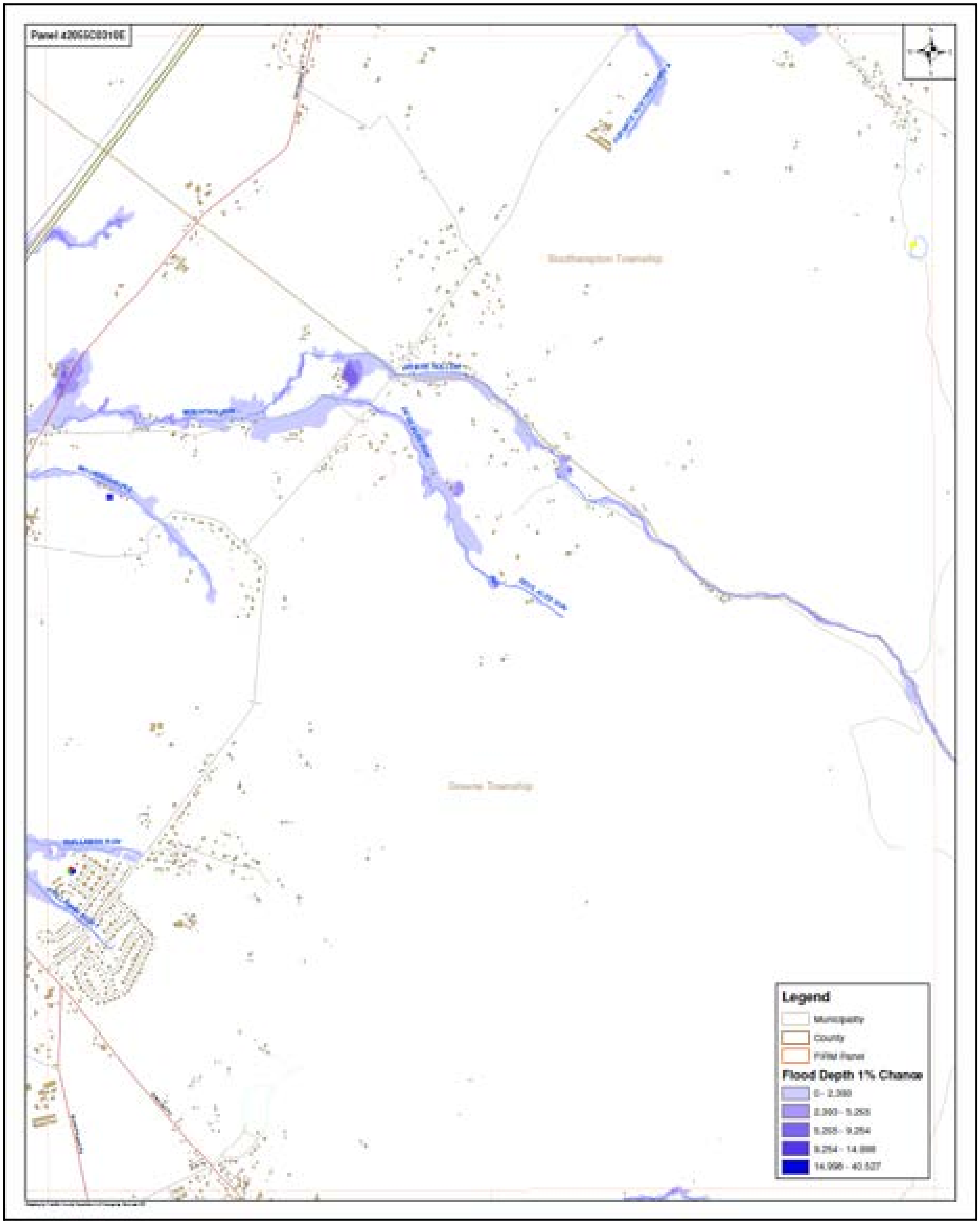


Figure D.76: Quadrant 4, Panel Number 42055C0310E

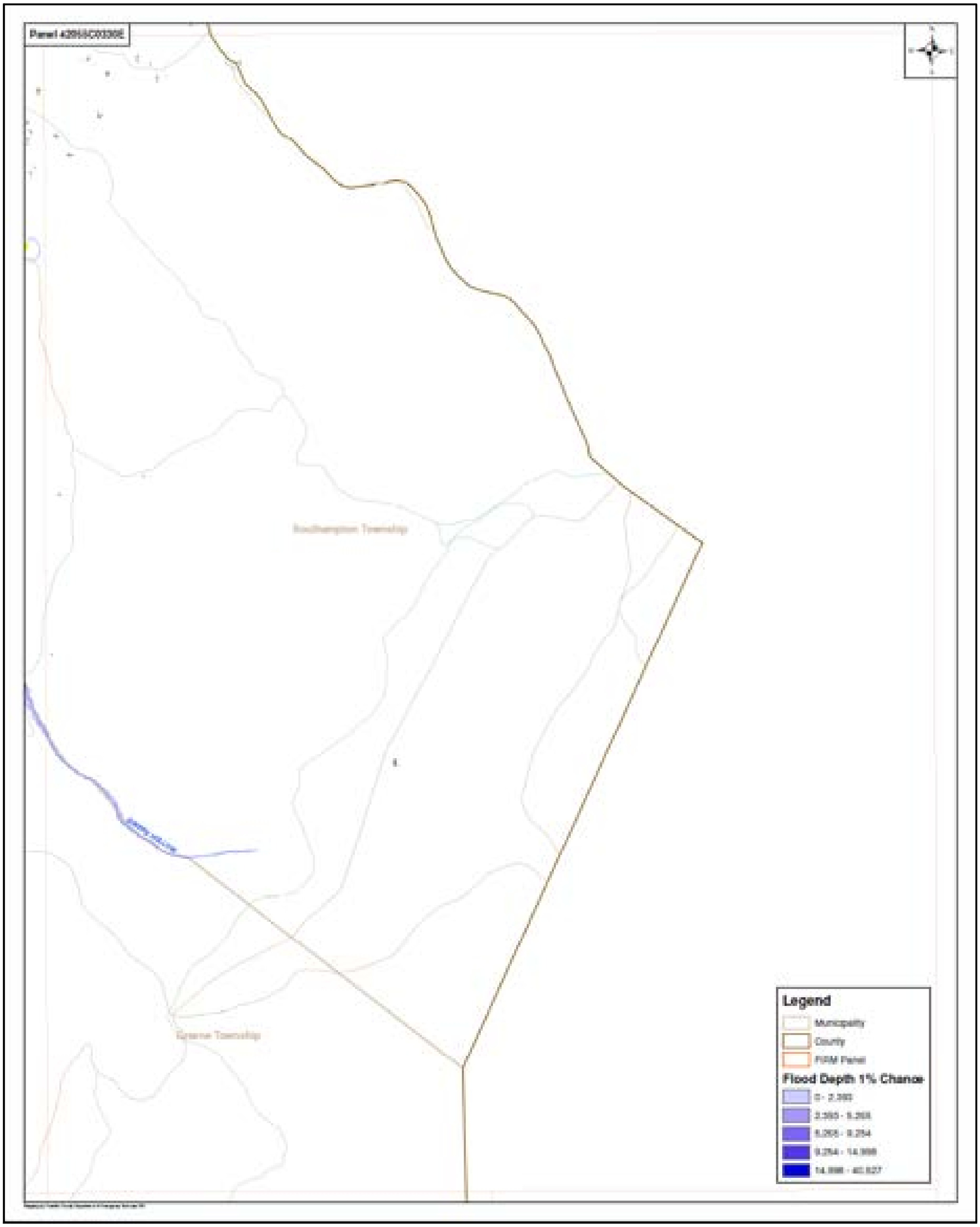


Figure D.77: Quadrant 4, Panel Number 42055C0330E

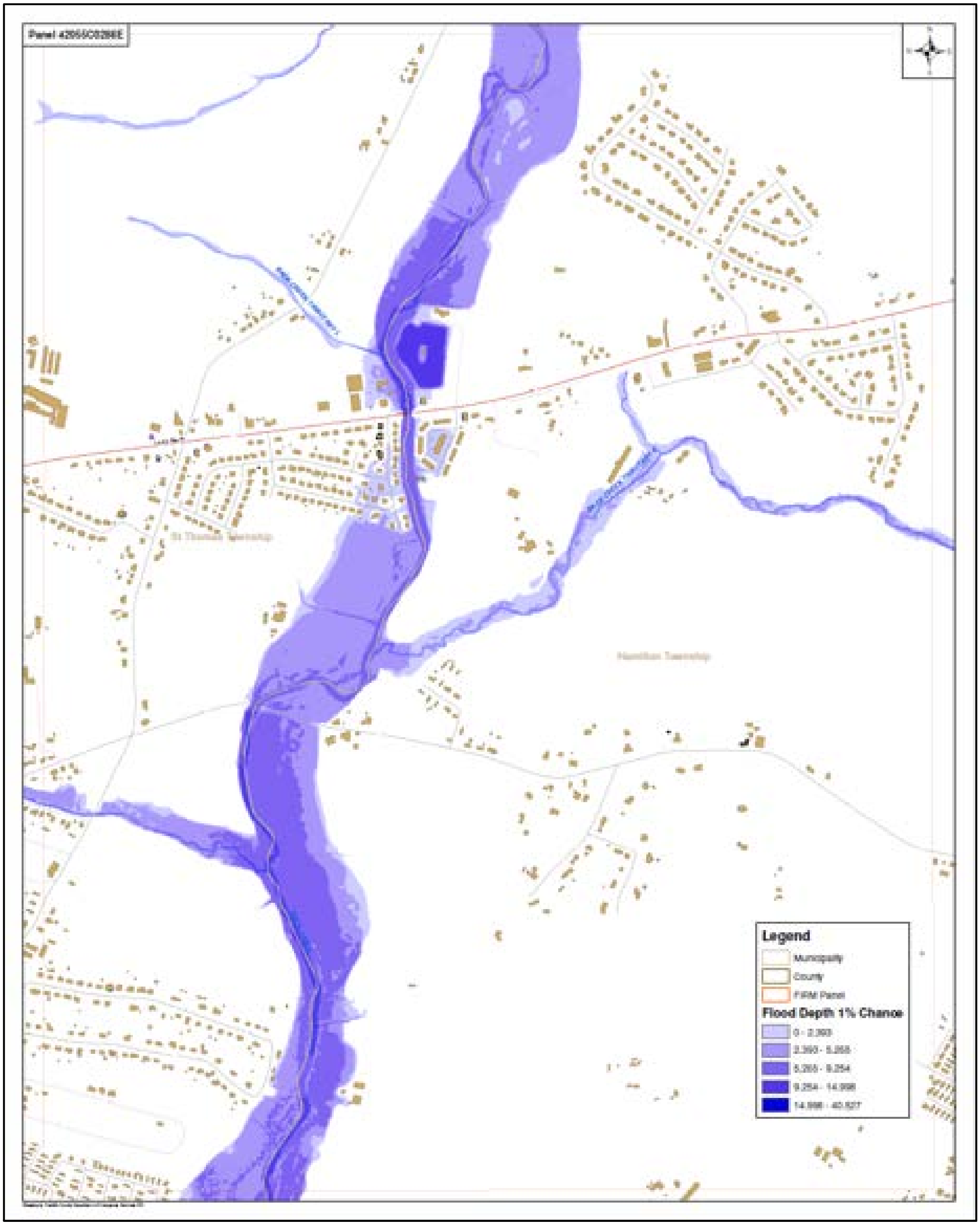


Figure D.78: Quadrant 4, Panel Number 42055C0286E

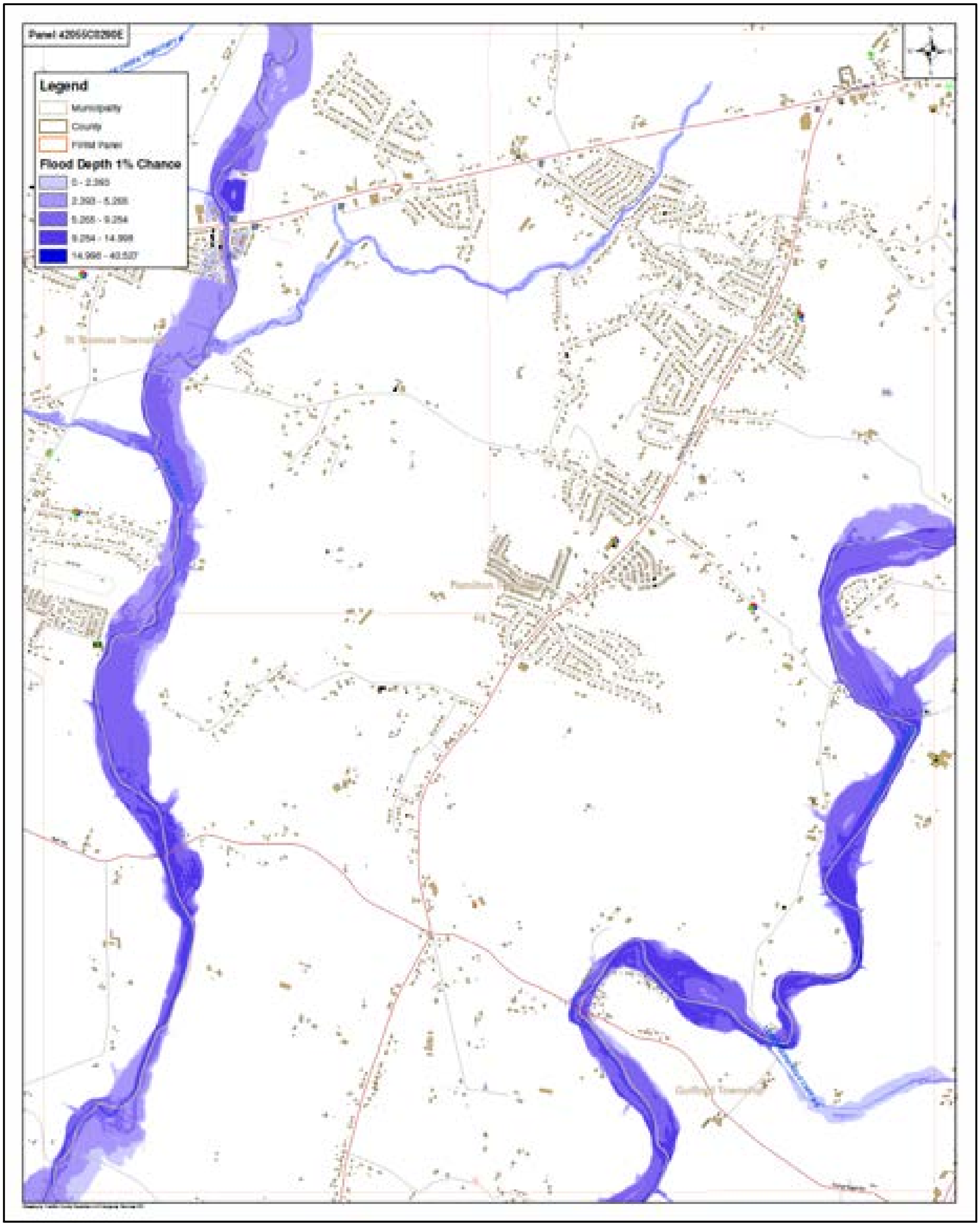


Figure D.79: Quadrant 4, Panel Number 42055C0290E

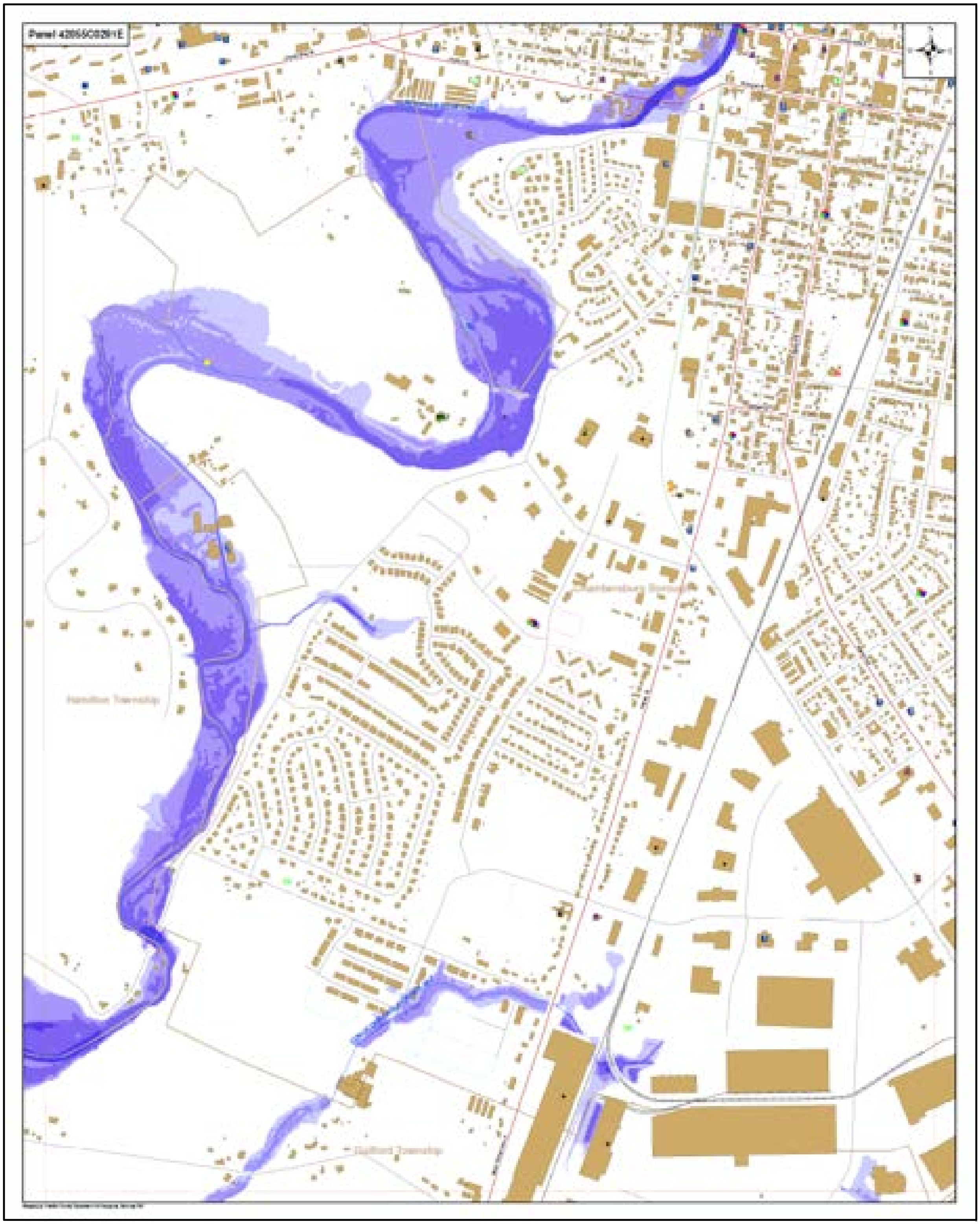


Figure D.80: Quadrant 4, Panel Number 42055C0291E

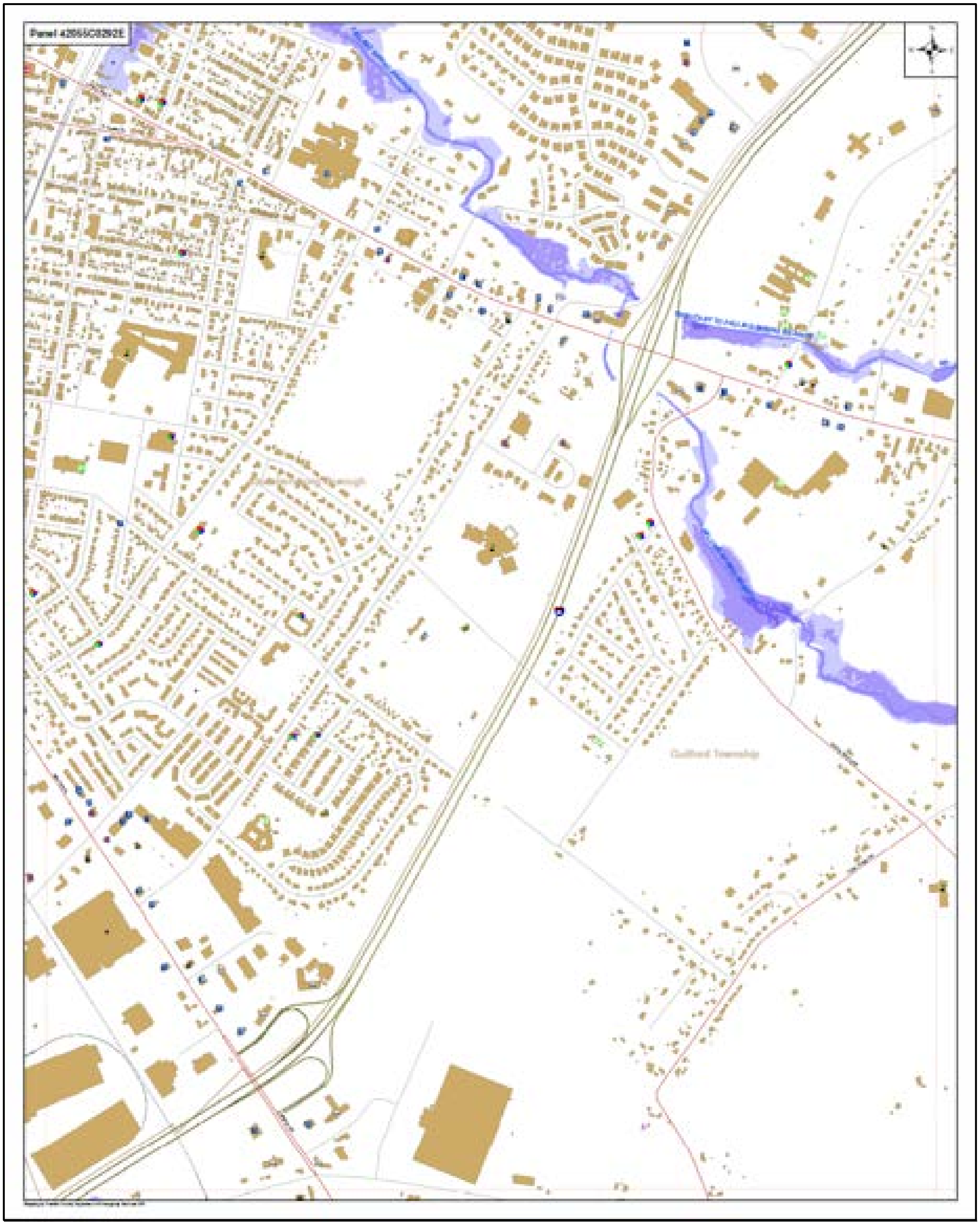
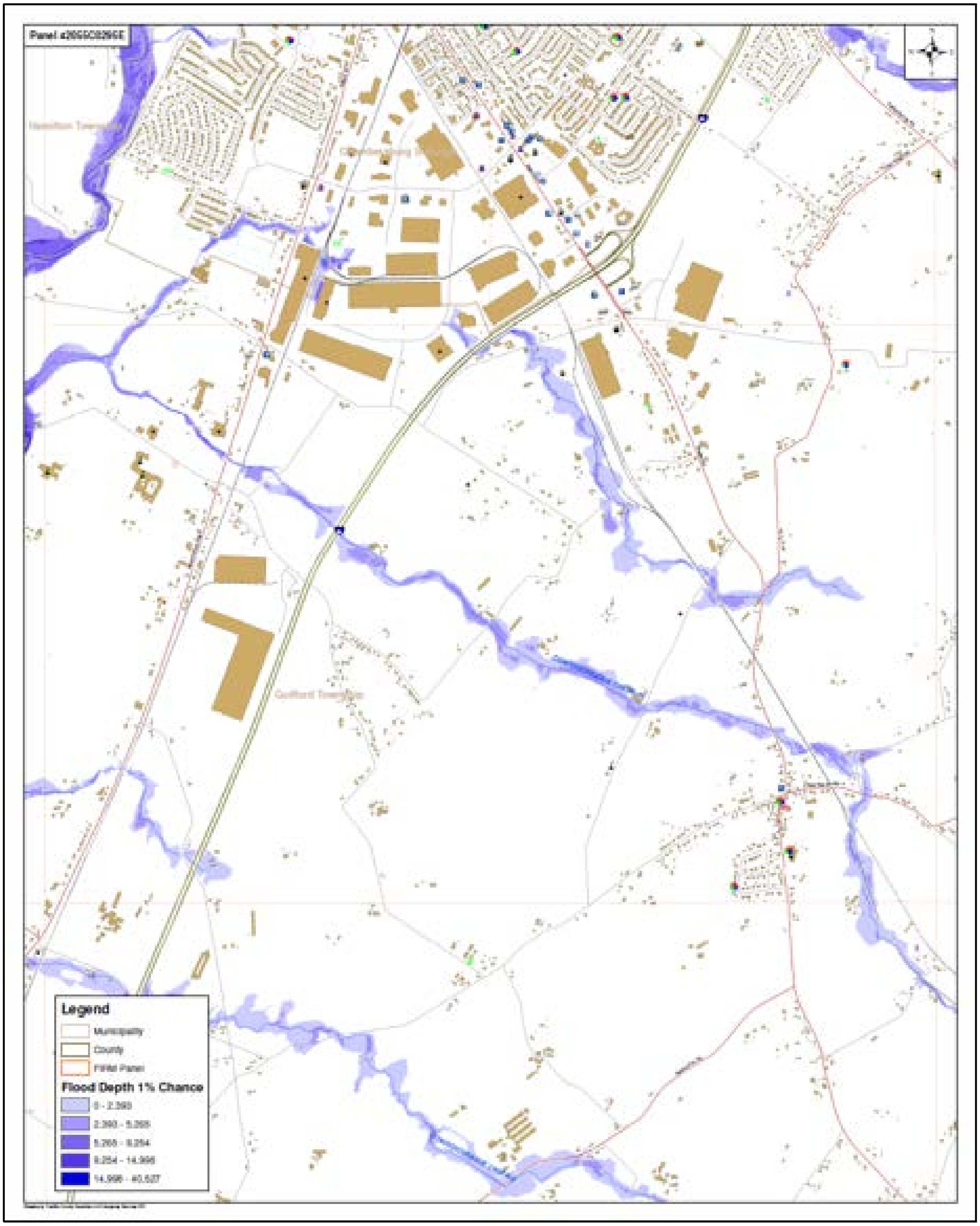


Figure D.81: Quadrant 4, Panel Number 42055C0292E



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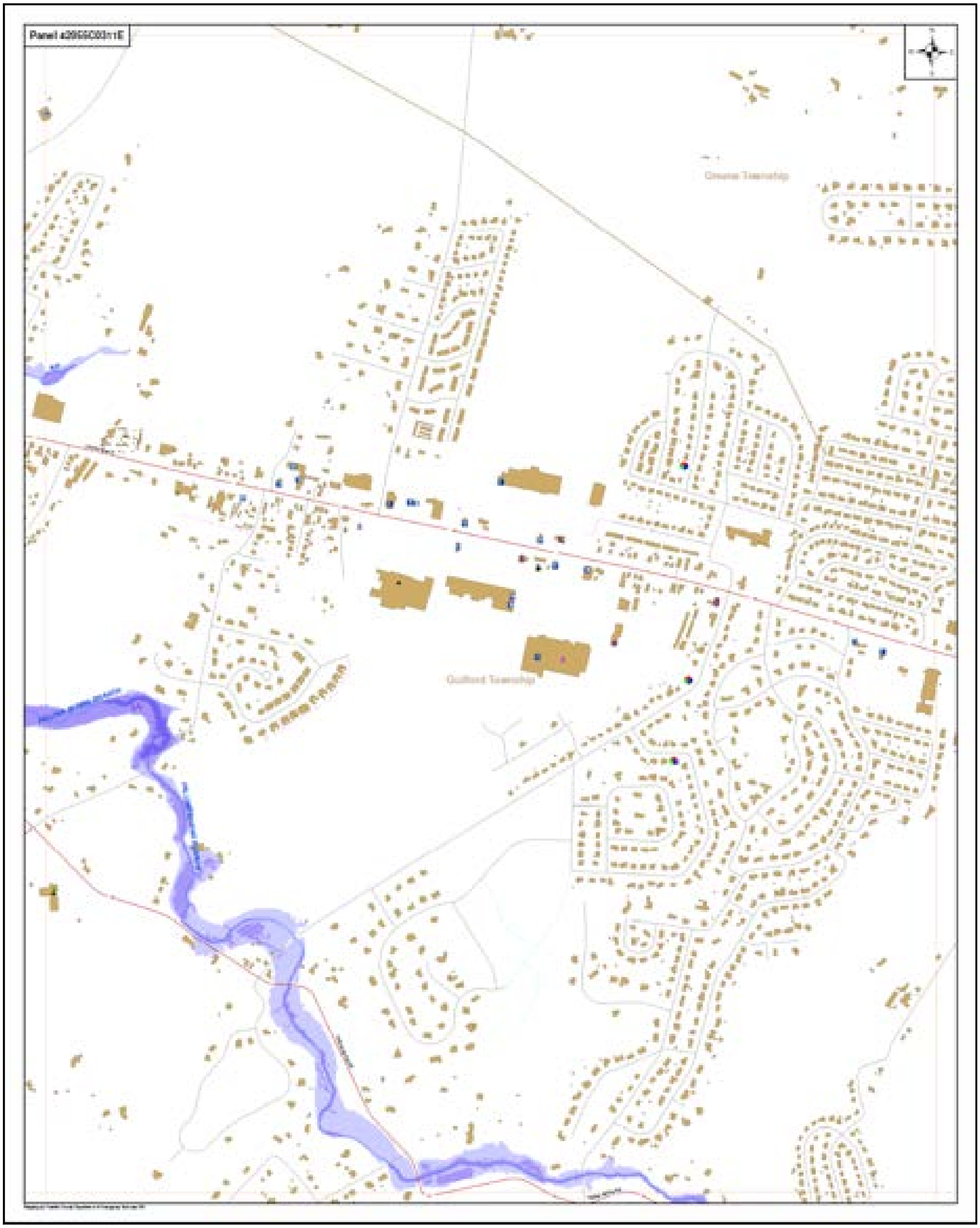

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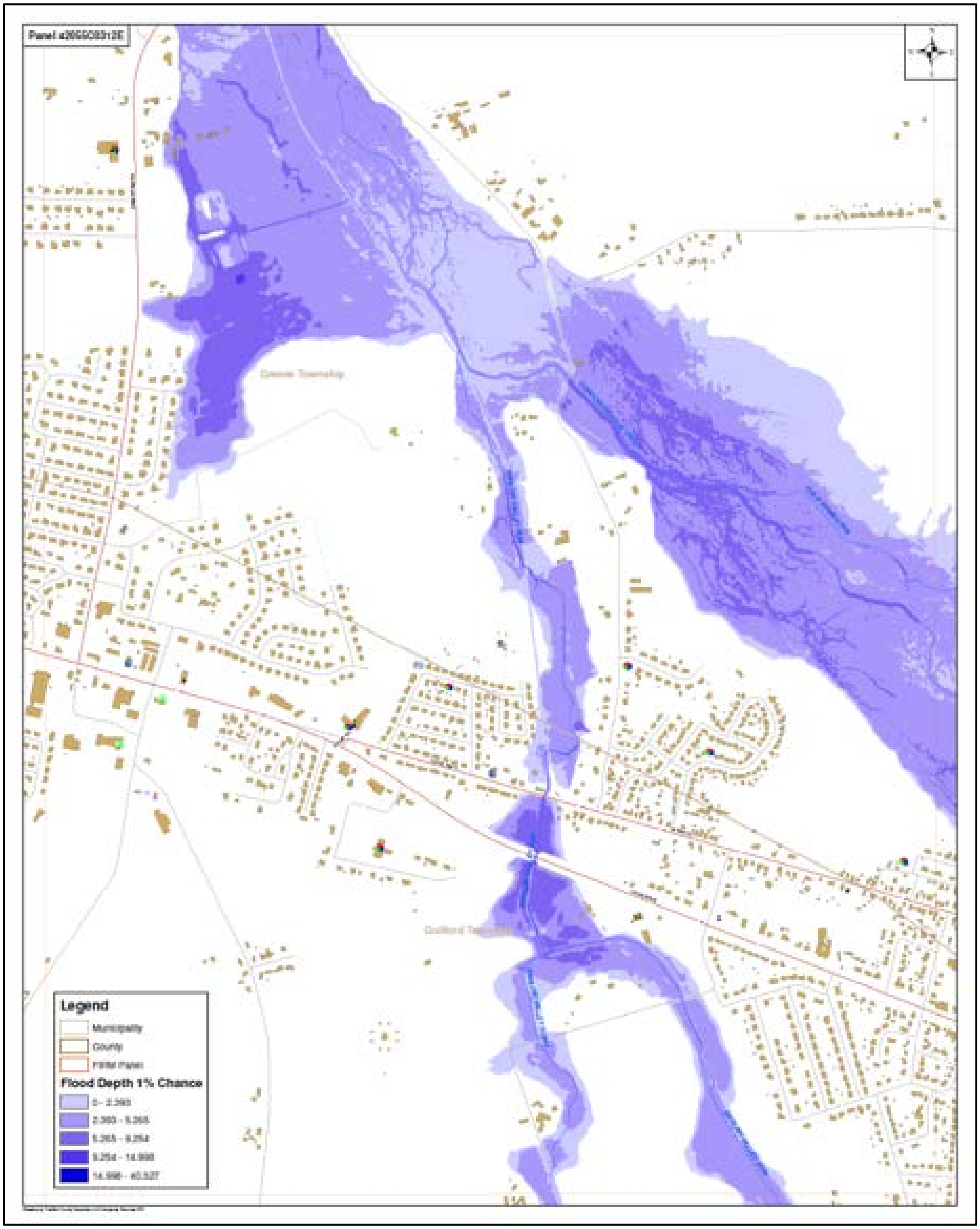

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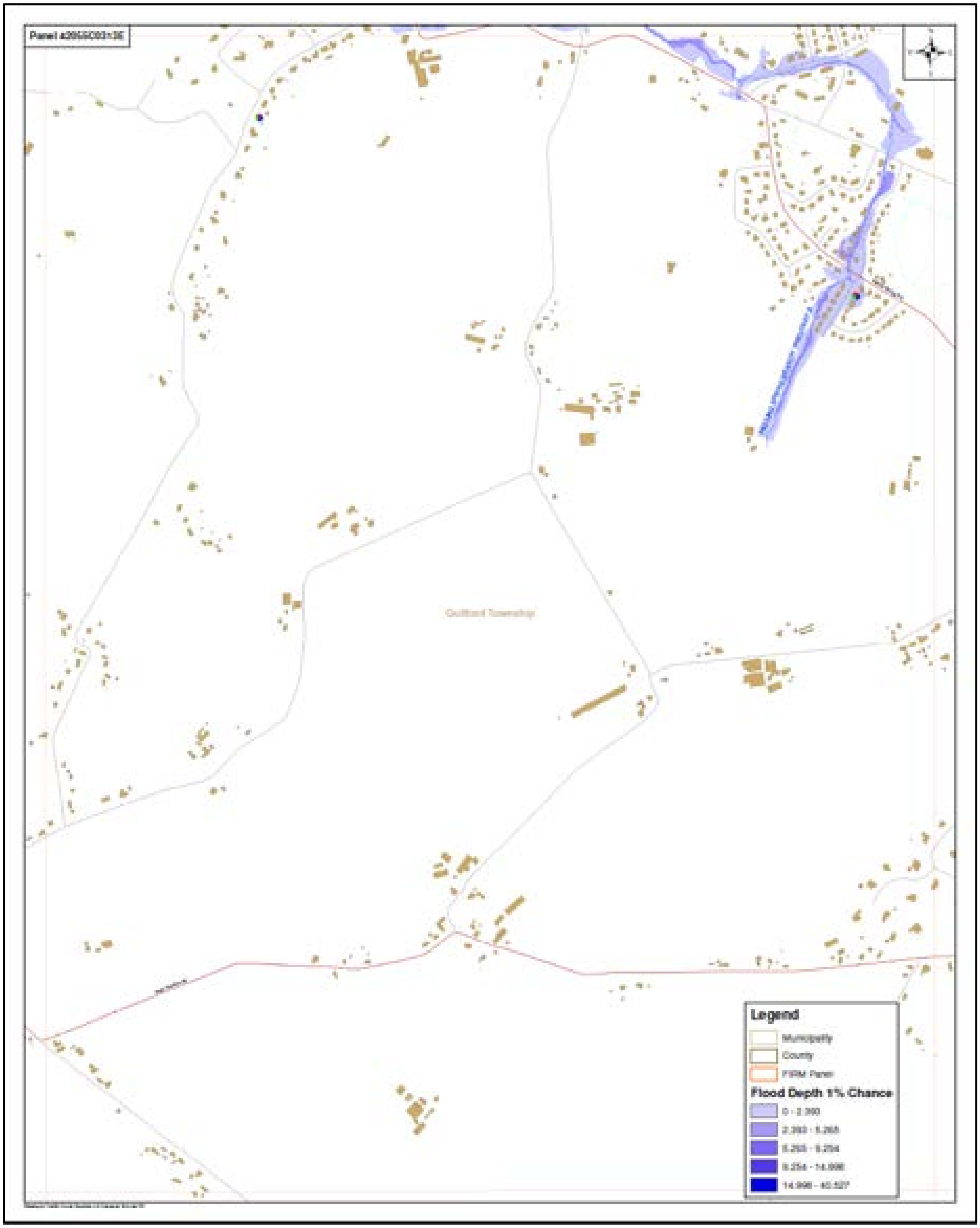


Figure D.85: Quadrant 4, Panel Number 42055C0313E

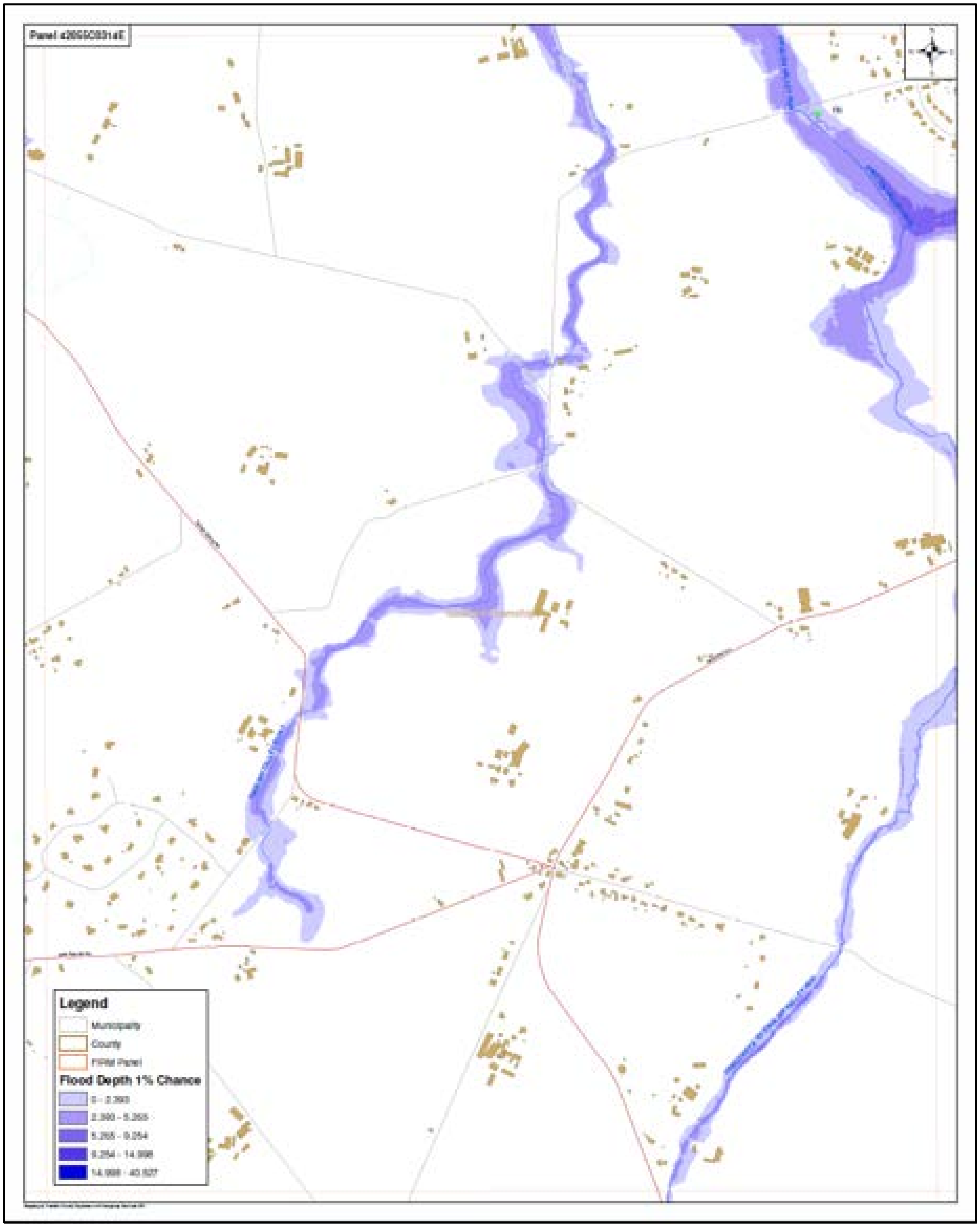


Figure D.86: Quadrant 4, Panel Number 42055C0314E

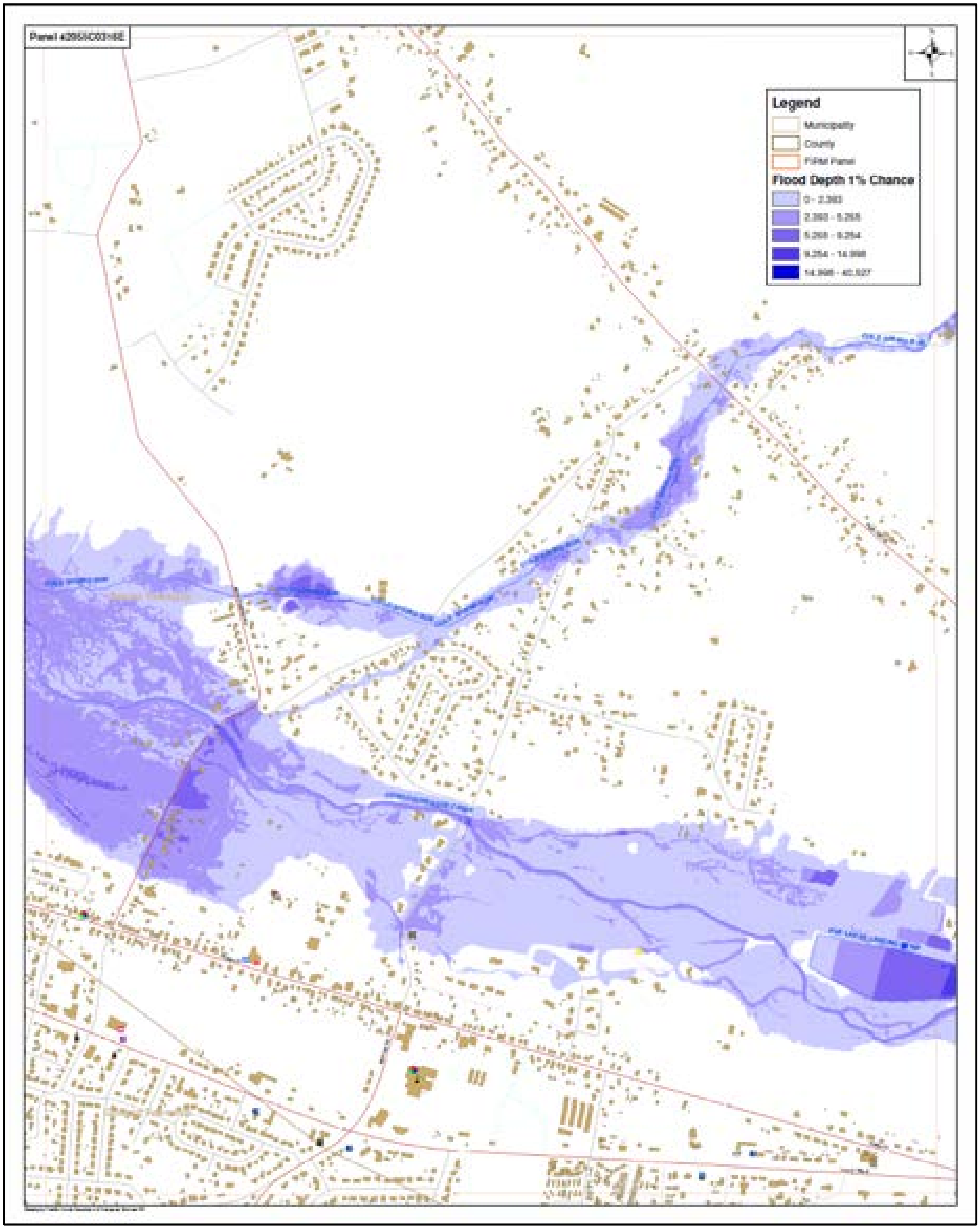


Figure D.87: Quadrant 4, Panel Number 42055C0316E

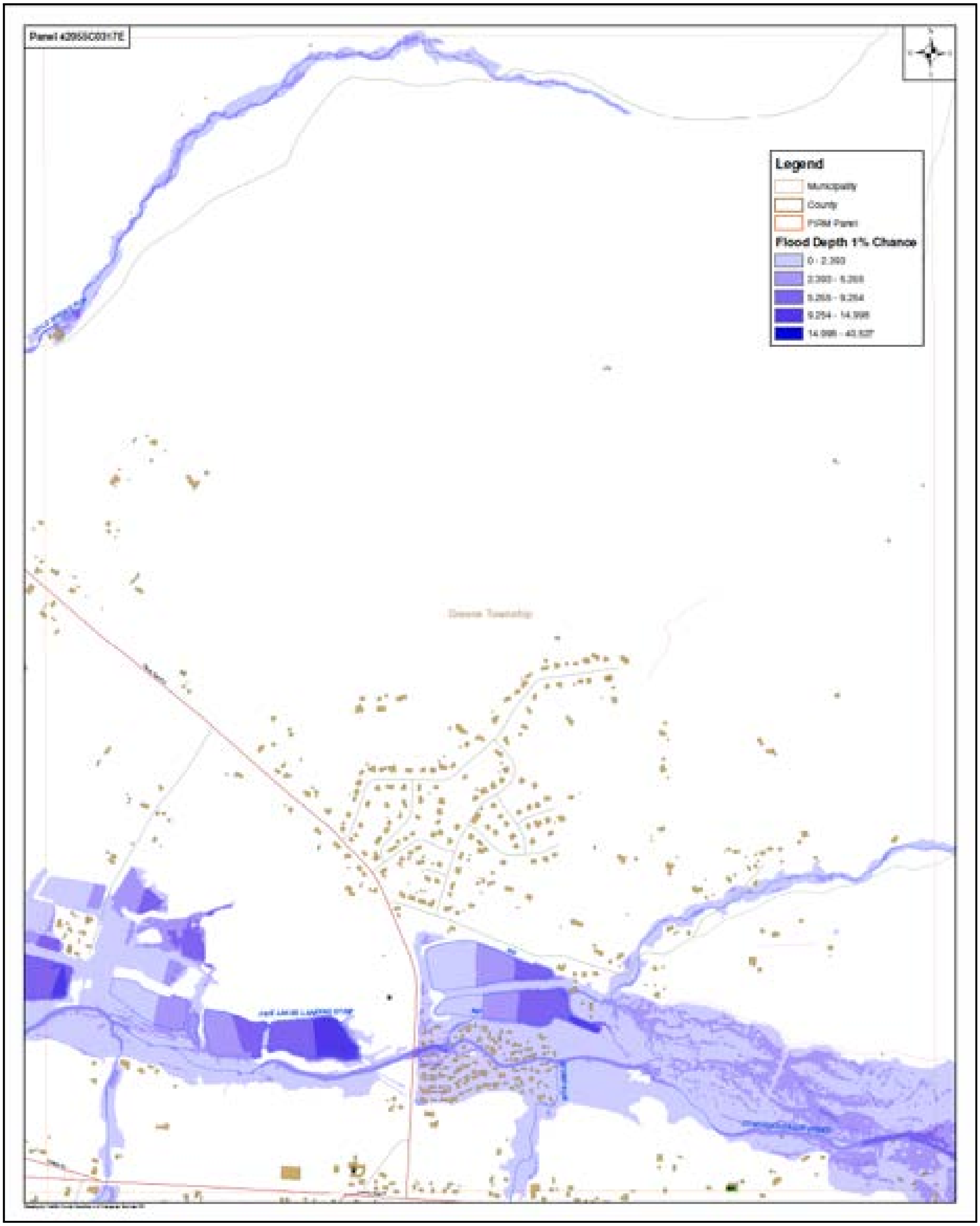


Figure D.88: Quadrant 4, Panel Number 42055C0317E

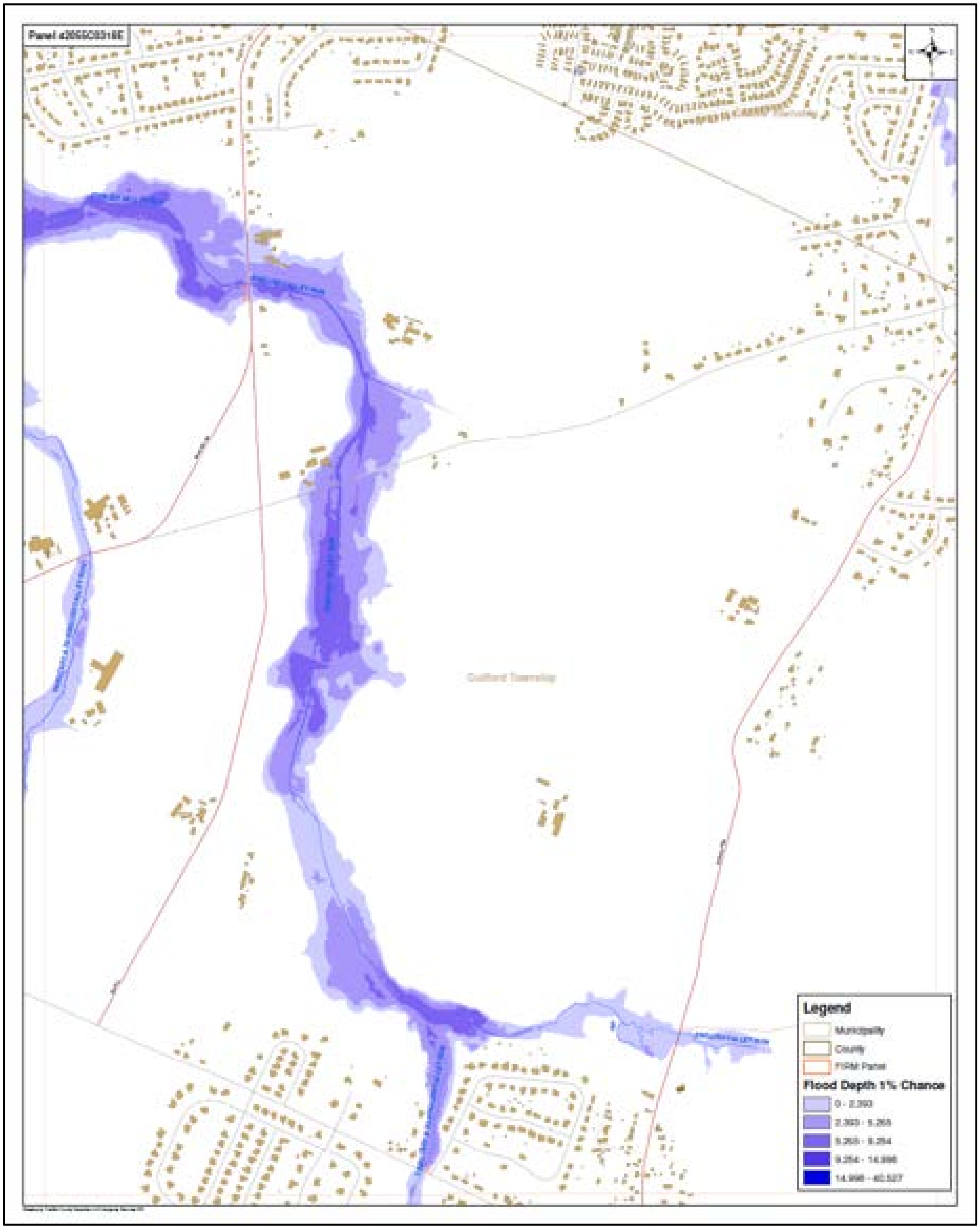


Figure D.89: Quadrant 4, Panel Number 42055C0318E

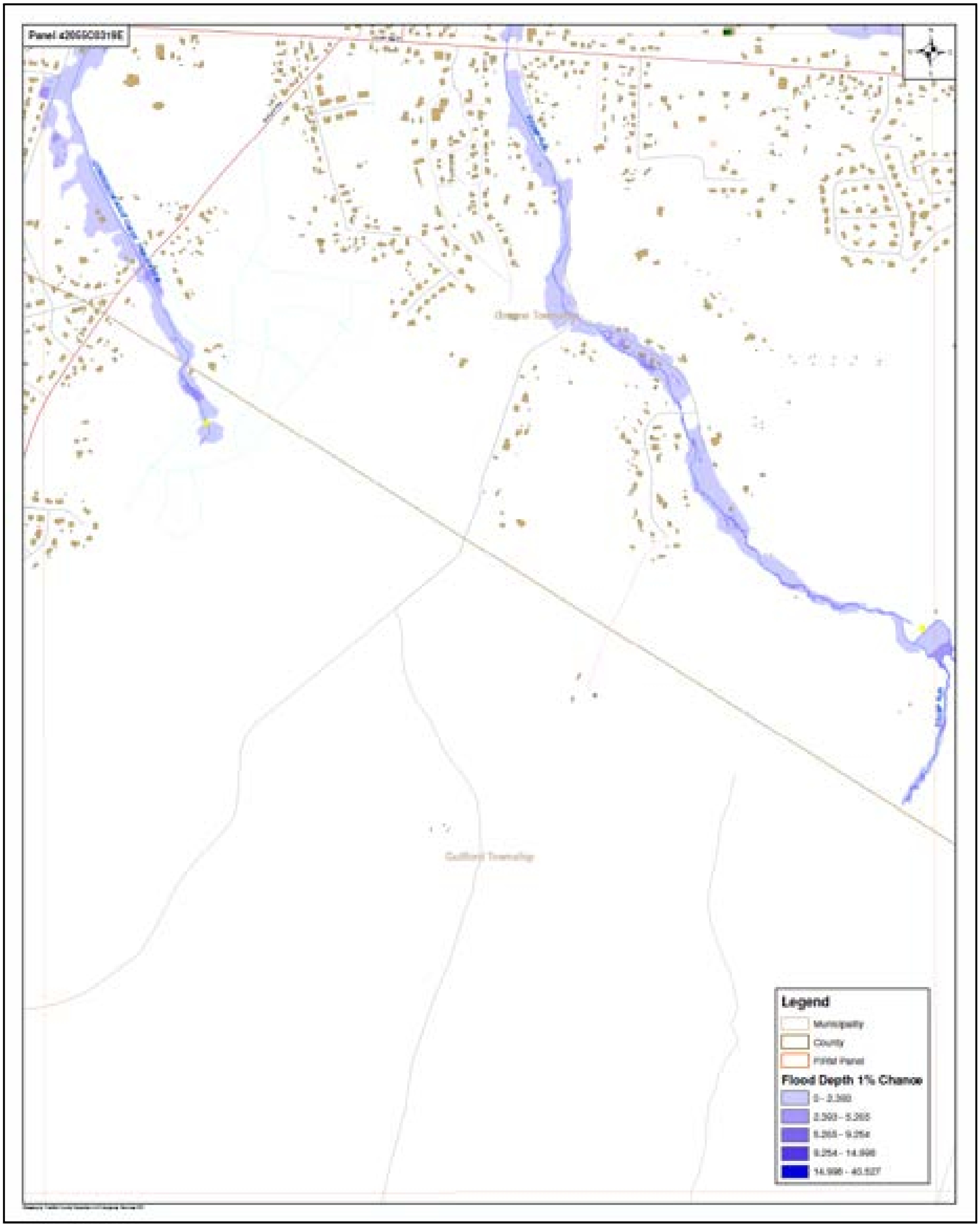


Figure D.90: Quadrant 4, Panel Number 42055C0319E

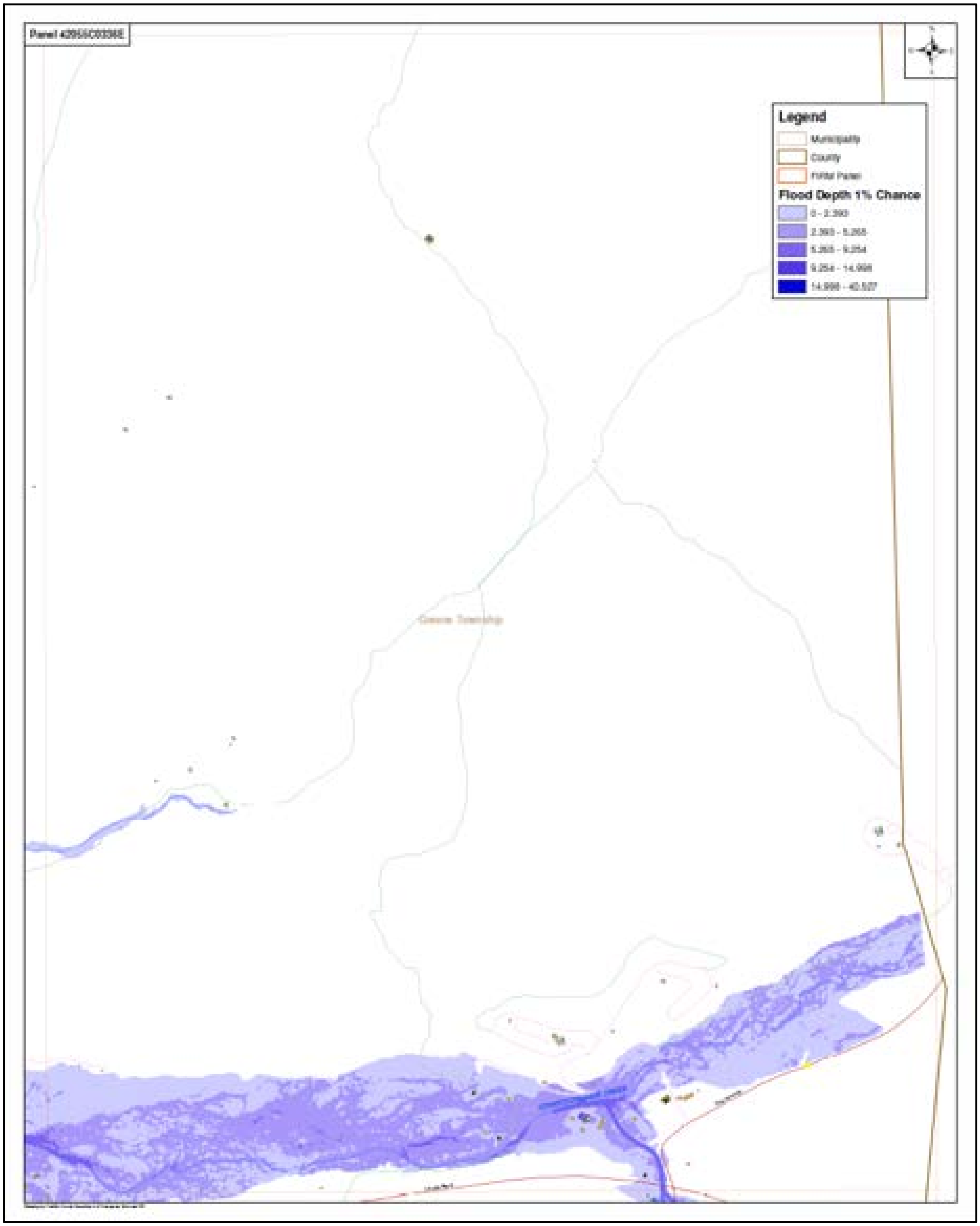


Figure D.91: Quadrant 4, Panel Number 42055C0336E

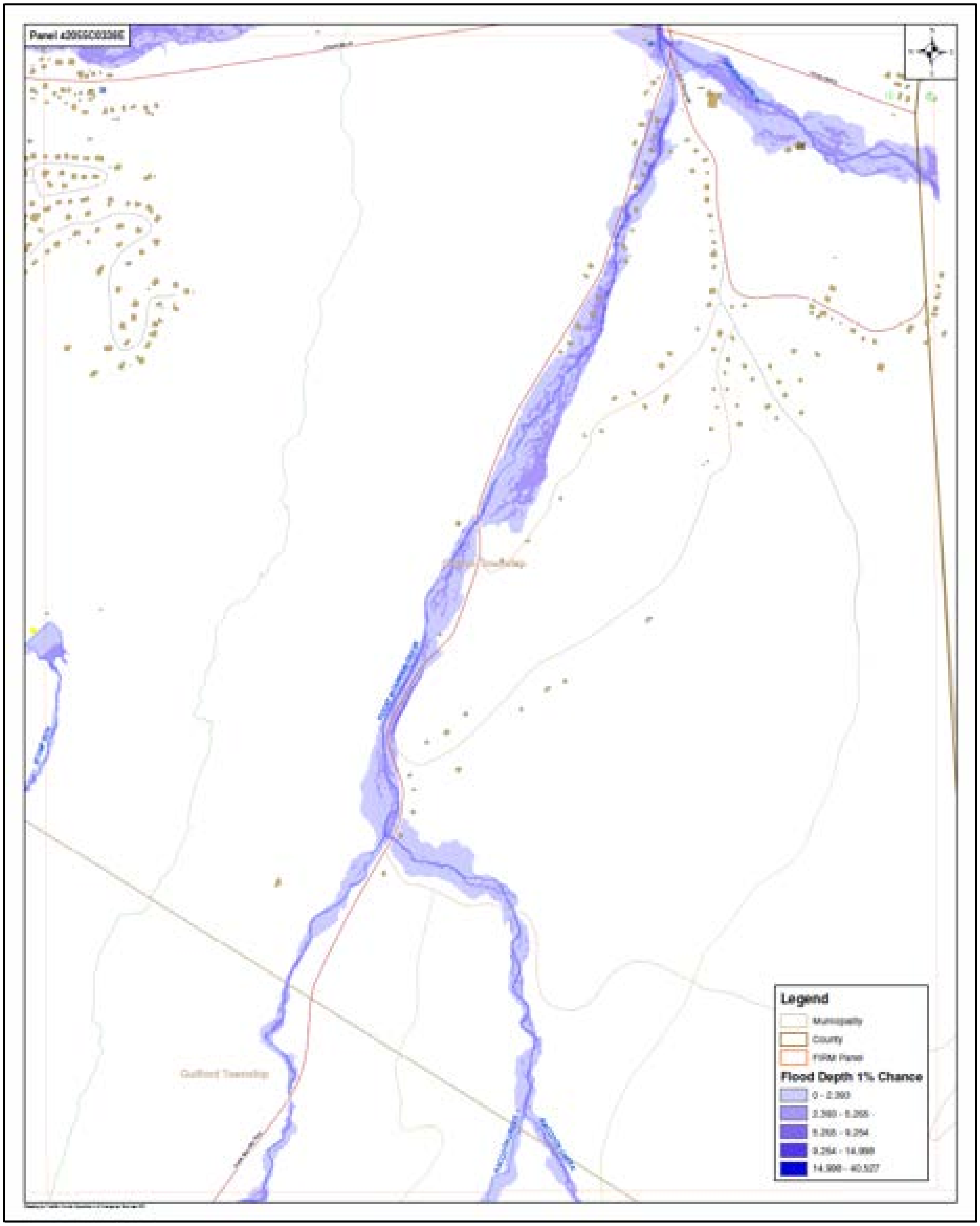


Figure D.92: Quadrant 4, Panel Number 42055C0338E

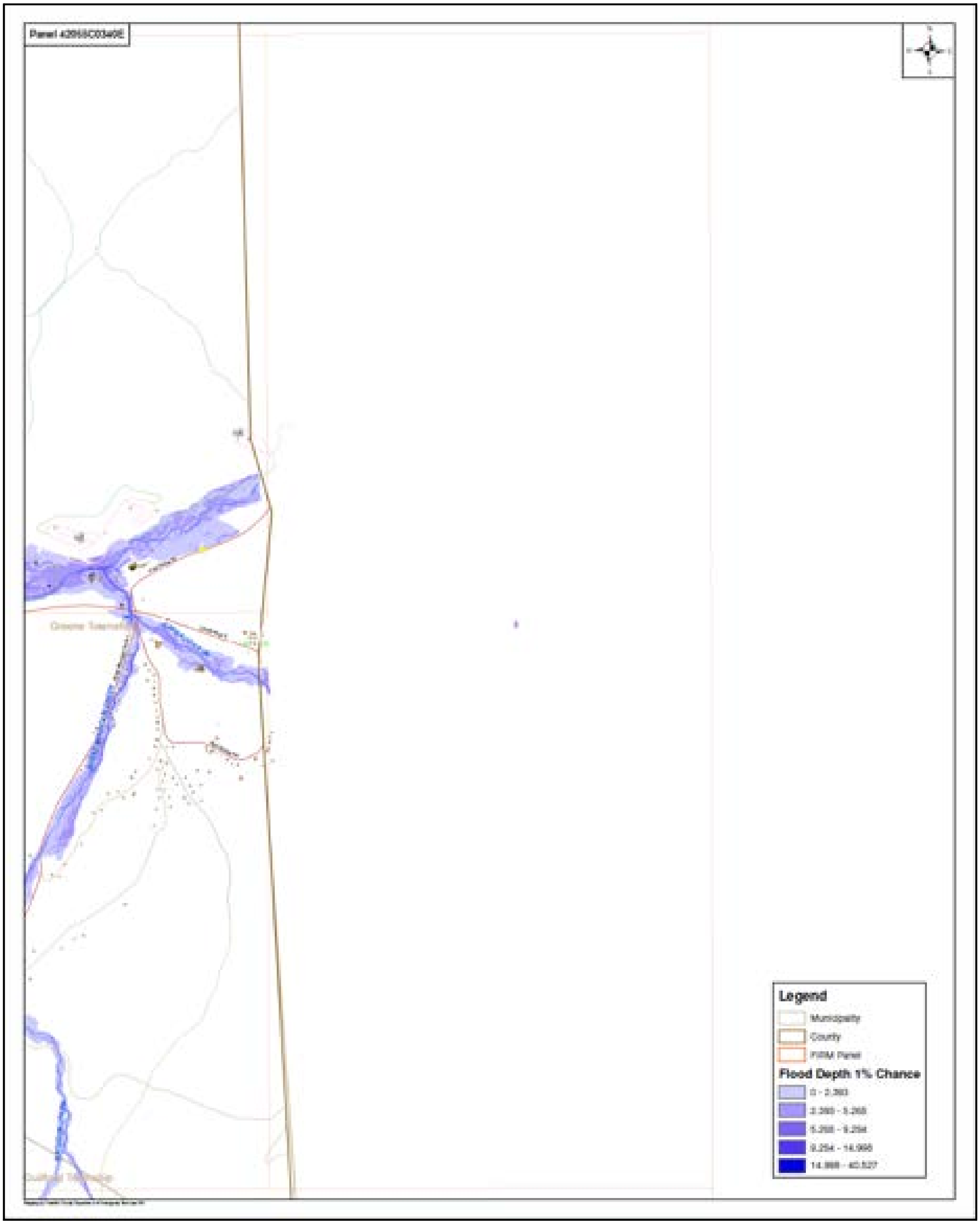


Figure D.93: Quadrant 4, Panel Number 42055C0340E

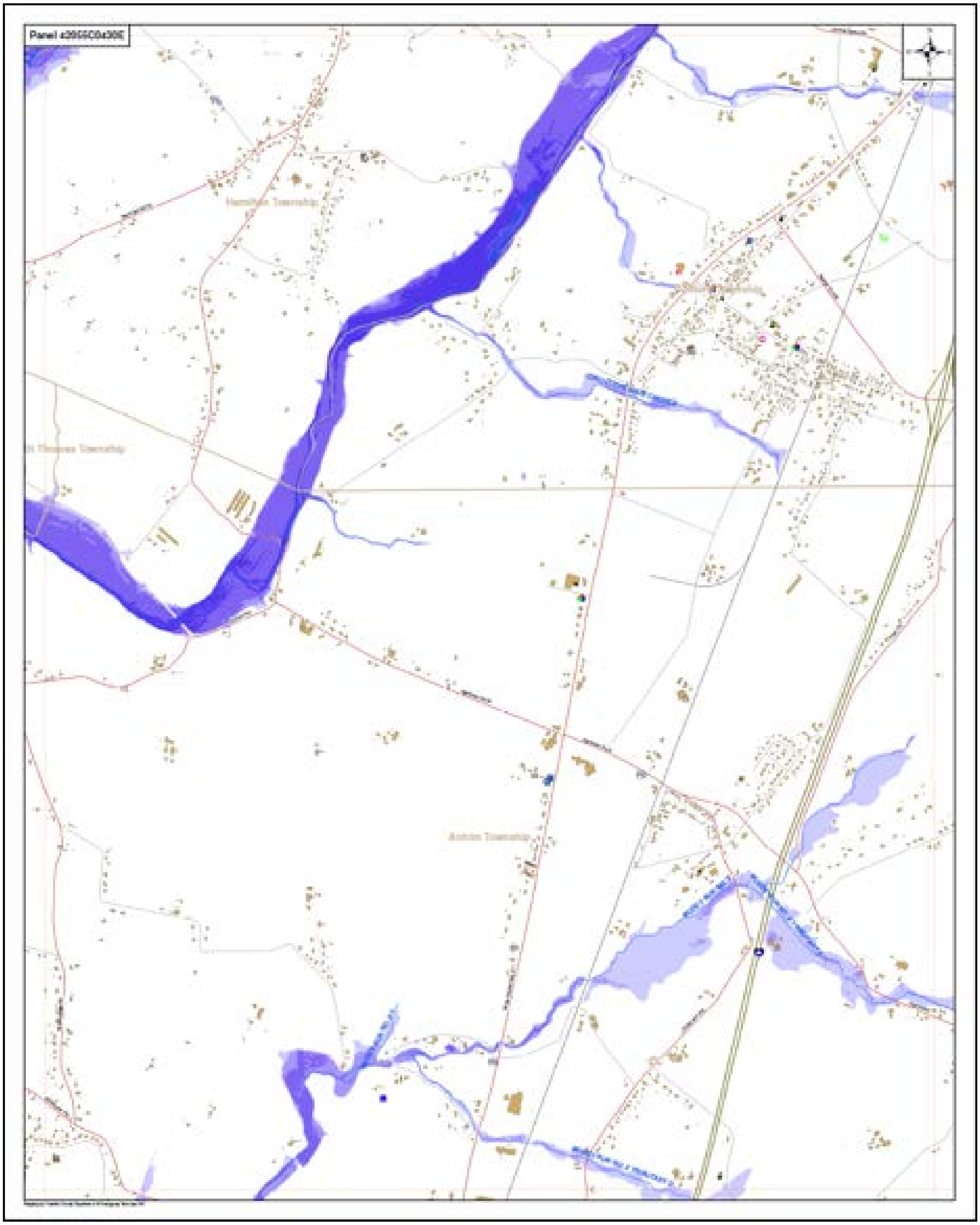


Figure D.94: Quadrant 4, Panel Number 42055C0430E

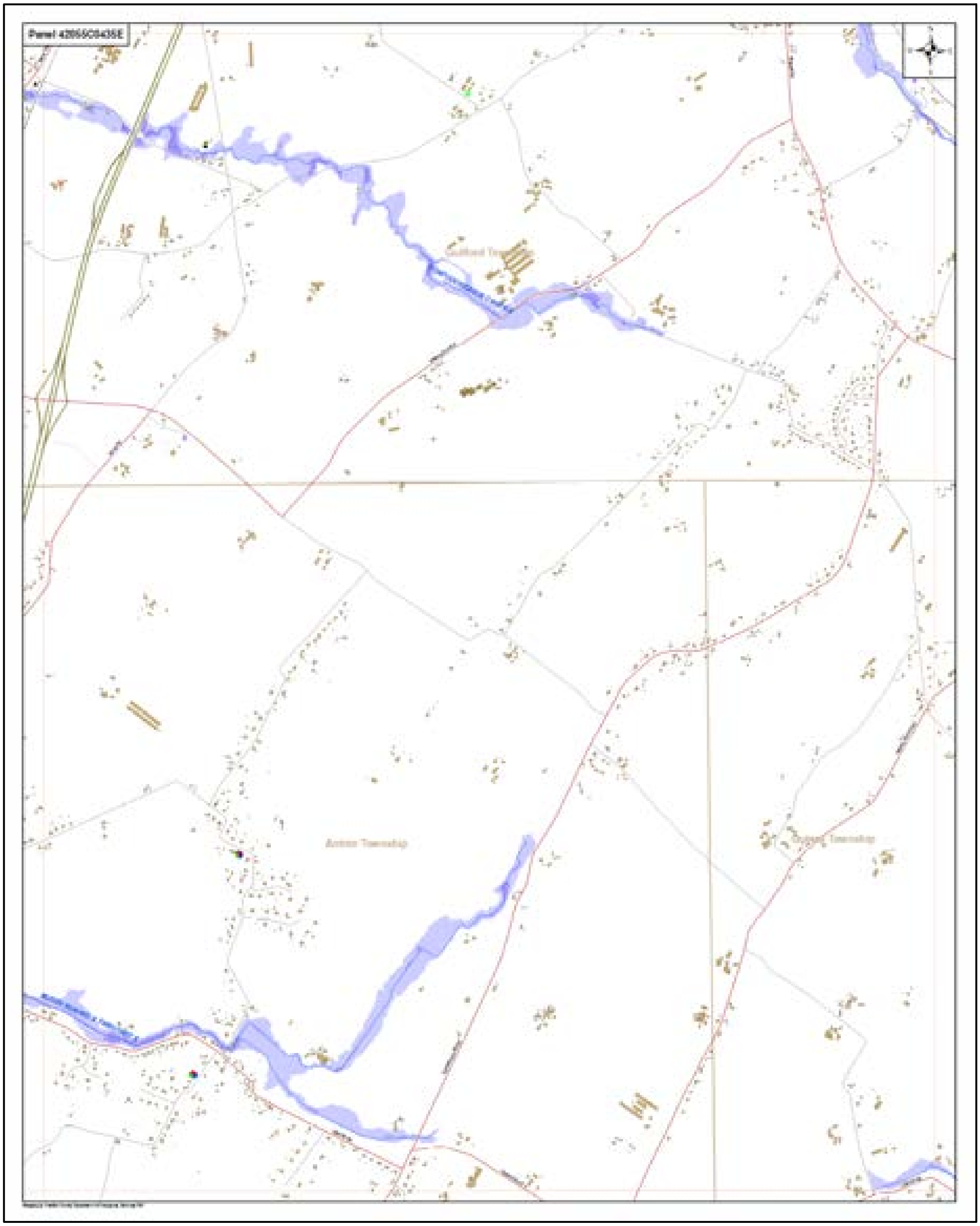


Figure D.95: Quadrant 4, Panel Number 42055C0435E

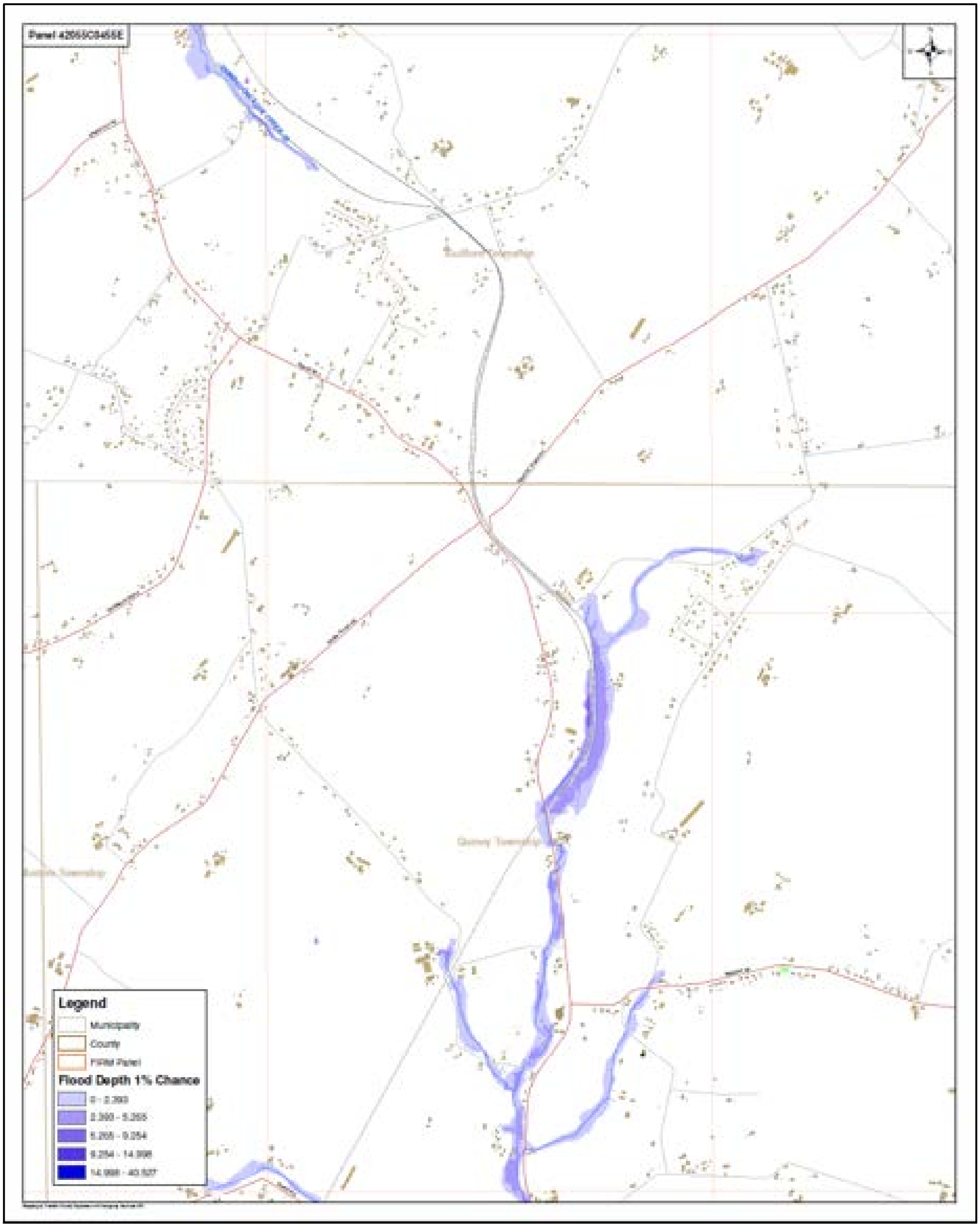


Figure D.96: Quadrant 4, Panel Number 42055C0455E

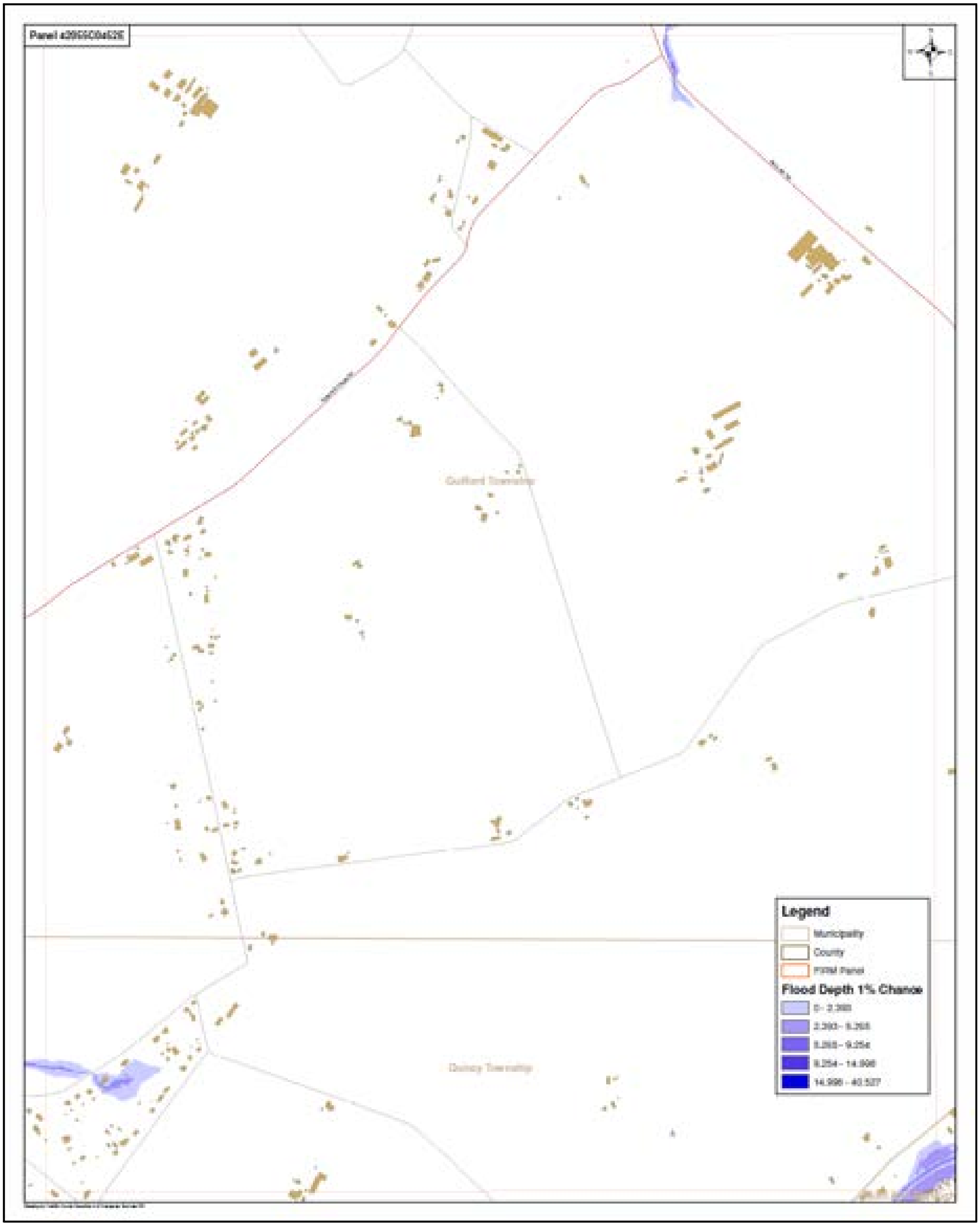


Figure D.97: Quadrant 4, Panel Number 42055C0452E

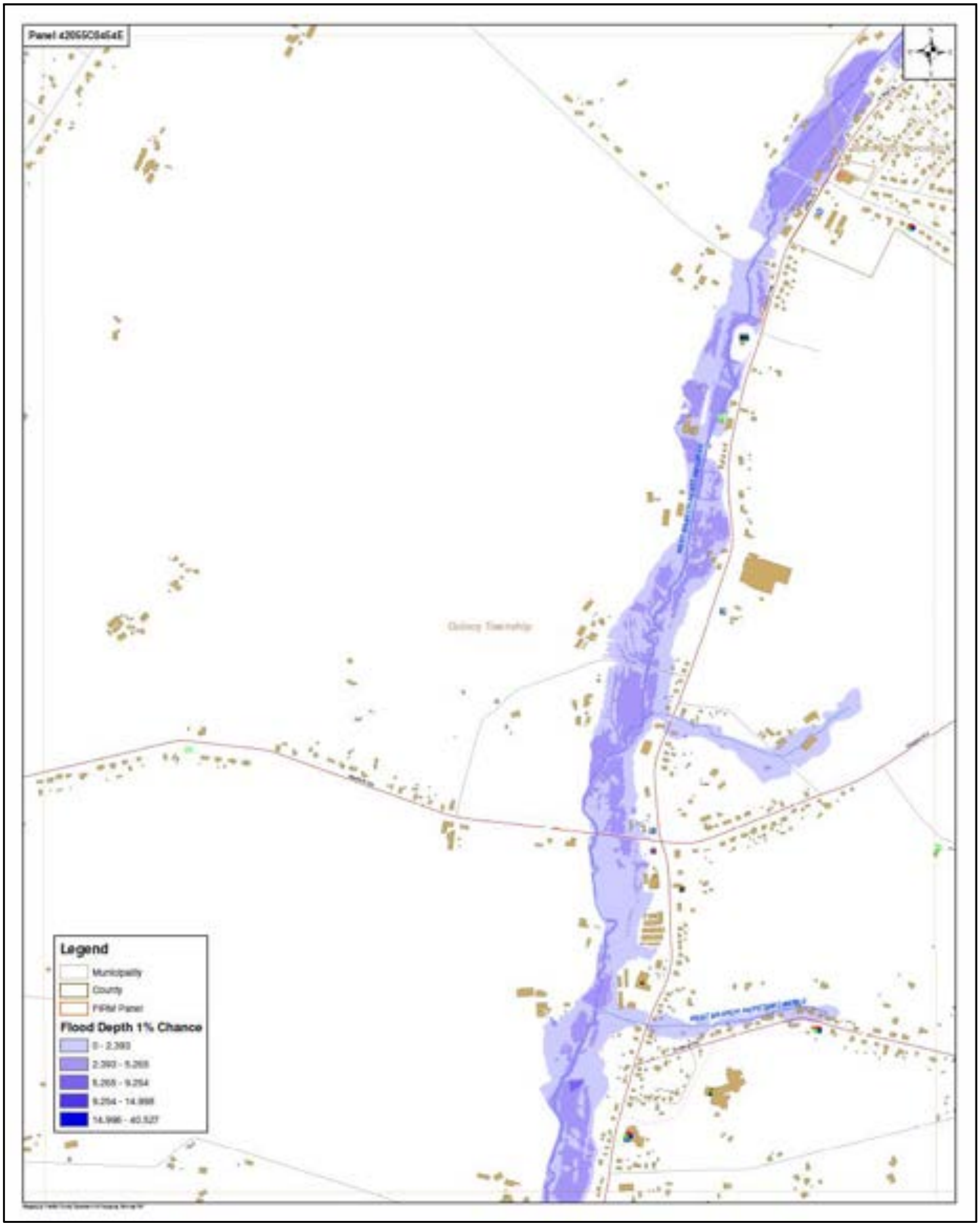


Figure D.98: Quadrant 4, Panel Number 42055C0454E

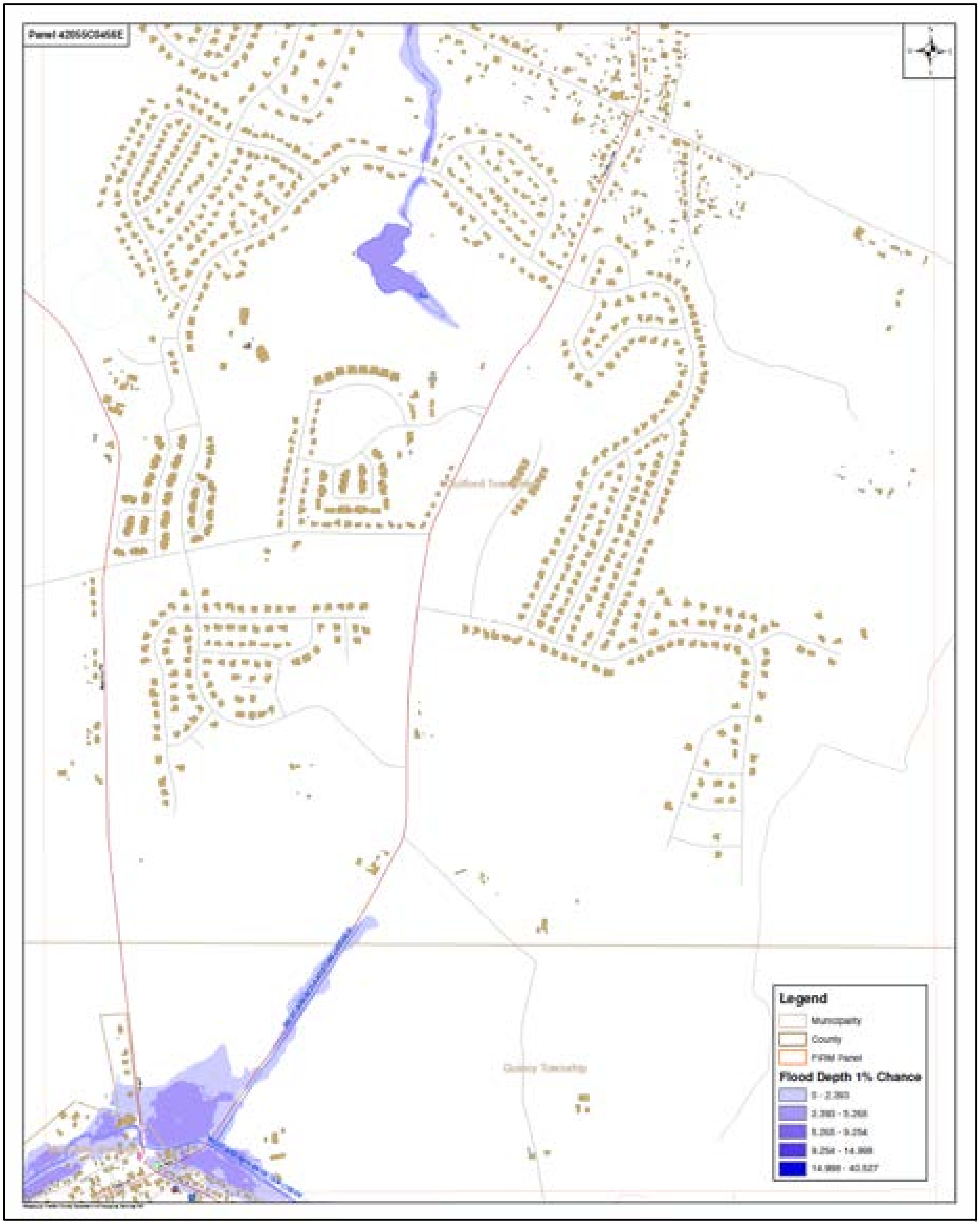


Figure D.99: Quadrant 4, Panel Number 42055C0456E

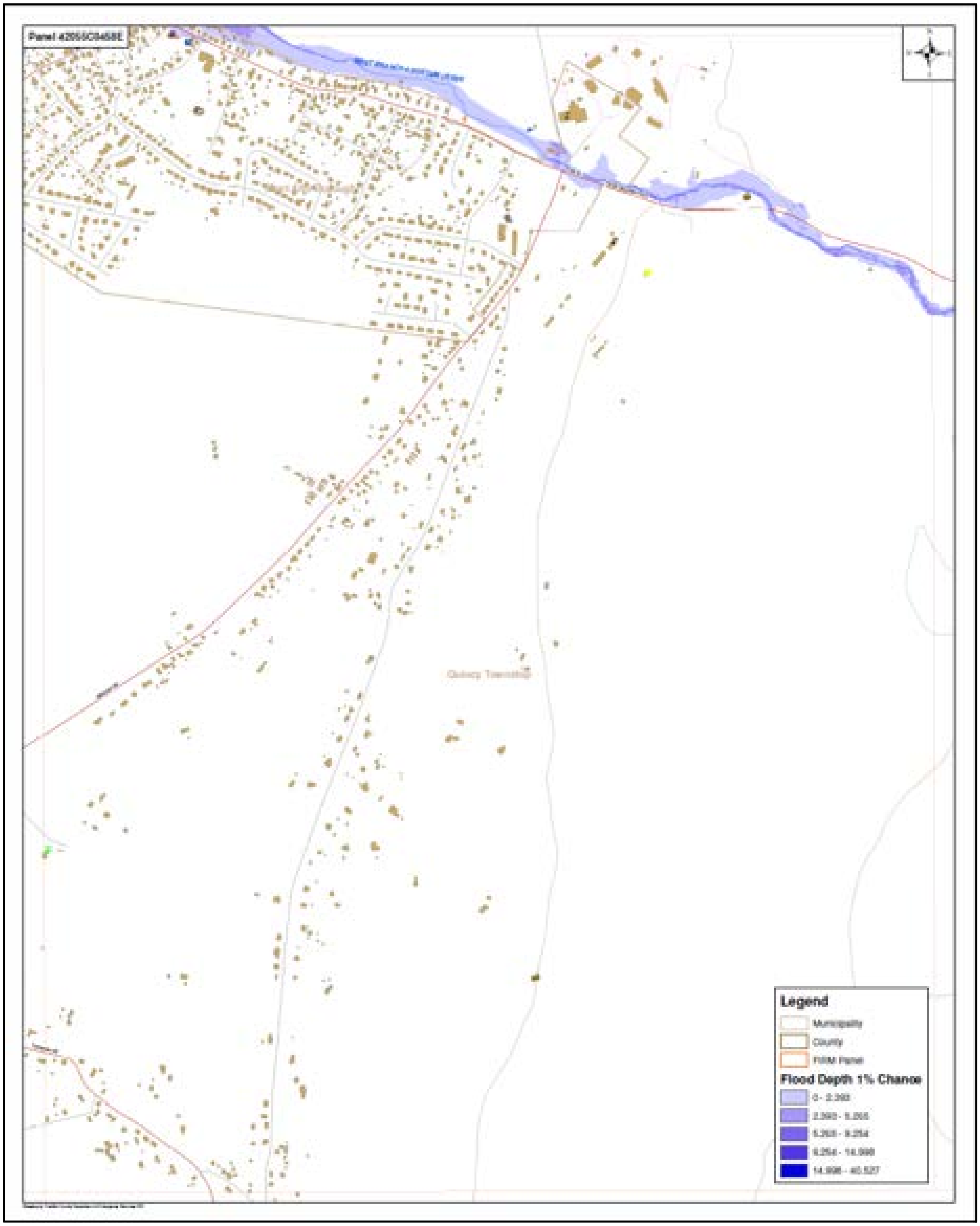


Figure D.100: Quadrant 4, Panel Number 42055C0458E

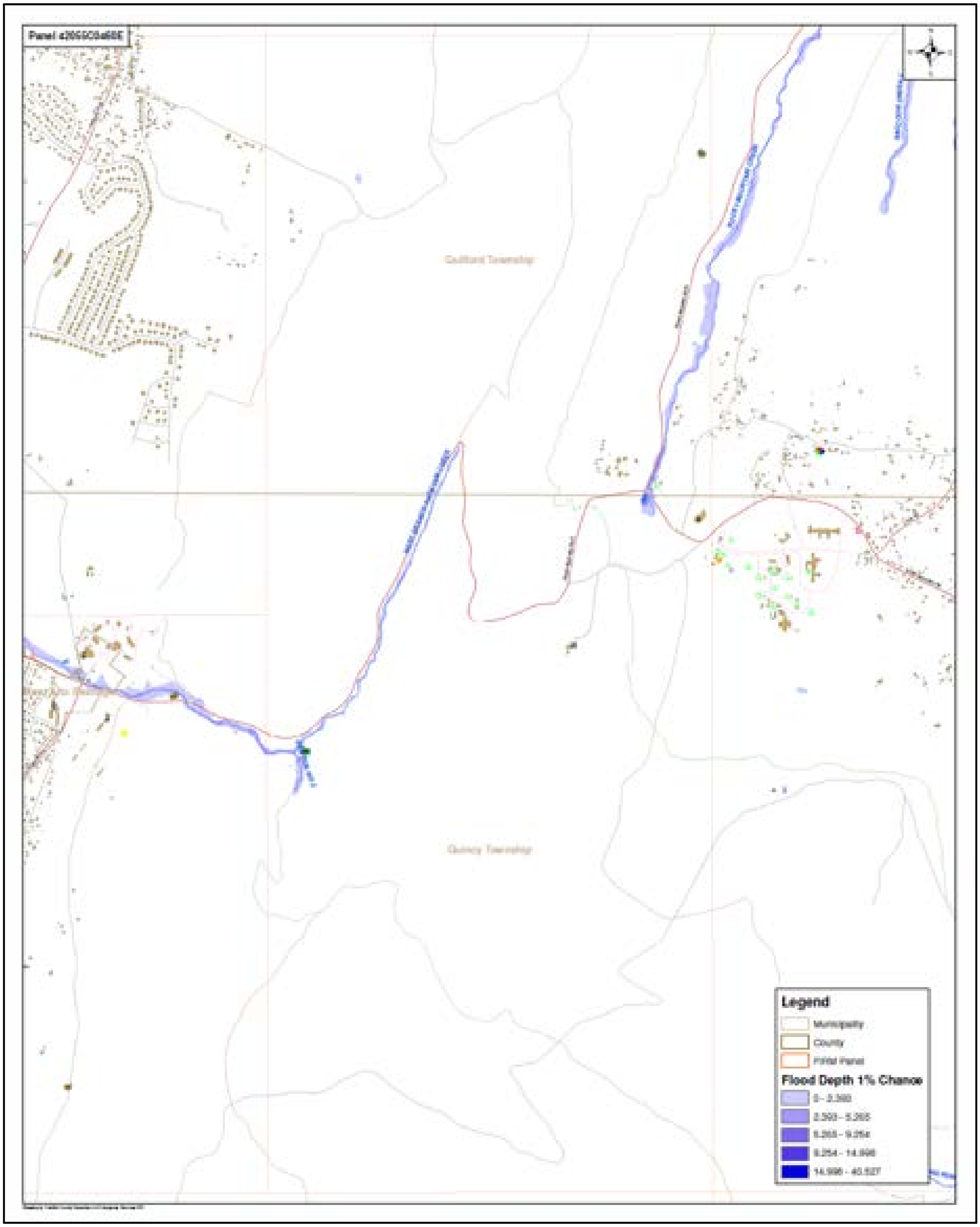


Figure D.101: Quadrant 4, Panel Number 42055C0460E

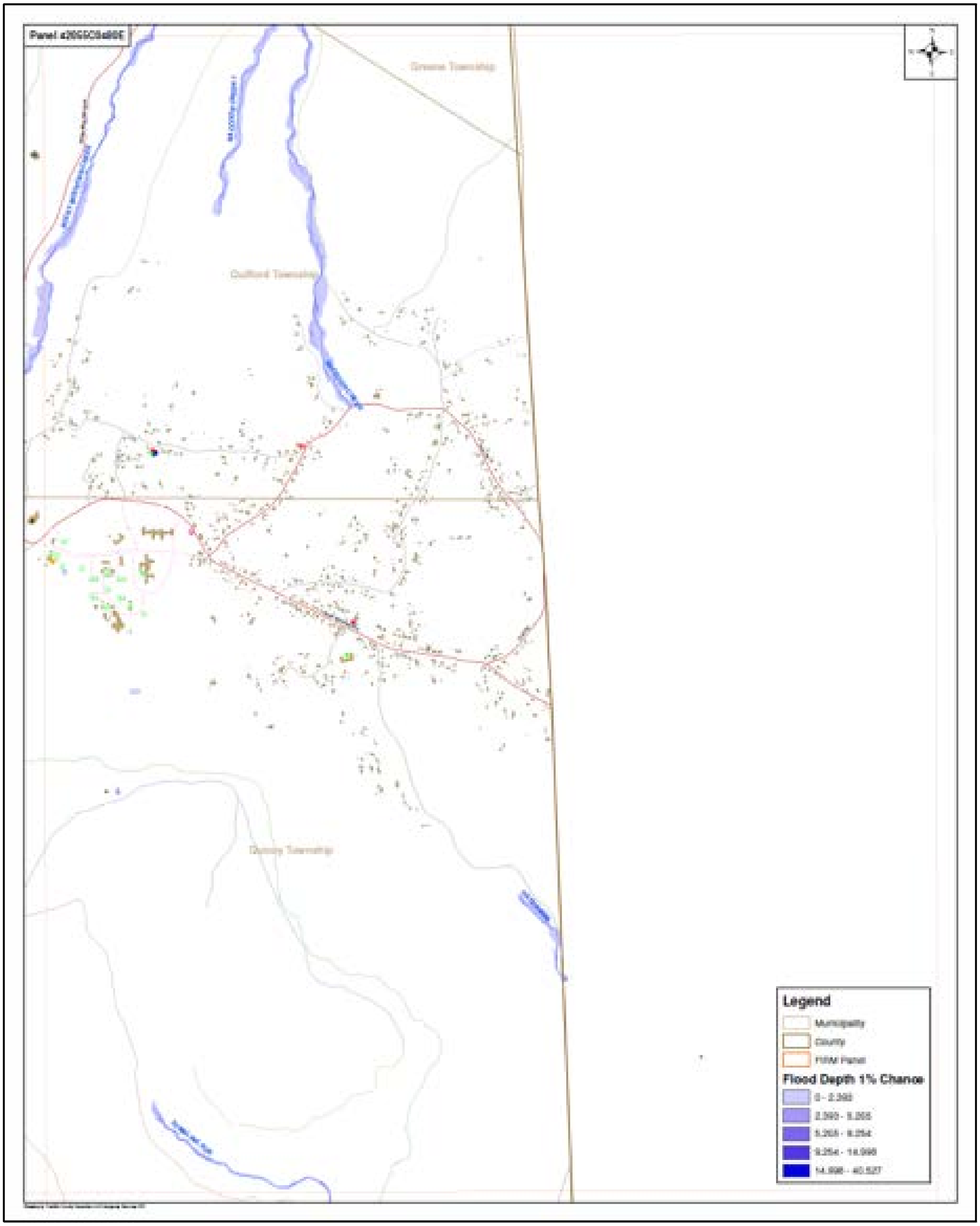


Figure D.102: Quadrant 4, Panel Number 42055C0480E

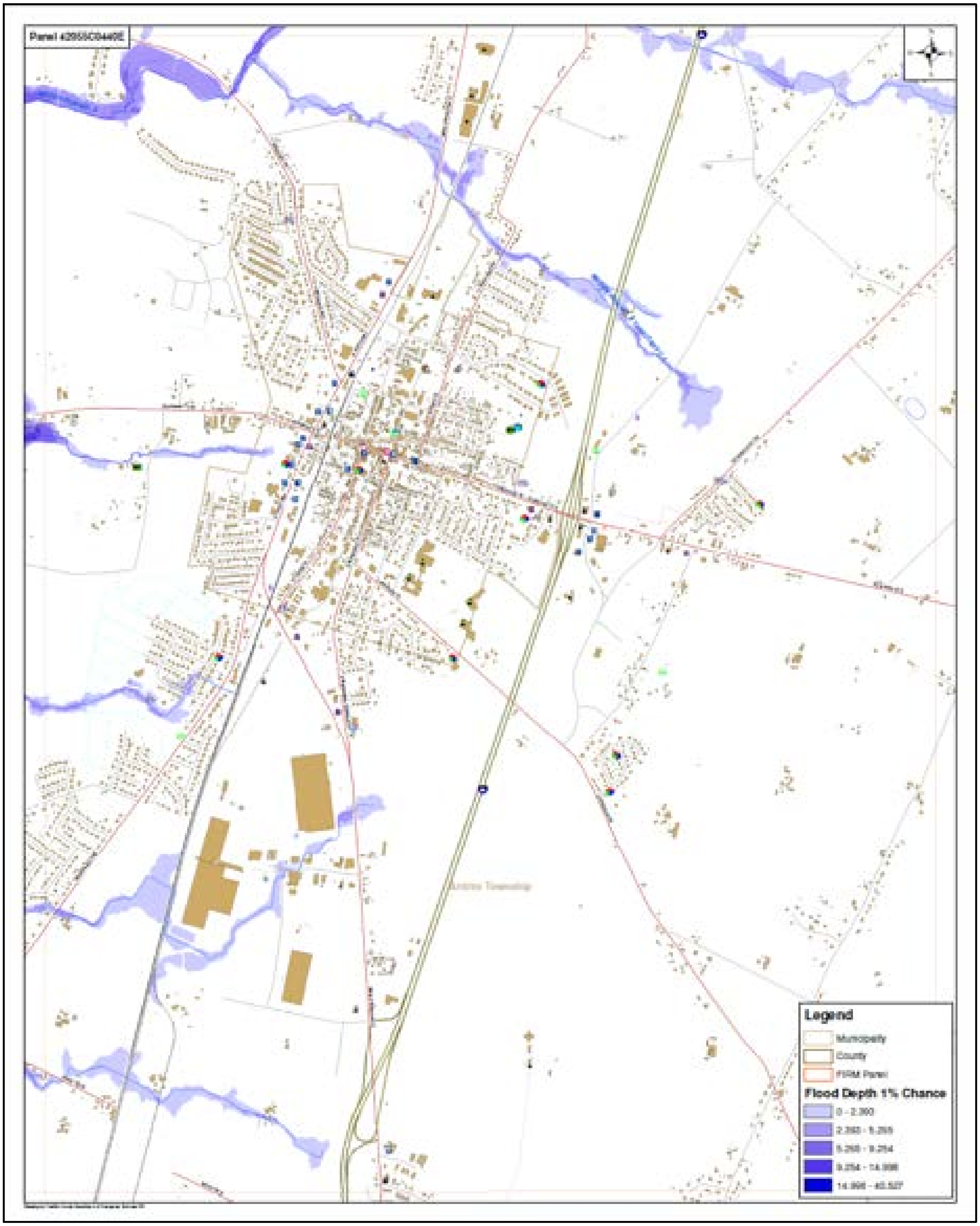


Figure D.103: Quadrant 4, Panel Number 42055C0440E

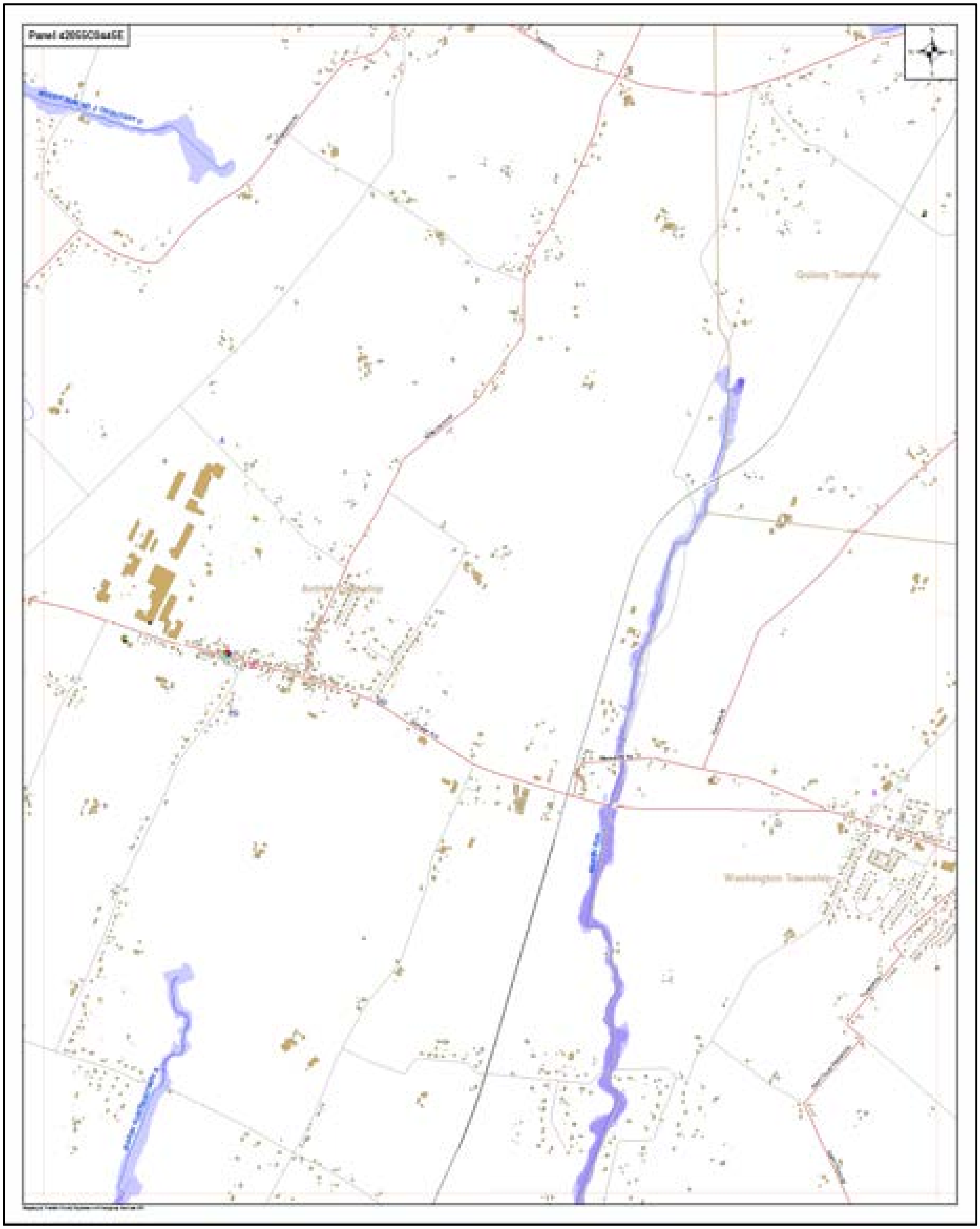


Figure D.104: Quadrant 4, Panel Number 42055C0445E

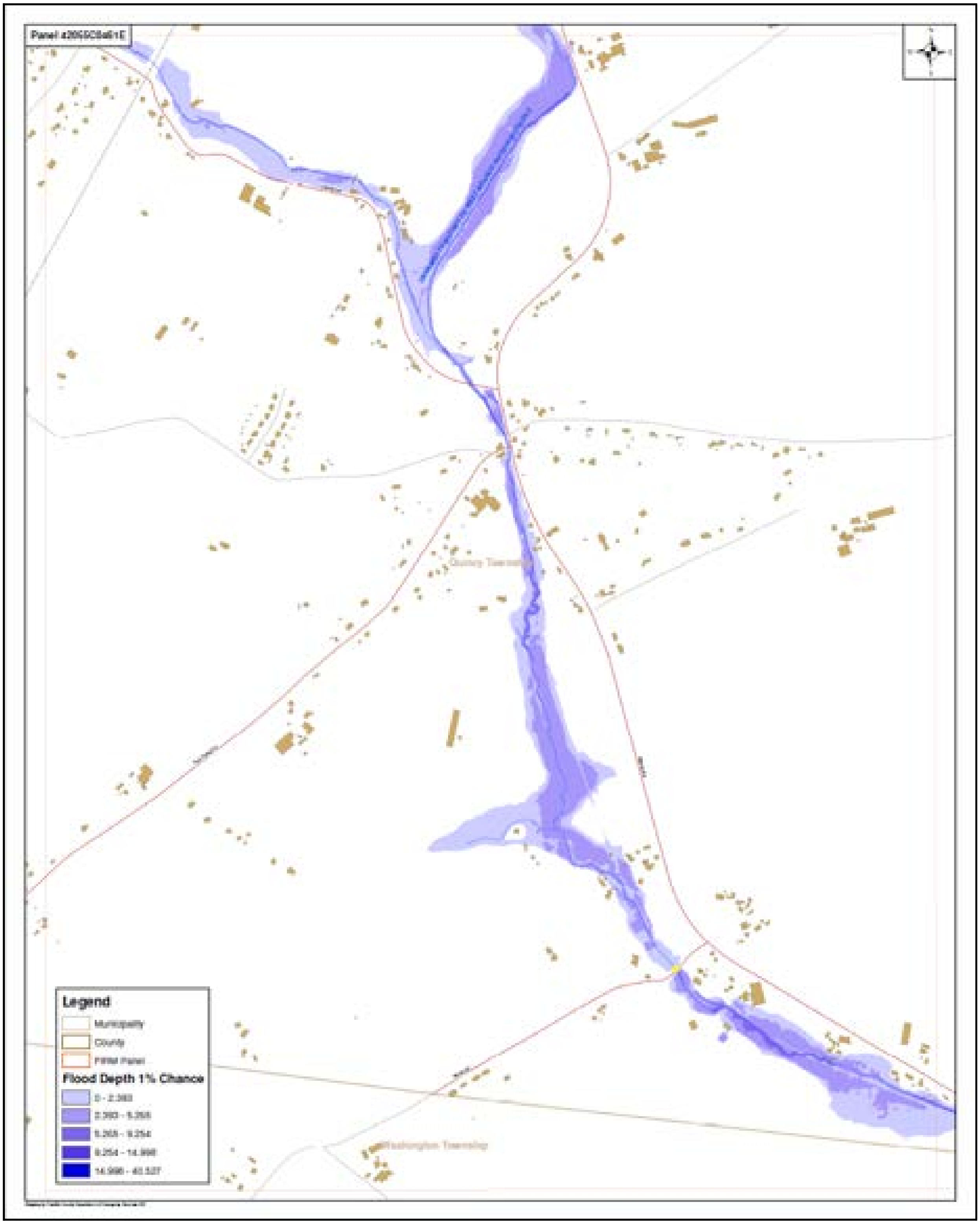


Figure D.105: Quadrant 4, Panel Number 42055C0461E

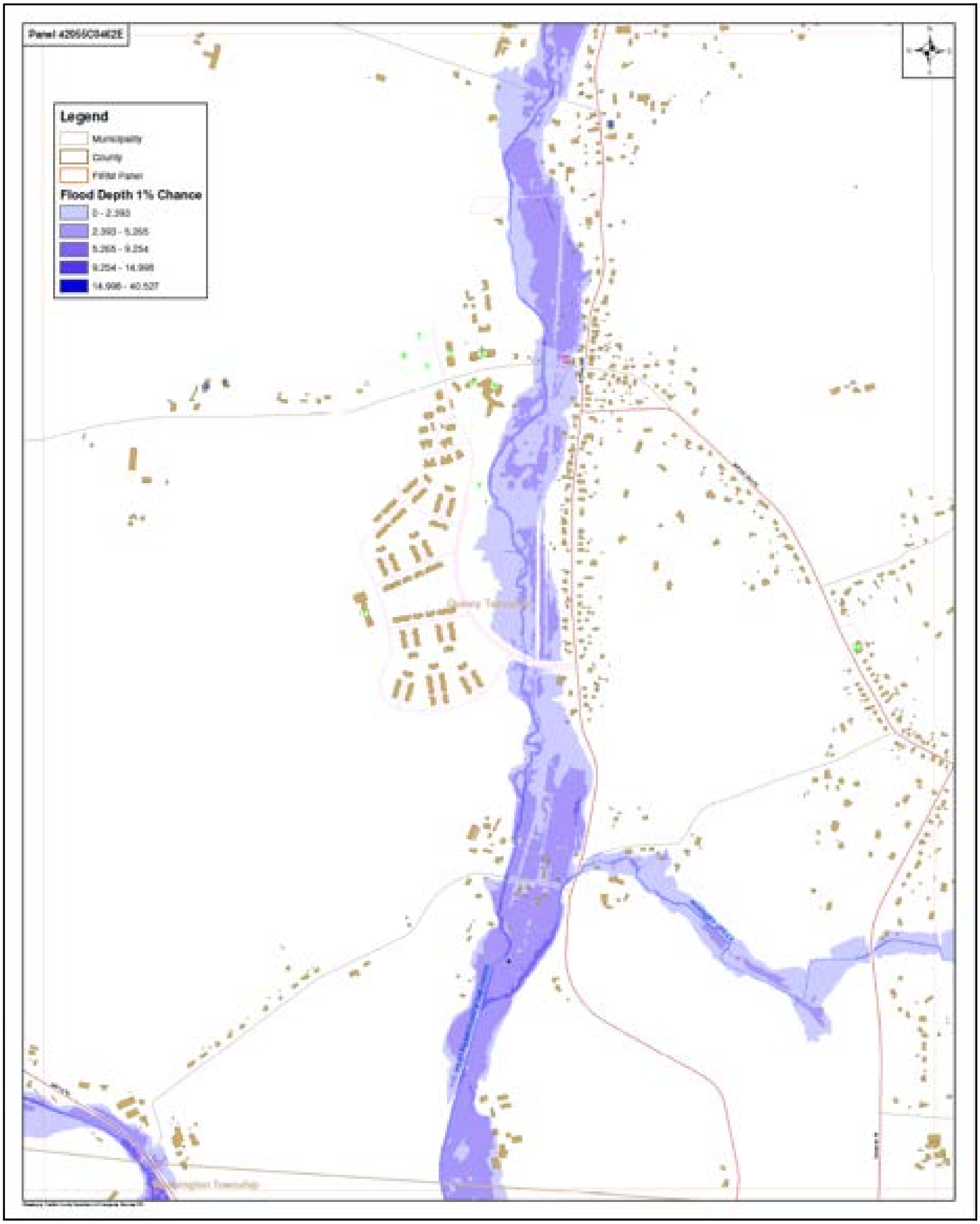


Figure D.106: Quadrant 4, Panel Number 42055C0462E

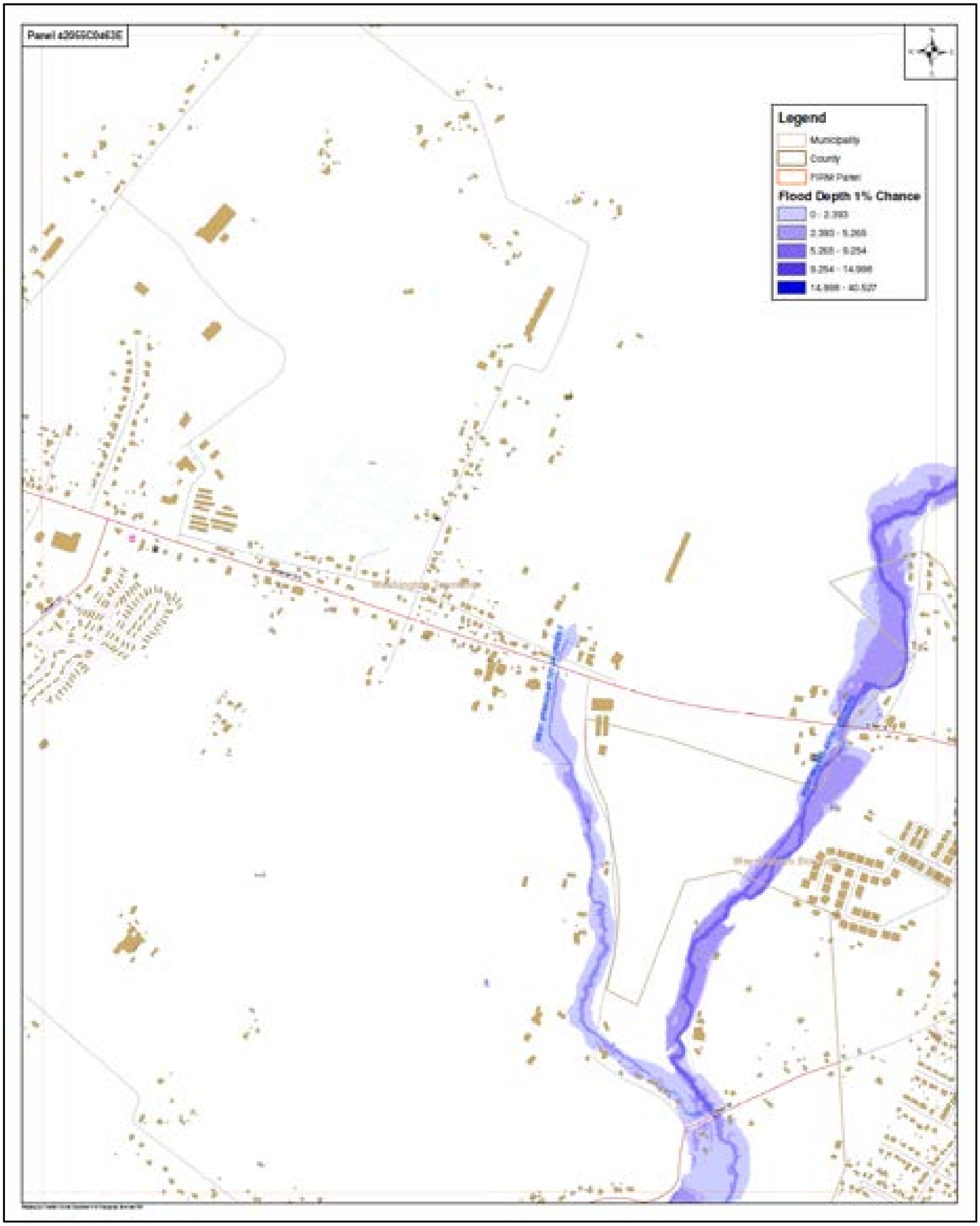


Figure D.107: Quadrant 4, Panel Number 42055C0463E

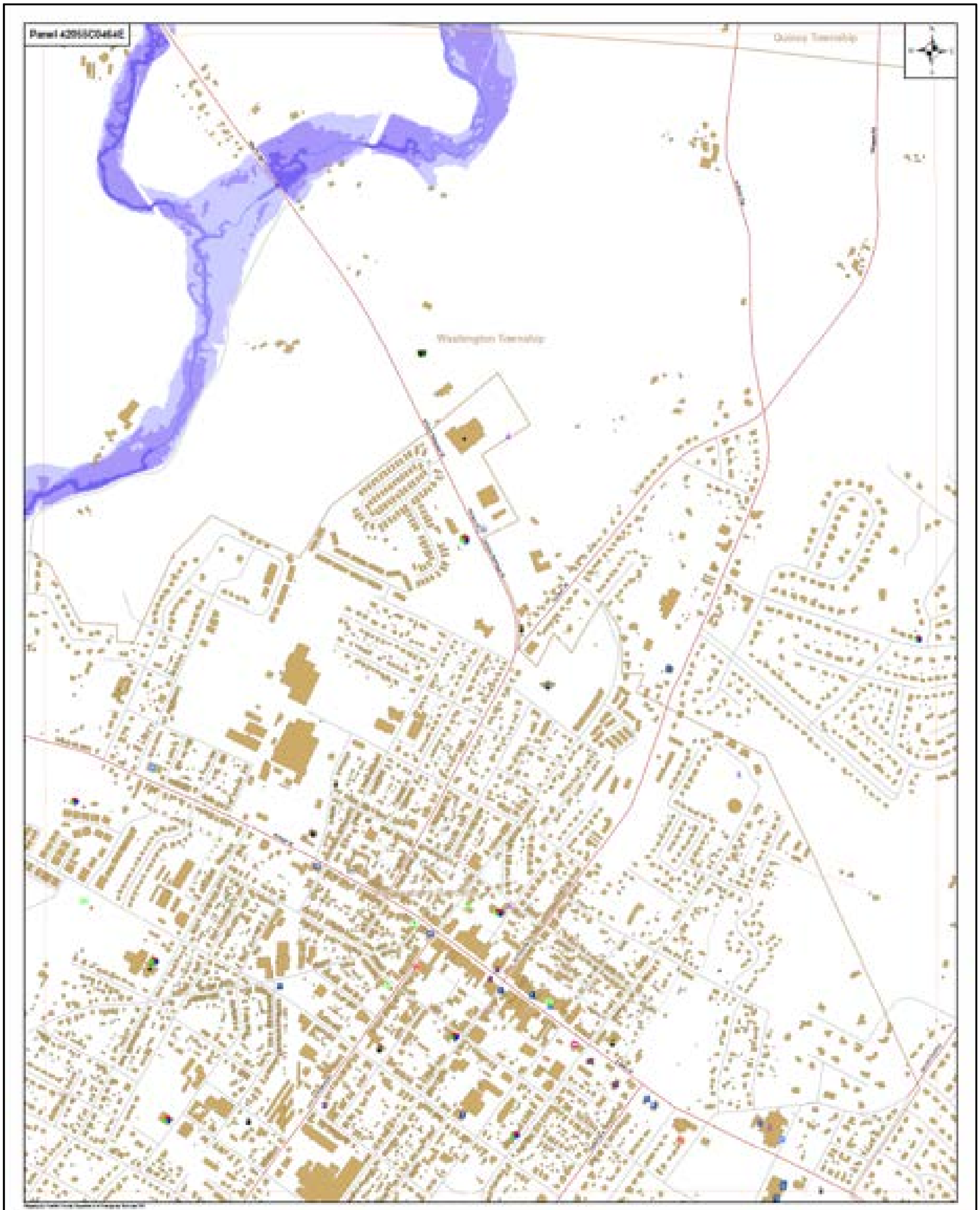


Figure D.108: Quadrant 4, Panel Number 42055C0464E

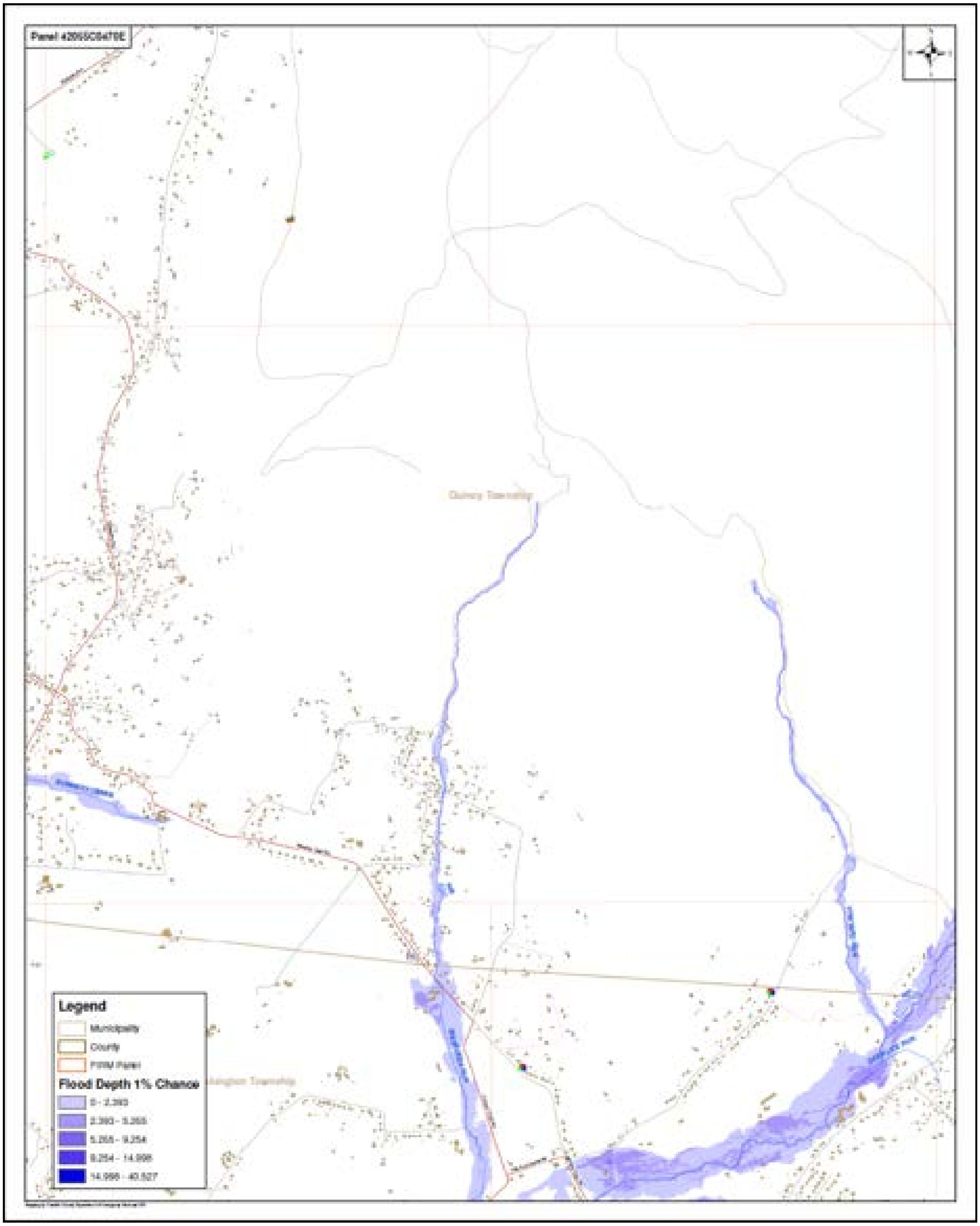


Figure D.109: Quadrant 4, Panel Number 42055C0470E

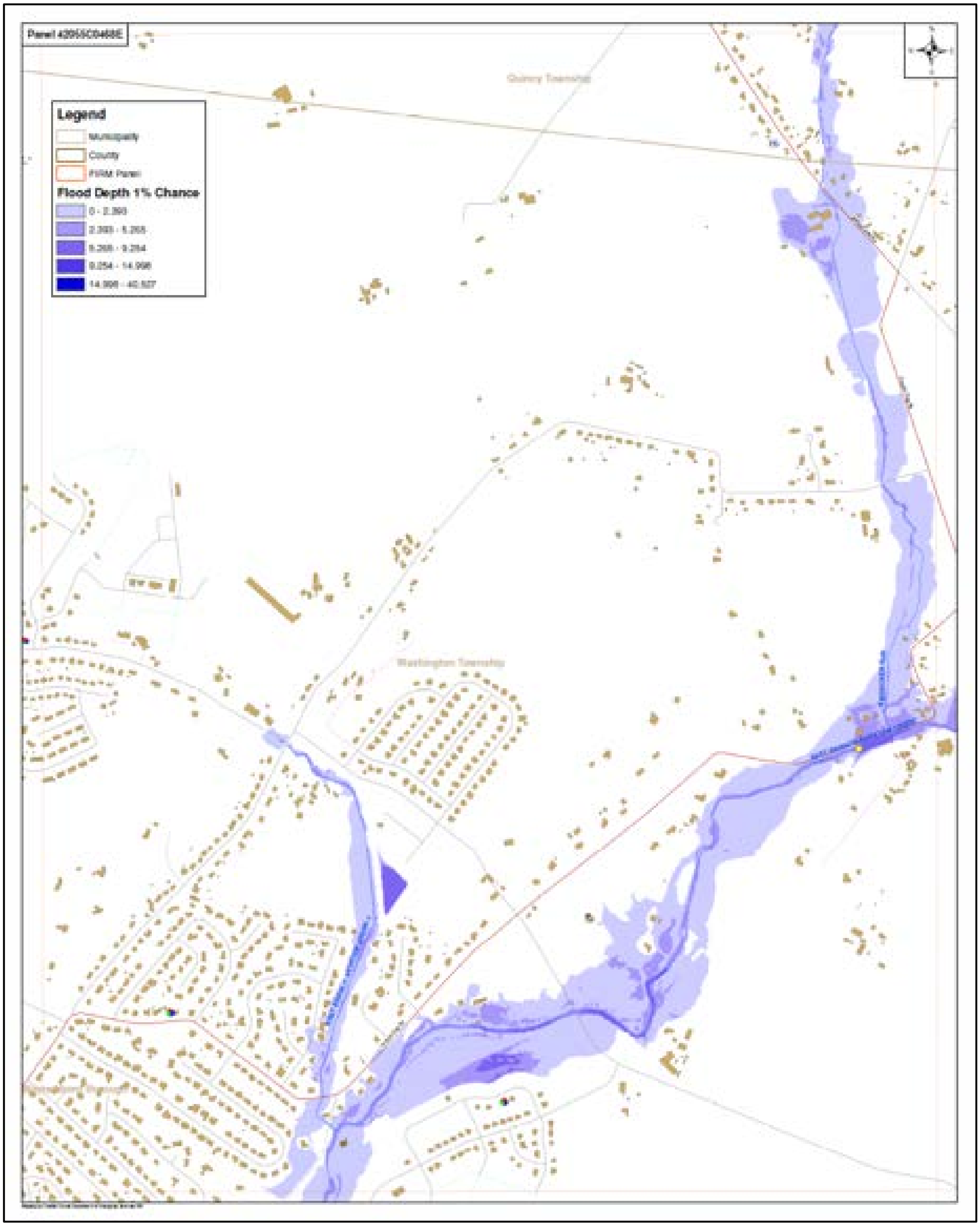


Figure D.110: Quadrant 4, Panel Number 42055C0468E

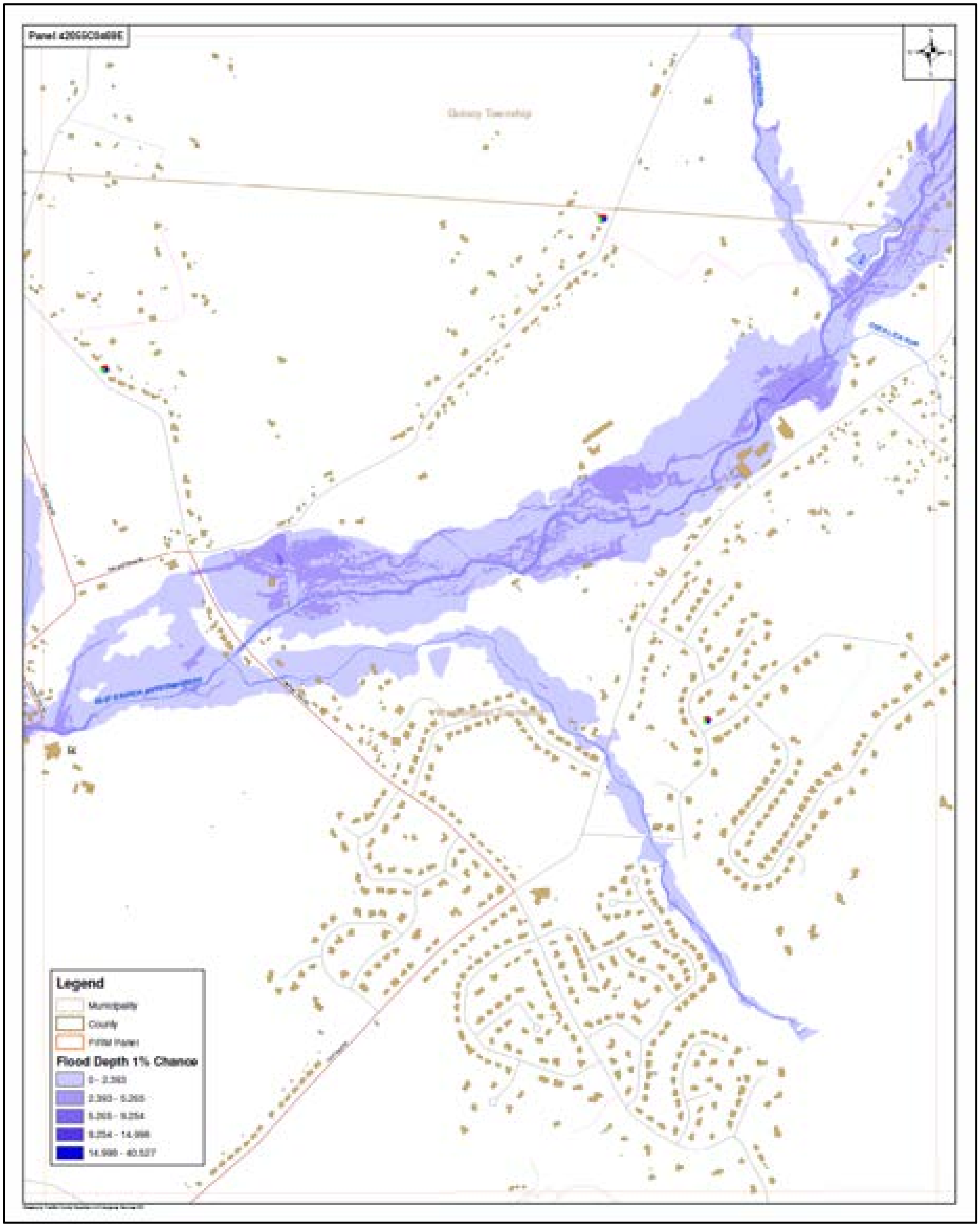


Figure D.111: Quadrant 4, Panel Number 42055C0469E

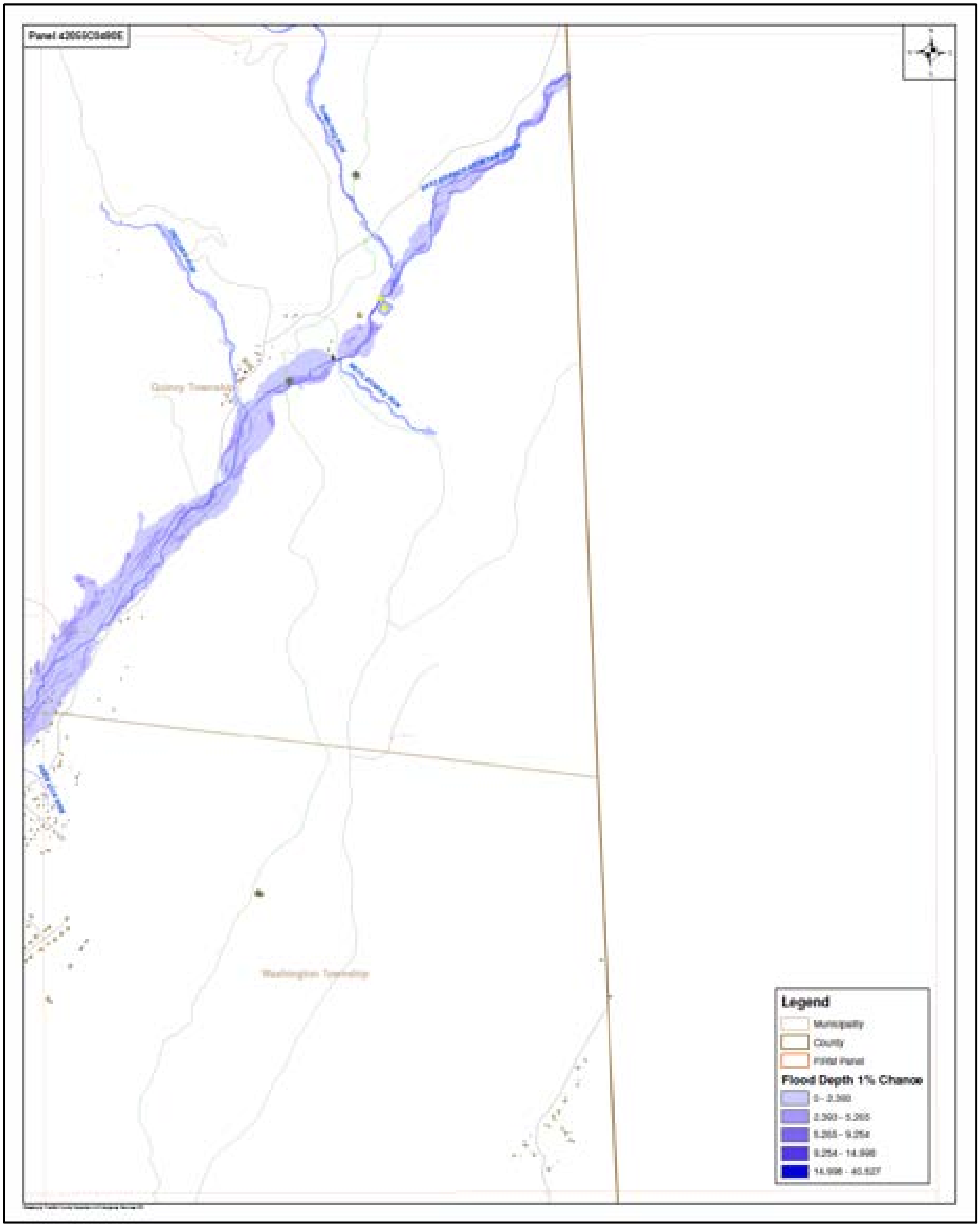


Figure D.112: Quadrant 4, Panel Number 42055C0490E

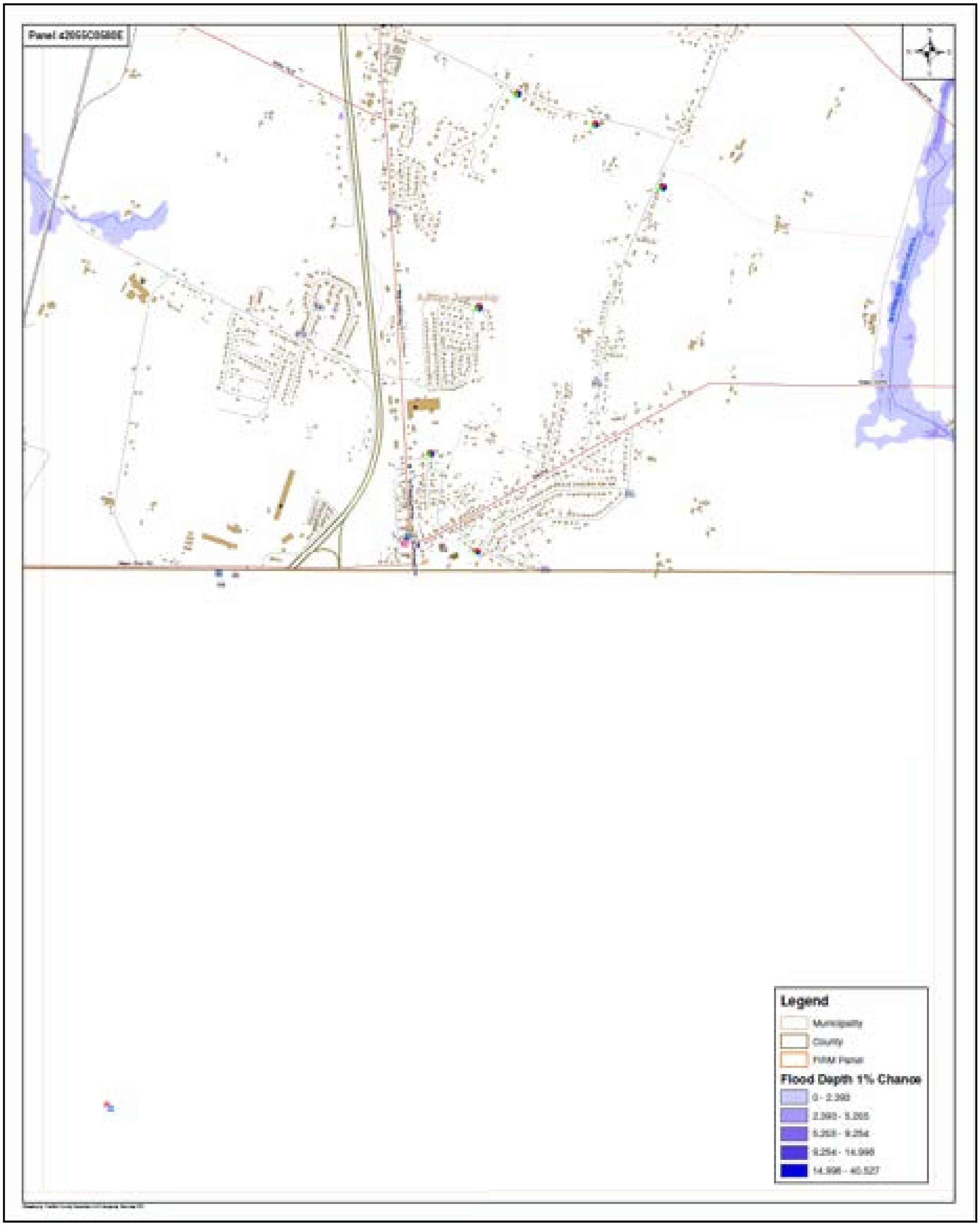


Figure D.113: Quadrant 4, Panel Number 42055C0580E

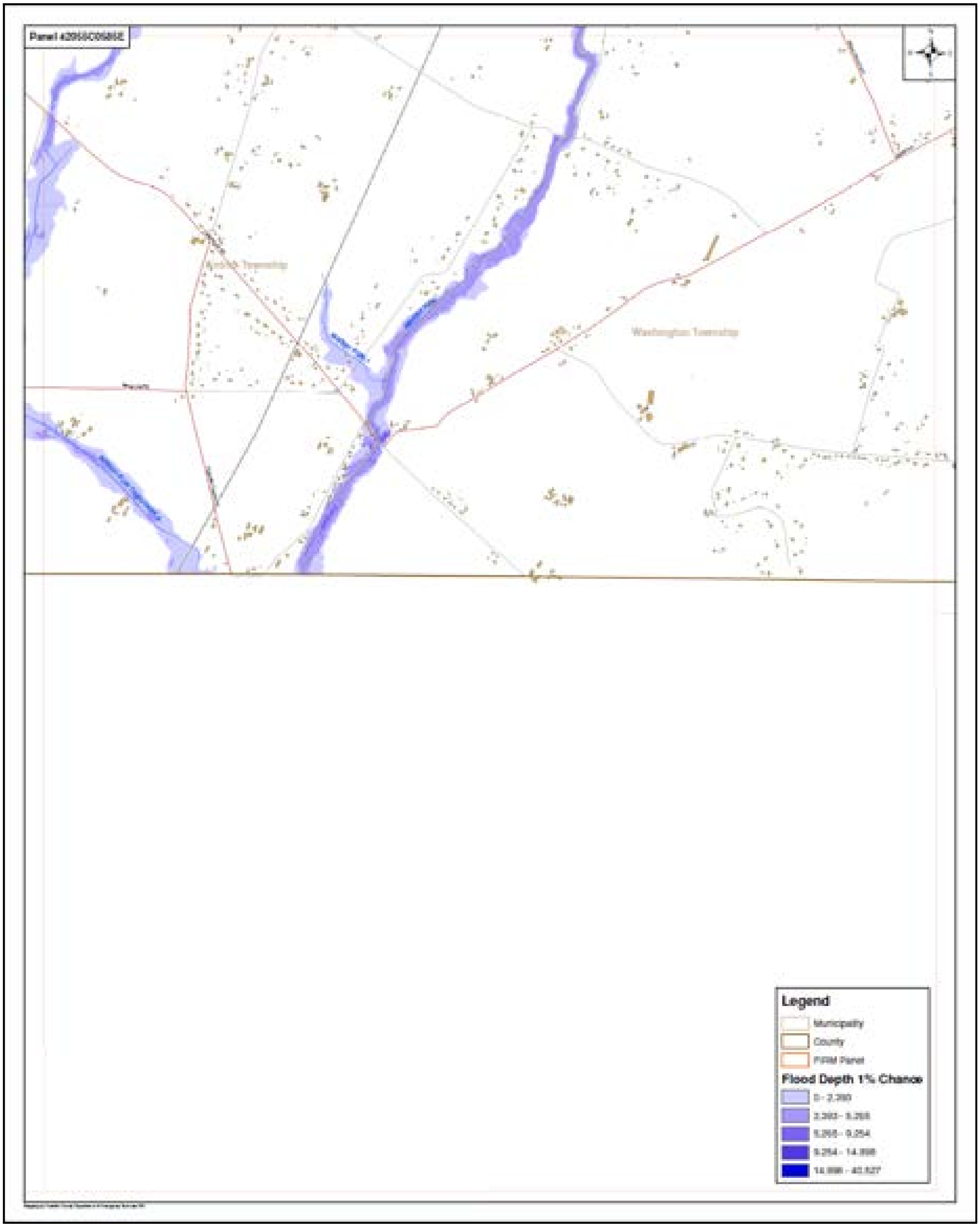


Figure D.114: Quadrant 4, Panel Number 42055C0585E

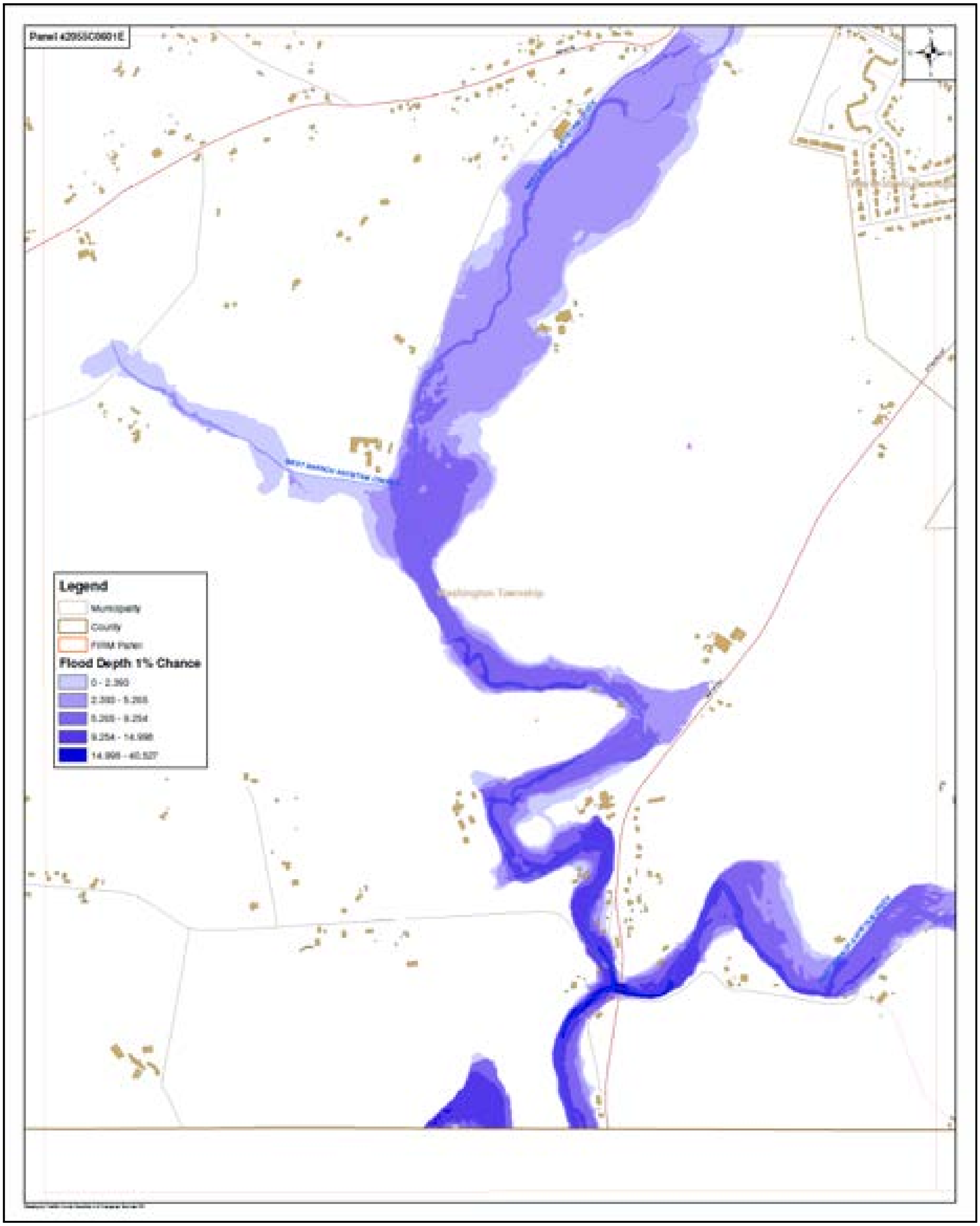


Figure D.115: Quadrant 4, Panel Number 42055C0601E

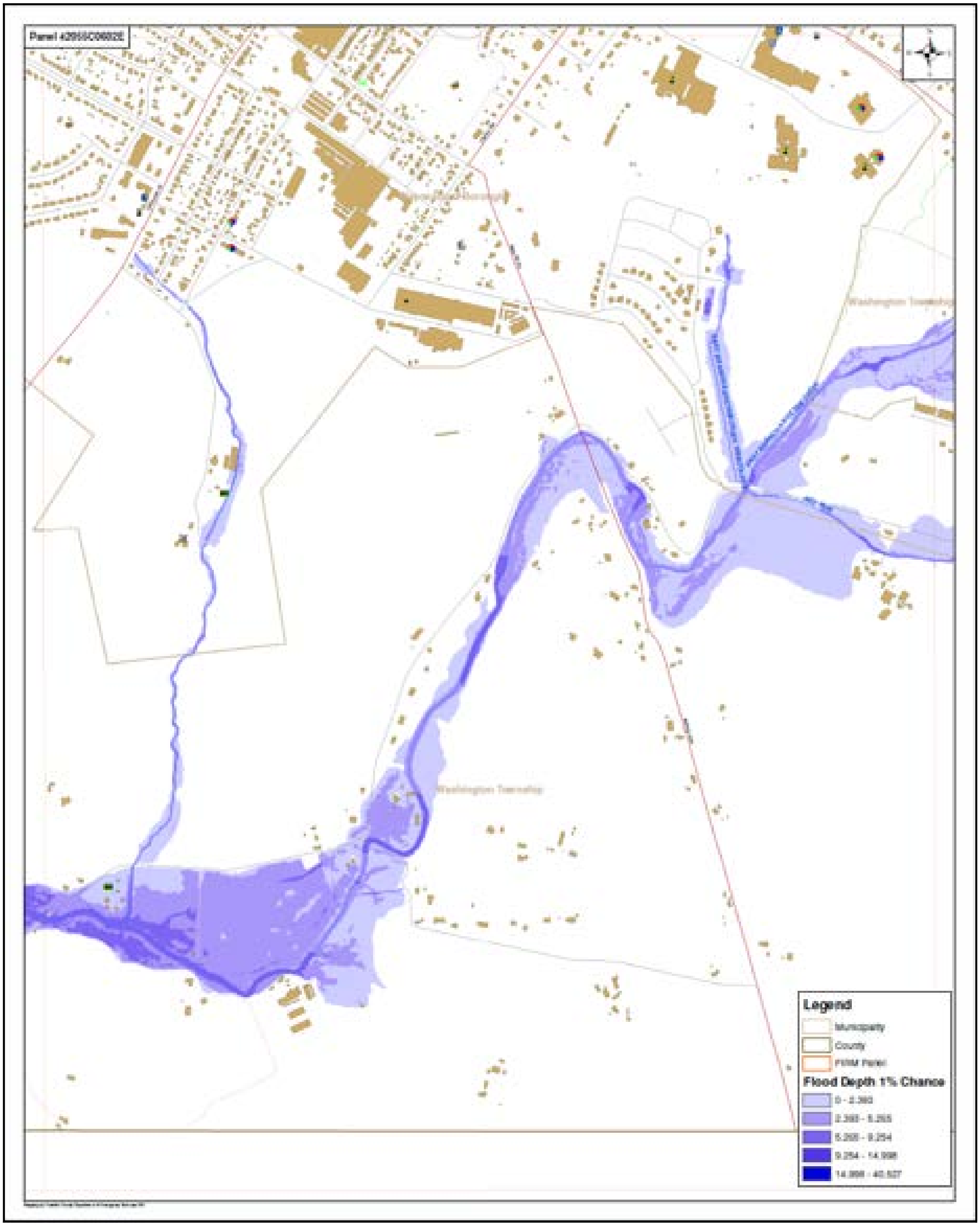


Figure D.116: Quadrant 4, Panel Number 42055C0602E

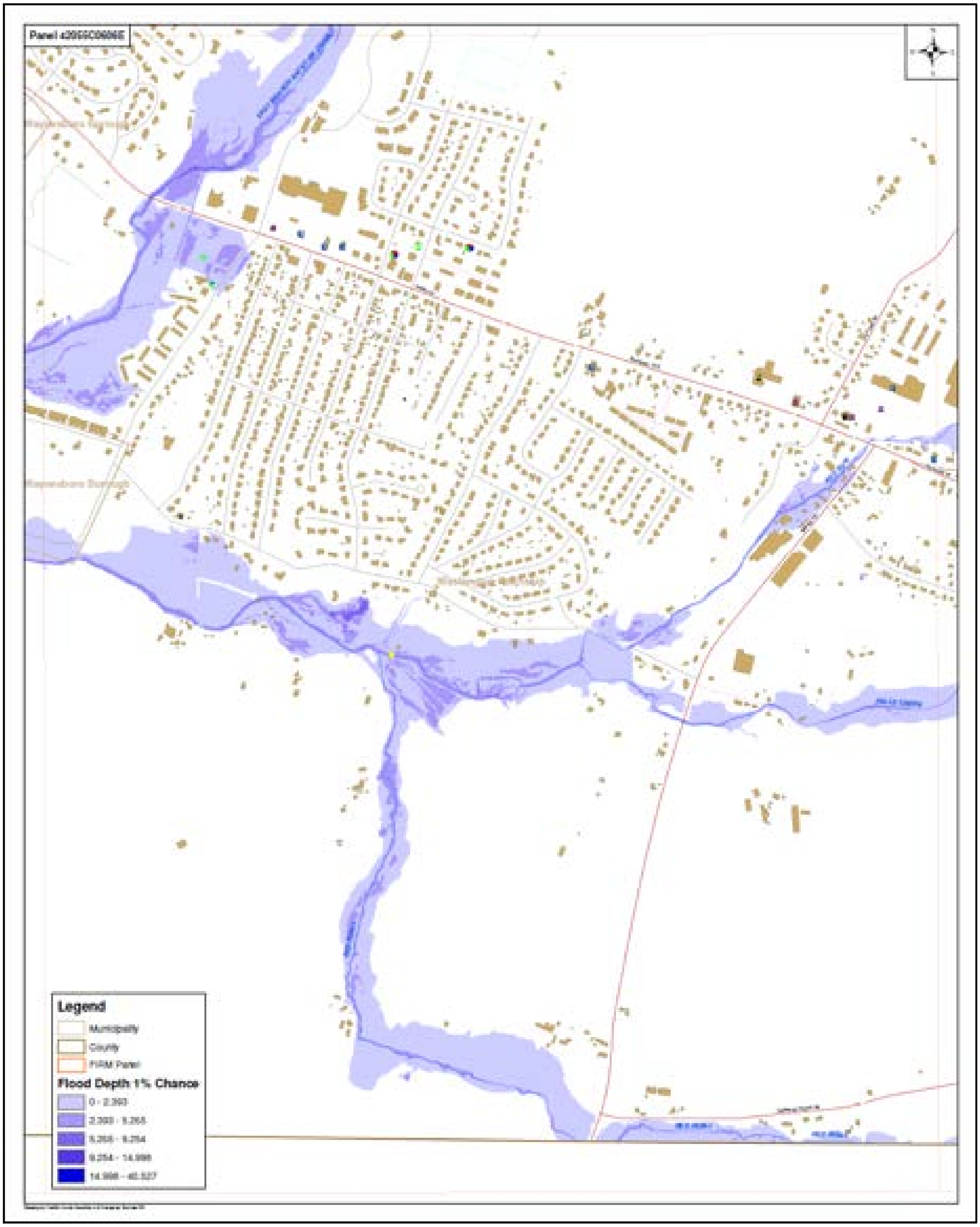


Figure D.117: Quadrant 4, Panel Number 42055C0606E

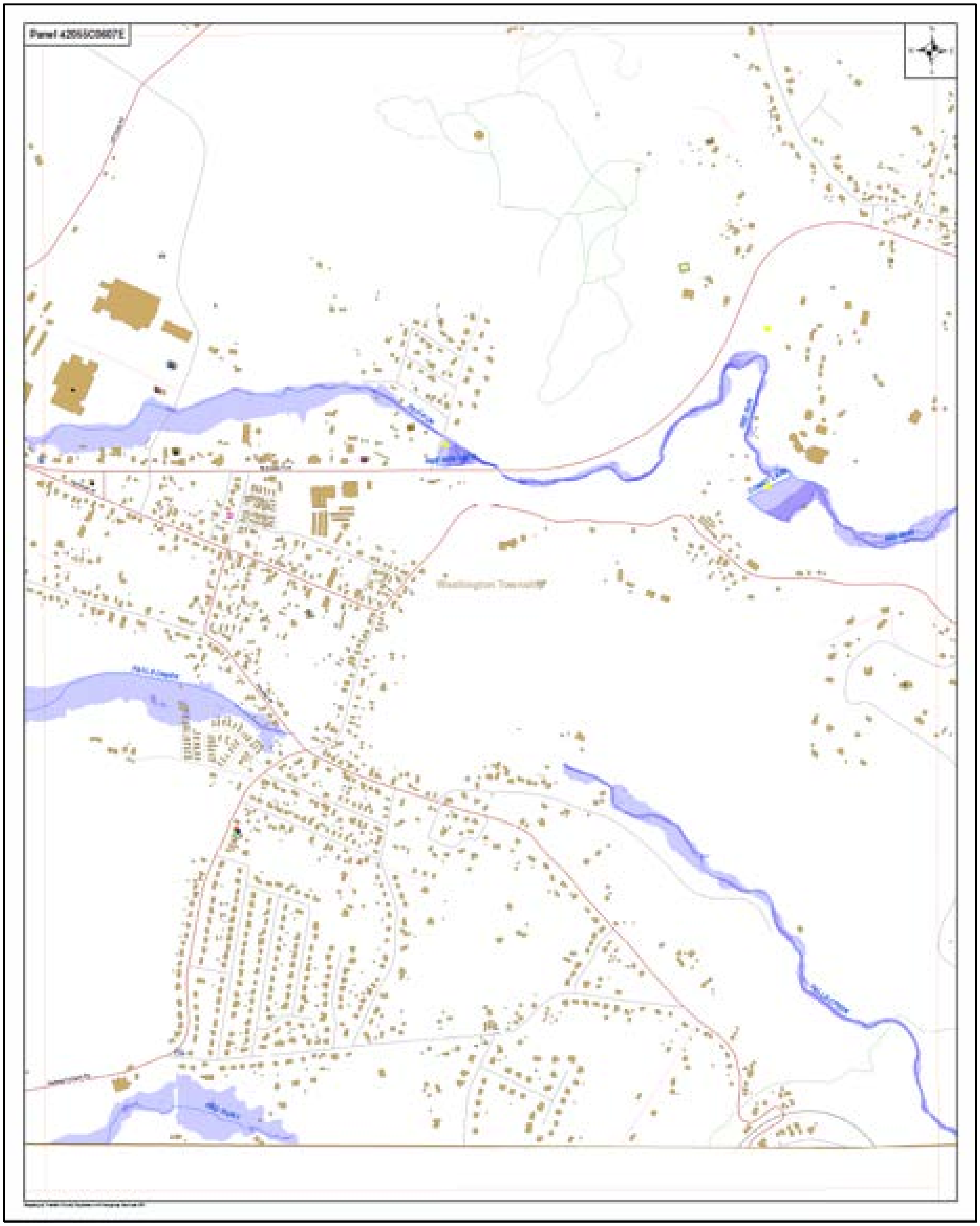


Figure D.118: Quadrant 4, Panel Number 42055C0607E

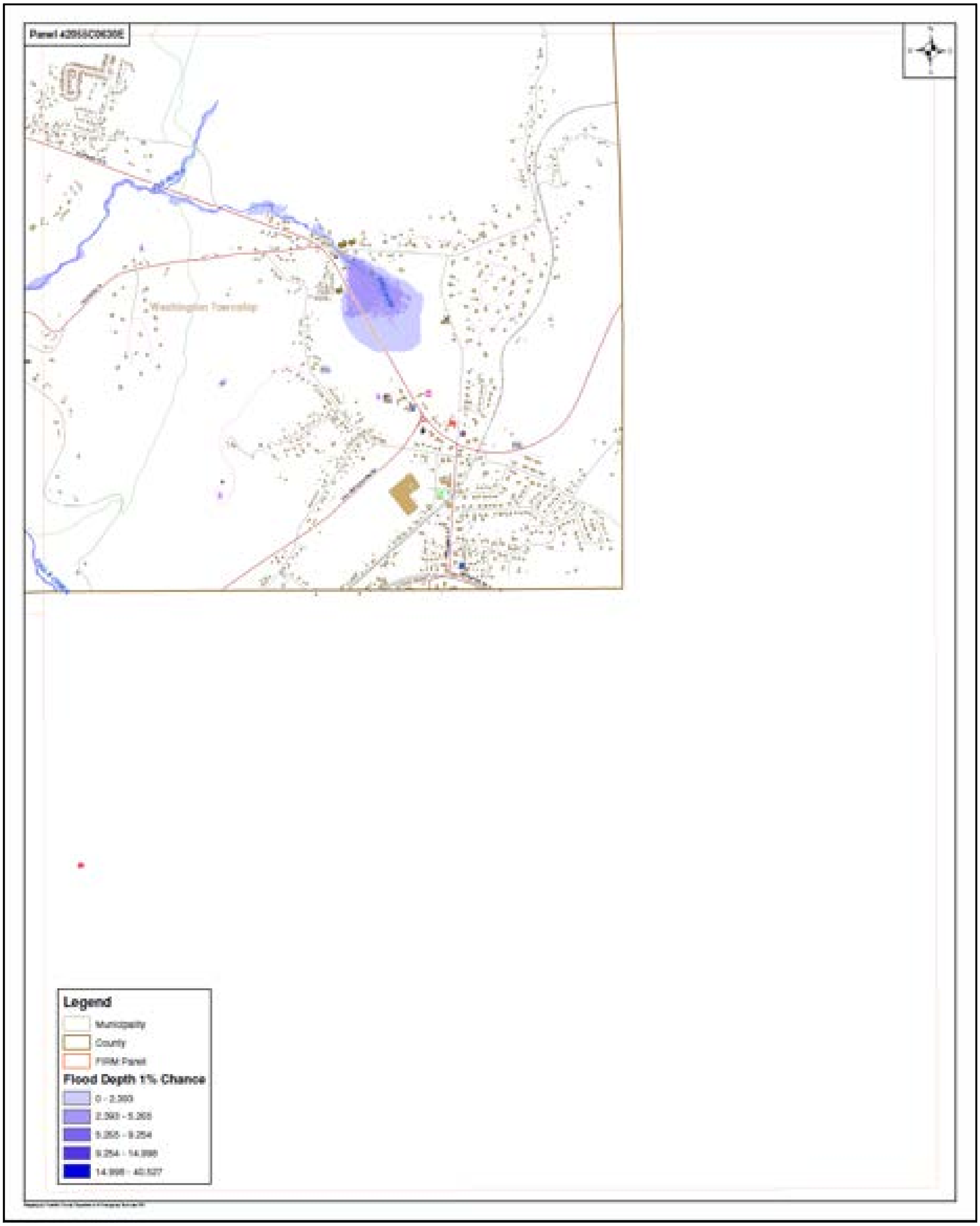


Figure D.119: Quadrant 4, Panel Number 42055C0630E

Appendix E: Franklin County Windstorm Events (1963 – 2017)

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Guilford Township	4/22/63	2200	Thunderstorm Wind		0	0	$0	$0
Quincy Township	8/26/65	1400	Thunderstorm Wind		0	0	$0	$0
Guilford Township	7/27/69	1600	Thunderstorm Wind		0	0	$0	$0
Montgomery Township	5/24/70	1325	Thunderstorm Wind		0	0	$0	$0
Southampton Township	6/18/70	1335	Thunderstorm Wind		0	0	$0	$0
Washington Township	6/18/70	1400	Thunderstorm Wind		0	0	$0	$0
Guilford Township	7/15/70	1350	Thunderstorm Wind		0	0	$0	$0
Letterkenny Township	6/7/71	1315	Thunderstorm Wind		0	0	$0	$0
Guilford Township	6/14/71	1500	Thunderstorm Wind		0	0	$0	$0
Guilford Township	8/7/73	1600	Thunderstorm Wind	55	0	0	$0	$0
Hamilton Township	6/10/74	1650	Thunderstorm Wind		0	0	$0	$0
Mercersburg Borough	6/10/74	1630	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	3/21/76	1100	Thunderstorm Wind	61	0	0	$0	$0
Hamilton Township	5/18/76	0008	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	7/11/76	1430	Thunderstorm Wind	55	0	0	$0	$0
Hamilton Township	4/5/77	1700	Thunderstorm Wind	72	0	0	$0	$0
Greene Township	7/17/77	1600	Thunderstorm Wind	60	0	0	$0	$0
Chambersburg Borough	8/8/77	1530	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	8/7/78	1430	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	5/12/80	1700	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	7/21/80	1600	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	8/11/80	1530	Thunderstorm Wind	56	0	0	$0	$0
Hamilton Township	9/2/80	1835	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	7/20/81	1400	Thunderstorm Wind		0	0	$0	$0
Metal Township	10/1/81	1700	Thunderstorm Wind		0	0	$0	$0
Waynesboro Borough	9/2/82	1520	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	7/21/83	1700	Thunderstorm Wind	76	0	0	$0	$0
Hamilton Township	7/21/83	1715	Thunderstorm Wind	87	0	0	$0	$0
St Thomas Township	7/21/83	1730	Thunderstorm Wind		0	0	$0	$0
Washington Township	7/26/87	1130	Thunderstorm Wind	69	0	0	$0	$0
Hamilton Township	7/30/88	1735	Thunderstorm Wind		0	0	$0	$0
Chambersburg Borough	8/6/88	1305	Thunderstorm Wind		0	0	$0	$0
Guilford Township	8/6/88	1324	Thunderstorm Wind		0	0	$0	$0
Antrim Township	8/15/88	1532	Thunderstorm Wind		0	0	$0	$0
Quincy Township	8/15/88	1517	Thunderstorm Wind		0	0	$0	$0
Warren Township	8/15/88	1508	Thunderstorm Wind		0	0	$0	$0
Washington Township	3/31/89	1345	Thunderstorm Wind		0	0	$0	$0

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Antrim Township	11/20/89	1810	Thunderstorm Wind		0	0	$0	$0
Chambersburg Borough	11/20/89	2015	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	11/20/89	1810	Thunderstorm Wind	72	0	0	$0	$0
Washington Township	5/10/90	1200	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	6/8/90	1445	Thunderstorm Wind		0	0	$0	$0
Washington Township	6/18/90	1335	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	6/30/90	1900	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	4/9/91	2003	Thunderstorm Wind		0	0	$0	$0
Mercersburg Borough	4/9/91	2003	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	5/6/91	1415	Thunderstorm Wind	57	0	0	$0	$0
Waynesboro Borough	5/6/91	1420	Thunderstorm Wind	61	0	0	$0	$0
Waynesboro Borough	5/13/91	1230	Thunderstorm Wind		0	0	$0	$0
Guilford Township	7/7/91	1100	Thunderstorm Wind		0	0	$0	$0
Hamilton Township	7/7/91	1045	Thunderstorm Wind	61	0	0	$0	$0
Greene Township	8/19/91	1645	Thunderstorm Wind		0	0	$0	$0
Guilford Township	9/18/91	1510	Thunderstorm Wind		0	0	$0	$0
Waynesboro Borough	1/14/92	0748	Thunderstorm Wind		0	0	$0	$0
Antrim Township	6/30/92	1415	Thunderstorm Wind		0	0	$0	$0
Letterkenny Township	7/17/92	1409	Thunderstorm Wind		0	0	$0	$0
Waynesboro Borough	7/17/92	1419	Thunderstorm Wind		0	0	$0	$0
Fannett Township	8/28/92	1605	Thunderstorm Wind		0	0	$0	$0
Waynesboro Borough	9/10/92	1540	Thunderstorm Wind		0	0	$0	$0
Quincy Township	8/11/93	2007	Thunderstorm Wind		0	0	$0	$0
Antrim Township	4/30/94	2000	Thunderstorm Wind		0	0	$50,000	$0
Chambersburg Borough	6/6/94	1350	Thunderstorm Wind		0	1	$500	$0
Waynesboro Borough	7/6/94	1610	Thunderstorm Wind		0	0	$5,000	$0
Chambersburg Borough	7/7/94	1930	Thunderstorm Wind		0	0	$500	$0
Greencastle Borough	5/25/95	1715	Thunderstorm Wind		0	0	$0	$0
Chambersburg Borough	6/2/95	1630	Thunderstorm Wind		0	0	$0	$0
Guilford Township	6/7/95	1800	Thunderstorm Wind		0	0	$0	$0
Chambersburg Borough	6/11/95	1800	Thunderstorm Wind		0	0	$0	$0
Antrim Township	6/21/95	1545	Thunderstorm Wind		0	0	$0	$0
Mercersburg Borough	6/21/95	1545	Thunderstorm Wind		0	0	$0	$0
Quincy Township	6/25/95	1715	Thunderstorm Wind		0	0	$0	$0
Greene Township	7/1/95	1330	Thunderstorm Wind		0	0	$0	$0
Chambersburg Borough	7/4/95	2125	Thunderstorm Wind		0	0	$0	$0
Mercersburg Borough	7/6/95	1303	Thunderstorm Wind		0	0	$0	$0

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Waynesboro Borough	7/10/95	2000	Thunderstorm Wind		0	0	$0	$0
Greene Township	7/15/95	2030	Thunderstorm Wind		0	0	$0	$0
Greene Township	7/15/95	2330	Thunderstorm Wind		0	0	$0	$0
Letterkenny Township	7/15/95	2122	Thunderstorm Wind		0	0	$0	$0
Guilford Township	8/5/95	1300	Thunderstorm Wind		0	0	$0	$0
Greencastle Borough	11/11/95	1725	Thunderstorm Wind	52	0	0	$0	$0
Greene Township	1/19/96	0940	Thunderstorm Wind		0	0	$500,000	$0
Franklin County	2/24/96	1200	High Wind	60	0	0	$0	$0
Hamilton Township	5/11/96	1304	Thunderstorm Wind		0	0	$20,000	$0
Shippensburg Borough	5/11/96	1327	Thunderstorm Wind		0	0	$0	$0
Mercersburg Borough	6/14/96	1700	Thunderstorm Wind		0	0	$0	$0
Washington Township	6/14/96	1700	Thunderstorm Wind		0	0	$0	$0
Antrim Township	6/24/96	1625	Thunderstorm Wind		0	0	$0	$0
Greene Township	6/24/96	1645	Thunderstorm Wind		0	0	$0	$0
Guilford Township	6/24/96	1645	Thunderstorm Wind		0	0	$0	$0
Mercersburg Borough	6/24/96	1616	Thunderstorm Wind		0	0	$0	$0
Guilford Township	6/30/96	1815	Thunderstorm Wind		0	0	$0	$0
Lurgan Township	7/3/96	0410	Thunderstorm Wind	50	0	0	$0	$0
Waynesboro Boroough	7/8/96	1550	Thunderstorm Wind	50	0	0	$0	$0
Letterkenny Township	7/30/96	1730	Thunderstorm Wind	50	0	0	$0	$0
Antrim Township	10/18/96	1815	Thunderstorm Wind	50	0	0	$0	$0
Fannett Township	10/18/96	1800	Thunderstorm Wind	50	0	0	$0	$0
Franklin County	5/3/97	1330	High Wind	50	1	0	$0	$0
Waynesboro Borough	7/9/97	1522	Thunderstorm Wind	54	0	0	$0	$0
Greene Township	7/21/96	2135	Thunderstorm Wind	51	0	0	$0	$0
Waynesboro Borough	7/28/96	1530	Thunderstorm Wind	51	0	0	$0	$0
Mercersburg Borough	8/17/96	1715	Thunderstorm Wind	51	0	0	$0	$0
Letterkenny Township	5/29/98	1730	Thunderstorm Wind	51	0	0	$0	$0
Hamilton Township	5/31/98	2233	Thunderstorm Wind	51	0	0	$0	$0
Waynesboro Borough	6/16/98	1810	Thunderstorm Wind	51	0	0	$0	$0
Antrim Township	6/30/98	1641	Thunderstorm Wind	51	0	0	$0	$0
Waynesboro Borough	1/18/99	1410	Thunderstorm Wind		0	0	$10,000	$0
Warren Township	2/12/99	1245	Thunderstorm Wind		0	0	$5,000	$0
Antrim Township	3/3/99	1905	Thunderstorm Wind		0	0	$2,000	$0
Hamilton Township	6/2/99	1715	Thunderstorm Wind		0	0	$5,000	$0
Franklin County	9/29/99	2000	High Wind	60	0	0	$0	$0
Antrim Township	6/2/00	1815	Thunderstorm Wind		0	0	$10,000	$0

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Mercersburg Borough	6/16/00	1600	Thunderstorm Wind		0	0	$2,000	$0
Mercersburg Borough	6/21/00	1820	Thunderstorm Wind		0	0	$3,000	$0
Hamilton Township	7/14/00	1953	Thunderstorm Wind		0	0	$2,000	$0
Hamilton Township	7/28/00	1725	Thunderstorm Wind		0	0	$3,000	$0
Franklin County	12/12/00	0400	High Wind		0	0	$13,900	$0
Franklin County	2/10/01	0200	High Wind		0	0	$5,550	$0
Hamilton Township	4/9/01	1815	Thunderstorm Wind		0	0	$10,000	$0
Hamilton Township	6/20/01	1515	Thunderstorm Wind	50	0	0	$0	$0
Mercersburg Borough	6/20/01	1535	Thunderstorm Wind	50	0	0	$0	$0
Hamilton Township	7/1/01	1530	Thunderstorm Wind	50	0	0	$0	$0
Quincy Township	7/10/01	1450	Thunderstorm Wind	50	0	0	$0	$0
Washington Township	8/4/01	1440	Thunderstorm Wind		0	0	$0	$0
Fannett Township	8/4/01	1734	Thunderstorm Wind	50	0	0	$0	$0
Franklin County	3/9/02	1930	High Wind	50	0	0	$0	$0
Antrim Township	5/12/02	1635	Thunderstorm Wind	50	0	0	$0	$0
Waynesboro Borough	5/12/02	1645	Thunderstorm Wind	50	0	0	$0	$0
Washington Township	6/5/02	1709	Thunderstorm Wind		0	0	$5,000	$0
Waynesboro Borough	6/5/02	1650	Thunderstorm Wind	50	0	0	$0	$0
Antrim Township	8/1/02	1632	Thunderstorm Wind	50	0	0	$0	$0
Hamilton Township	8/1/02	1557	Thunderstorm Wind	50	0	0	$0	$0
Montgomery Township	8/1/02	1624	Thunderstorm Wind	50	0	0	$0	$0
Southampton Township	8/2/02	1715	Thunderstorm Wind	50	0	0	$0	$0
Antrim Township	7/21/03	1445	Thunderstorm Wind	50	0	0	$0	$0
Waynesboro Borough	7/21/03	1850	Thunderstorm Wind	50	0	0	$0	$0
Greene Township	8/26/03	1420	Thunderstorm Wind	50	0	0	$0	$0
Hamilton Township	8/27/03	1745	Thunderstorm Wind	50	0	0	$0	$0
Franklin County	11/13/03	0500	High Wind	60	0	0	$0	$0
Letterkenny Township	11/19/03	1400	Thunderstorm Wind	50	0	0	$50,000	$0
Metal Township	5/7/04	1115	Thunderstorm Wind	50	0	0	$0	$0
Waynesboro Borough	5/25/04	1645	Thunderstorm Wind	50	0	0	$0	$0
St Thomas Township	7/31/04	1410	Thunderstorm Wind	50	0	0	$0	$0
Quincy Township	8/4/04	1700	Thunderstorm Wind	50	0	0	$0	$0
Guilford Township	8/20/04	1655	Thunderstorm Wind	50	0	0	$0	$0
Lurgan Township	8/20/04	1650	Thunderstorm Wind	50	0	0	$0	$0
Mercersburg Borough	8/20/04	1645	Thunderstorm Wind	50	0	0	$0	$0
Quincy Township	1/14/05	0040	Thunderstorm Wind	50	0	0	$0	$0
Antrim Township	6/6/05	1430	Thunderstorm Wind	50	0	0	$0	$0

Appendix E: Franklin County Windstorm Events (1963 – 2017)

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Antrim Township	6/6/05	1615	Thunderstorm Wind	50	0	0	$0	$0
St Thomas Township	6/6/05	1430	Thunderstorm Wind	50	0	0	$0	$0
Antrim Township	7/21/05	1439	Thunderstorm Wind	50	0	0	$0	$0
Quincy Township	11/29/05	1817	Thunderstorm Wind	50	0	0	$0	$0
Mercersburg Borough	7/18/06	1550	Thunderstorm Wind	50	0	0	$0	$0
Hamilton Township	9/28/06	1550	Thunderstorm Wind	50	0	0	$0	$0
Fannett Township	11/16/06	1320	Thunderstorm Wind	50	0	0	$0	$0
Franklin County	12/1/06	1500	High Wind	45	0	0	$5,000	$0
Waynesboro Borough	6/1/07	2035	Thunderstorm Wind	50	0	0	$0	$0
Waynesboro Borough	6/8/07	1855	Thunderstorm Wind	50	0	0	$0	$0
Antrim Township	6/12/07	1815	Thunderstorm Wind	50	0	0	$0	$0
Chambersburg Borough	6/13/07	1615	Thunderstorm Wind	50	0	0	$0	$0
Letterkenny Township	7/29/07	1110	Thunderstorm Wind	50	0	0	$0	$0
Letterkenny Township	8/9/07	1715	Thunderstorm Wind	50	0	0	$0	$0
Waynesboro Borough	8/9/07	1025	Thunderstorm Wind	50	0	0	$0	$0
Fannett Township	6/10/08	1630	Thunderstorm Wind	50	0	0	$3,000	$0
Fannett Township	6/10/08	1635	Thunderstorm Wind	61	0	0	$3,000	$0
Fannett Township	6/10/08	1635	Thunderstorm Wind	61	0	0	$1,000	$0
Mercersburg Borough	6/20/08	1449	Thunderstorm Wind	50	0	0	$2,500	$0
Mercersburg Borough	7/26/08	1456	Thunderstorm Wind	61	0	0	$0	$0
Chambersburg Borough	8/2/08	1235	Thunderstorm Wind	50	0	0	$0	$0
Franklin County	12/31/08	0800	High Wind	50	0	0	$5,000	$0
Franklin County	2/12/09	0100	High Wind	50	0	0	$25,000	$0
Greencastle Borough	6/13/09	1721	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	7/23/09	1615	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	7/29/09	1641	Thunderstorm Wind	60	0	0	$10,000	$0
Mercersburg Borough	7/29/09	1530	Thunderstorm Wind	60	0	0	$5,000	$0
Peters Township	7/29/09	1534	Thunderstorm Wind	60	0	0	$12,000	$0
Chambersburg Borough	4/8/10	1630	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	4/16/10	1641	Thunderstorm Wind	50	0	0	$5,000	$0
Guilford Township	5/14/10	1630	Thunderstorm Wind	61	0	0	$10,000	$0
Hamilton Township	6/4/10	1730	Thunderstorm Wind	50	0	0	$5,000	$0
Lurgan Township	6/12/10	1645	Thunderstorm Wind	50	0	0	$5,000	$0
Metal Township	6/24/10	1245	Thunderstorm Wind	50	0	0	$5,000	$0
Fannett Township	7/25/10	1219	Thunderstorm Wind	50	0	0	$5,000	$0
Lurgan Township	7/25/10	1220	Thunderstorm Wind	50	0	0	$5,000	$0
Greencastle Borough	8/4/10	1750	Thunderstorm Wind	50	0	0	$5,000	$0

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Chambersburg Borough	9/22/10	1735	Thunderstorm Wind	50	0	0	$5,000	$0
Shippensburg Borough	9/22/10	1742	Thunderstorm Wind	50	0	0	$5,000	$0
St Thomas Township	9/22/10	1732	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	5/26/11	1625	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	5/26/11	1710	Thunderstorm Wind	50	0	0	$5,000	$0
Greencastle Borough	5/26/11	1653	Thunderstorm Wind	52	0	0	$0	$0
Guilford Township	5/26/11	1713	Thunderstorm Wind	61	0	0	$0	$0
Mercersburg Borough	5/26/11	1640	Thunderstorm Wind	50	0	0	$5,000	$0
Waynesboro Borough	5/27/11	1912	Thunderstorm Wind	50	0	0	$5,000	$0
Guilford Township	6/9/11	1625	Thunderstorm Wind	50	0	0	$5,000	$0
Guilford Township	8/14/11	1734	Thunderstorm Wind	50	0	0	$5,000	$0
Quincy Township	8/14/11	1717	Thunderstorm Wind	50	0	0	$5,000	$0
Washington Township	8/14/11	1746	Thunderstorm Wind	50	0	0	$2,000	$0
Washington Township	8/14/11	1750	Thunderstorm Wind	50	0	0	$5,000	$0
Waynesboro Borough	8/14/11	1733	Thunderstorm Wind	50	0	0	$5,000	$0
Waynesboro Borough	8/14/11	1737	Thunderstorm Wind	50	0	0	$0	$0
Montgomery Township	9/4/11	2005	Thunderstorm Wind	50	0	0	$10,000	$0
Guilford Township	9/14/11	1715	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	5/27/12	1820	Thunderstorm Wind	76	0	0	$0	$0
Chambersburg Borough	5/27/12	1820	Thunderstorm Wind	50	0	0	$5,000	$0
St Thomas Township	5/29/12	1515	Thunderstorm Wind	50	0	0	$5,000	$0
St Thomas Township	5/29/12	1530	Thunderstorm Wind	50	0	0	$15,000	$0
Mercersburg Borough	6/29/12	2025	Thunderstorm Wind	50	0	0	$5,000	$0
Greencastle Borough	7/3/12	1722	Thunderstorm Wind	50	0	0	$1,000	$0
Greene Twonship	7/15/12	1352	Thunderstorm Wind	50	0	0	$5,000	$0
Hamilton Township	7/15/12	1340	Thunderstorm Wind	50	0	0	$5,000	$0
Antrim Township	7/18/12	1400	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	7/18/12	1327	Thunderstorm Wind	50	0	0	$5,000	$0
Guilford Township	7/18/12	1330	Thunderstorm Wind	50	0	0	$5,000	$0
Hamilton Township	7/18/12	1326	Thunderstorm Wind	50	0	0	$7,500	$0
Greene Township	8/3/12	1310	Thunderstorm Wind	50	0	0	$2,500	$0
Hamilton Township	8/5/12	1340	Thunderstorm Wind	50	0	0	$5,000	$0
St Thomas Township	8/5/12	1337	Thunderstorm Wind	50	0	0	$7,500	$0
Franklin County	10/29/12	1600	High Wind	50	0	0	$0	$0
Greencastle Borough	4/24/13	1640	Thunderstorm Wind	50	0	0	$2,000	$0
Mercersburg Borough	4/24/13	1630	Thunderstorm Wind	50	0	0	$2,000	$0
Washington Township	6/2/13	1450	Thunderstorm Wind	50	0	0	$10,000	$0

Appendix E: Franklin County Windstorm Events (1963 – 2017)

Municipality	Date	Time	Type	Wind Speed (kts)	Deaths	Injuries	Property Damage	Crop Damage
Fannett Township	6/25/13	1934	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	6/28/13	1540	Thunderstorm Wind	50	0	0	$2,500	$0
Shippensburg Borough	7/7/13	1500	Thunderstorm Wind	50	0	0	$5,000	$0
Greencastle Borough	7/19/13	1732	Thunderstorm Wind	50	0	0	$2,500	$0
Hamilton Township	7/19/13	1658	Thunderstorm Wind	50	0	0	$5,000	$0
Chambersburg Borough	9/12/13	1400	Thunderstorm Wind	50	0	0	$2,000	$0
Greene Township	10/7/13	0823	Thunderstorm Wind	50	0	0	$2,000	$0
Waynesboro Borough	11/18/13	0100	Thunderstorm Wind	50	0	0	$0	$0
Greencastle Borough	7/1/14	1710	Thunderstorm Wind	50	0	0	$1,000	$0
Greencastle Borough	7/8/14	1702	Thunderstorm Wind	50	0	0	$500	$0
Guilford Township	7/8/14	1705	Thunderstorm Wind	50	0	0	$1,000	$0
Mercersburg Borough	7/8/14	1652	Thunderstorm Wind	50	0	0	$1,000	$0
Greencastle Borough	7/13/14	1920	Thunderstorm Wind	50	0	0	$500	$0
Quincy Township	7/23/14	1625	Thunderstorm Wind	50	0	0	$1,000	$0
Greene Township	9/2/14	1610	Thunderstorm Wind	50	0	0	$1,000	$0
Guilford Township	9/2/14	1602	Thunderstorm Wind	50	0	0	$500	$0
Washington Township	6/1815	1902	Thunderstorm Wind	50	0	0	$500	$0
Letterkenny Township	6/20/15	1930	Thunderstorm Wind	50	0	0	$1,000	$0
Guilford Township	7/9/15	1550	Thunderstorm Wind	50	0	0	$1,500	$0
Shippensburg Borough	7/9/15	1550	Thunderstorm Wind	50	0	0	$2,000	$0
Franklin County	4/3/16	0000	High Wind	52	0	0	$4,000	$4,000
Guilford Township	6/28/16	1350	Thunderstorm Wind	52	0	0	$2,000	$0
Fannett Township	7/30/16	1427	Thunderstorm Wind	52	0	0	$4,000	$0
Guilford Township	8/16/16	2058	Thunderstorm Wind	52	0	0	$4,000	$0
Hamilton Township	8/16/16	1330	Thunderstorm Wind	52	0	0	$108,000	$0
Mercersburg Borough	2/12/17	2155	Thunderstorm Wind	52	0	0	$35,500	$0
Washington Township	2/12/17	2156	Thunderstorm Wind	52	0	0	$33,500	$0
Antrim Township	4/6/17	1140	Thunderstorm Wind	52	0	0	$41,500	$0
Fannett Township	5/1/17	2005	Thunderstorm Wind	52	0	0	$39,500	$0
Greencastle Borough	6/19/17	1125	Thunderstorm Wind	52	0	0	$41,500	$0
Totals					**1**	**1**	**$1,076,950**	**$4,000**

Franklin County Hazard Vulnerability Assessment (HVA) – 2018
Appendix F: DCNR Wildfire Data for Franklin County (1940 – 2015)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1940	6	4	57	874	909	75	64	121	9	140	147	5	**2,411**
1941	1	7	37	2,051	1,028	63	35	67	173	140	433	49	**4,084**
1942	3	18	149	1,336	279	6	14	11	10	93	91	0	**2,010**
1943	2	3	356	553	240	12	12	42	192	427	126	152	**2,117**
1944	7	29	68	560	529	19	60	127	46	119	154	4	**1,722**
1945	0	0	08	391	81	4	3	6	5	56	111	0	**865**
1946	2	15	390	955	167	10	22	6	33	63	303	205	**2,171**
1947	10	5	34	581	230	26	1	3	9	520	31	47	**1,497**
1948	0	8	142	379	124	20	3	9	50	46	69	21	**871**
1949	11	30	145	442	294	148	60	56	10	145	193	6	**1,540**
1950	2	3	54	363	308	20	3	5	0	52	95	2	**907**
1951	2	11	61	228	247	5	5	24	28	166	69	7	**853**
1952	1	17	86	425	408	85	119	21	19	269	178	5	**1,633**
1953	4	21	69	126	91	15	41	151	94	389	384	32	**1,417**
1954	7	24	92	382	119	65	157	21	7	17	49	6	**946**
1955	3	2	77	453	391	34	127	80	24	13	24	18	**1,246**
1956	6	2	21	181	124	26	1	5	0	87	95	12	**560**
1957	4	7	195	156	323	22	55	186	71	117	60	18	**1,214**
1958	4	2	28	465	194	31	3	2	2	52	123	7	**913**
1959	7	16	137	441	203	18	18	29	61	10	35	9	**984**
1960	4	5	2	606	6	10	10	6	5	63	180	155	**1,052**
1961	0	1	45	71	83	12	11	5	9	118	93	87	**535**
1962	3	1	217	595	300	39	179	72	11	91	48	117	**1,673**
1963	0	0	95	919	363	62	45	27	57	836	78	0	**2,482**
1964	1	0	45	279	388	29	45	62	277	294	493	117	**2,000**
1965	0	10	24	233	359	137	157	19	11	107	130	32	**1,219**
1966	4	0	99	126	286	169	252	87	35	212	80	2	**1,352**
1967	3	4	34	357	235	164	8	2	9	32	64	6	**918**
1968	0	91	232	760	154	13	48	45	13	59	21	18	**1,454**
1969	5	11	308	729	392	41	19	16	12	170	19	13	**1,735**
1970	0	8	39	502	228	4	20	23	10	11	39	21	**905**
1971	2	9	63	1,102	209	45	45	46	3	15	60	8	**1,607**
1972	12	2	108	485	308	18	3	15	29	15	4	1	**1,000**
1973	26	28	231	369	66	20	10	6	10	103	108	23	**1,000**
1974	7	26	250	595	162	23	20	14	4	211	123	11	**1,446**
1975	0	14	68	680	215	8	9	18	1	125	160	25	**1,323**
1976	2	173	309	926	177	33	2	8	10	21	103	17	**1,781**
1977	1	7	375	776	315	56	28	2	7	39	22	2	**1,630**
1978	0	0	40	663	208	21	12	4	4	36	136	17	**1,141**

Appendix F: DCNR Wildfire Data for Franklin County (1940 – 2015)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1979	0	6	567	527	247	27	7	2	2	41	56	66	**1,548**
1980	19	98	72	783	324	33	45	44	99	131	181	35	**1,864**
1981	17	13	466	731	366	22	22	34	6	45	105	0	**1,827**
1982	1	1	118	809	438	0	6	3	9	75	63	13	**1,536**
1983	16	37	239	260	169	17	38	38	72	50	11	1	**948**
1984	0	10	47	427	140	32	11	4	11	49	67	2	**800**
1985	4	24	392	538	140	6	7	7	28	89	46	3	**1,284**
1986	6	1	662	449	435	18	29	6	14	12	5	3	**1,640**
1987	2	15	499	294	255	15	13	45	2	50	139	2	**1,331**
1988	0	6	341	430	208	172	396	71	9	26	31	81	**1,771**
1989	64	54	325	726	57	4	4	5	9	53	24	2	**1,327**
1990	2	36	215	366	58	15	25	5	2	7	77	21	**829**
1991	2	36	144	234	83	93	121	108	701	177	257	5	**1,961**
1992	12	38	154	344	212	50	21	7	8	16	14	0	**876**
1993	10	71	2	188	221	49	63	23	6	27	40	2	**702**
1994	0	0	3	511	144	39	15	6	23	30	78	18	**867**
1995	11	5	314	344	133	14	13	79	85	33	3	0	**1,034**
1996	0	12	46	212	65	14	3	2	0	17	26	0	**397**
1997	4	35	95	501	135	23	87	45	3	30	2	7	**967**
1998	2	23	250	204	29	17	10	36	17	66	165	91	**910**
1999	1	35	289	246	245	46	123	100	20	30	163	7	**1,305**
2000	11	13	198	224	112	5	8	4	2	78	80	9	**744**
2001	1	15	66	270	224	18	11	27	10	108	220	4	**974**
2002	34	46	105	142	92	7	49	98	53	0	0	0	**626**
2003	1	0	59	242	64	2	6	2	1	6	23	1	**407**
2004	4	4	34	102	10	2	2	0	0	4	45	4	**211**
2005	3	0	27	458	139	31	25	36	36	12	37	0	**804**
2006	4	49	266	342	167	26	2	27	0	3	6	20	**912**
2007	3	3	65	162	171	17	41	13	19	28	14	4	**540**
2008	9	0	136	408	46	22	10	16	12	22	8	0	**689**
2009	0	31	222	284	30	3	8	1	3	2	34	1	**619**
2010	1	1	73	256	25	7	47	18	59	23	53	10	**573**
2011	4	8	65	22	26	8	31	6	0	1	24	7	**202**
2012	11	31	215	316	17	15	29	4	5	16	57	1	**717**
2013	2	5	70	315	120	9	6	12	11	23	58	1	**632**
2014	1	3	152	449	69	7	11	11	11	46	111	0	**871**
2015	2	1	83	446	161	5	4	14	16	23	60	2	**817**
Total	**416**	**1,380**	**12,066**	**35,647**	**16,320**	**2,498**	**3,075**	**2,408**	**2,724**	**6,928**	**7,114**	**1,700**	**92,276**
%/Month	**0.45**	**1.50**	**13.08**	**38.63**	**17.69**	**2.71**	**3.33**	**2.61**	**2.95**	**7.51**	**7.71**	**1.84**	**100.00**

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: BRAD GRAHAM	Organization: ANTRIM TOWNSHIP		Date: 9/13/17	
Hazard	**(P) Probability of Occurrence**	**(Z) Percentage of Municipality Impacted**	**(W) Warning Time**	**(I) Impact of Occurrence**
Civil Disturbance	1	2	1	1
Dam Failure (High Hazard Dams)	1	2	2	1
Drought	2	3	1	3
Earthquake	1	3	4	2
Environmental Hazards (HAZMAT Release)	2	3	4	2
Extreme Temperature	2	4	1	2
Flood, Flash Flood, Ice Jam	2	2	1	2
Hailstorm	2	3	2	2
Hurricane, Tropical Storm, Nor'Easter	3	4	1	2
Invasive Species	2	3	1	2
Landslide	1	1	4	2
Lightning Strike	3	2	4	2
Mass Food and Animal Feed Contamination	1	2	1	2
Nuclear Incident	2	2	4	2
Pandemic and Infectious Disease	2	2	1	2
Radon Exposure	2	3	1	1
Subsidence, Sinkhole	3	1	4	2
Terrorism	2	2	4	1
Tornado, Windstorm	4	3	2	2
Transportation Accident (Air/Rail/Highway)	4	3	4	3
Urban Fire and Explosion	2	2	4	2
Utility Interruption (Comm/Power/Water/Sewage)	2	3	4	2
Wildfire	2	2	4	2
Winter Storm	4	4	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.1: Antrim Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
DAVID C. FINCH	BOROUGH OF CHAMBERSBURG	7/21/17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	2	1	4	1
Dam Failure (High Hazard Dams)	1	3	1	4
Drought	2	4	1	1
Earthquake	1	4	4	4
Environmental Hazards (HAZMAT Release)	2	2	4	1
Extreme Temperature	4	4	1	1
Flood, Flash Flood, Ice Jam	2	1	3	1
Hailstorm	4	4	4	1
Hurricane, Tropical Storm, Nor'Easter	2	4	1	2
Invasive Species	4	4	1	1
Landslide	1	1	4	1
Lightning Strike	4	1	4	1
Mass Food and Animal Feed Contamination	2	1	4	1
Nuclear Incident	1	1	3	1
Pandemic and Infectious Disease	1	4	1	1
Radon Exposure	4	3	1	1
Subsidence, Sinkhole	4	1	4	1
Terrorism	1	1	4	1
Tornado, Windstorm	2	2	4	3
Transportation Accident (Air/Rail/Highway)	4	1	4	1
Urban Fire and Explosion	4	2	4	2
Utility Interruption (Comm/Power/Water/Sewage)	4	4	4	1
Wildfire	1	2	4	1
Winter Storm	4	4	2	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.2: Chambersburg Borough Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
Steven Sites	Fannett Township	8/25/17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	1	1
Dam Failure (High Hazard Dams)	1	1	1	1
Drought	2	4	1	1
Earthquake	1	1	1	1
Environmental Hazards (HAZMAT Release)	1	1	1	1
Extreme Temperature	2	3	1	2
Flood, Flash Flood, Ice Jam	2	3	4	2
Hailstorm	1	1	1	1
Hurricane, Tropical Storm, Nor'Easter	1	1	1	1
Invasive Species	1	1	1	1
Landslide	1	1	1	1
Lightning Strike	2	4	4	2
Mass Food and Animal Feed Contamination	1	1	1	1
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	1	1	1	1
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	1	1
Terrorism	1	1	1	1
Tornado, Windstorm	2	4	4	2
Transportation Accident (Air/Rail/Highway)	2	2	4	2
Urban Fire and Explosion	1	1	1	1
Utility Interruption (Comm/Power/Water/Sewage)	1	1	1	1
Wildfire	1	1	1	1
Winter Storm	2	4	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.3: Fannett Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name	Organization			Date
Craig Myers EMC	Greencastle Borough			11/17/2017
Hazard	**(P) Probability of Occurrence**	**(Z) Percentage of the Municipality Impacted**	**(W) Warning Time**	**(I) Impact of Occurrence**
Civil Disturbance	1	1	4	1
Dam Failure (High Hazard Dams)	1	1	1	3
Drought	2	4	1	2
Earthquake	1	3	4	3
Environmental Hazards (HAZMAT Release)	2	4	4	2
Extreme Temperatures	3	4	1	1
Flood, Flash Flood, Ice Jam	2	3	4	2
Hailstorm	2	4	3	2
Hurricane, Tropical Storm, Nor'easter	1	4	4	3
Invasive Species	1	4	4	2
Landslide	1	2	4	2
Lightning Strike	3	1	4	2
Mass Food and Animal Feed Contamination	1	1	1	3
Nuclear Incident	1	4	4	2
Pandemic and Infectious Disease	1	4	1	2
Radon Exposure	1	1	4	1
Subsidence, Sinkhole	2	1	4	1
Terrorism	2	3	4	4
Tornado, Windstorm	2	4	4	4
Transportation Accident (Air/Rail/Highway)	3	1	4	2
Urban Fire and Explosion	1	2	3	1
Utility Interruption (Comm/Power/Water/Sewage)	2	4	4	2
Wildfire	1	1	3	1
Winter Storm	2	4	1	2

Figure G.4: Greencastle Borough Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Shawn Corwell | Organization: Greene Township | Date: 7/18/17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	2	1
Dam Failure (High Hazard Dams)	2	3	4	2
Drought	2	4	1	2
Earthquake	1	2	4	1
Environmental Hazards (HAZMAT Release)	3	1	4	1
Extreme Temperature	2	4	1	2
Flood, Flash Flood, Ice Jam	2	2	2	2
Hailstorm	2	3	4	2
Hurricane, Tropical Storm, Nor'Easter	2	4	3	2
Invasive Species	1	2	4	1
Landslide	1	1	4	1
Lightning Strike	4	3	4	1
Mass Food and Animal Feed Contamination	1	1	4	1
Nuclear Incident	1	1	3	1
Pandemic and Infectious Disease	1	1	1	2
Radon Exposure	2	2	1	2
Subsidence, Sinkhole	2	2	4	1
Terrorism	1	1	4	1
Tornado, Windstorm	2	3	4	2
Transportation Accident (Air/Rail/Highway)	4	2	4	2
Urban Fire and Explosion	1	2	4	1
Utility Interruption (Comm/Power/Water/Sewage)	1	2	4	2
Wildfire	1	2	4	1
Winter Storm	2	4	2	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.5: Greene Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: FRANK M. HOBBS
Organization: GUILFORD TOWNSHIP
Date: 7/18/2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	4	2
Dam Failure (High Hazard Dams)	1	2	4	1
Drought	2	4	1	1
Earthquake	1	3	4	2
Environmental Hazards (HAZMAT Release)	4	2	4	2
Extreme Temperature	3	4	1	1
Flood, Flash Flood, Ice Jam	3	3	3	1
Hailstorm	4	3	4	1
Hurricane, Tropical Storm, Nor'Easter	2	4	1	2
Invasive Species	1	1	1	1
Landslide	1	1	4	2
Lightning Strike	2	2	3	1
Mass Food and Animal Feed Contamination	1	2	1	3
Nuclear Incident	1	1	4	2
Pandemic and Infectious Disease	1	3	1	3
Radon Exposure	1	1	2	1
Subsidence, Sinkhole	4	2	4	2
Terrorism	1	2	4	3
Tornado, Windstorm	3	4	4	2
Transportation Accident (Air/Rail/Highway)	4	4	4	2
Urban Fire and Explosion	1	1	4	2
Utility Interruption (Comm/Power/Water/Sewage)	4	4	4	1
Wildfire	1	2	4	1
Winter Storm	4	4	1	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability	1 = Less that 1% of Municipality affected	1 = More than 24 hrs
2 = Possible: Between 1 and 49.9% Annual Probability	2 = Between 1 and 10% of Municipality affected	2 = 12 to 24 hrs
3 = Likely: Between 50 and 90% Annual Probability	3 = Between 10 and 50% of Municipality affected	3 = 6 to 12 hrs
4 = Highly Likely: Grater than 90% Annual Probability	4 = Between 50 and 100% of Municipality affected	4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries: Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.6: Guilford Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
Michael K. Kessinger	Hamilton Township	July 19,2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	2	4	1
Dam Failure (High Hazard Dams)	1	3	4	1
Drought	1	4	1	1
Earthquake	1	4	4	1
Environmental Hazards (HAZMAT Release)	1	3	4	1
Extreme Temperature	1	4	2	1
Flood, Flash Flood, Ice Jam	1	3	4	1
Hailstorm	2	4	4	1
Hurricane, Tropical Storm, Nor'Easter	1	4	1	1
Invasive Species	2	4	1	1
Landslide	1	2	4	1
Lightning Strike	2	4	4	1
Mass Food and Animal Feed Contamination	1	2	4	1
Nuclear Incident	1	1	4	1
Pandemic and Infectious Disease	1	3	2	1
Radon Exposure	1	2	4	1
Subsidence, Sinkhole	1	1	4	1
Terrorism	1	3	4	1
Tornado, Windstorm	2	4	4	2
Transportation Accident (Air/Rail/Highway)	2	2	4	1
Urban Fire and Explosion	1	3	4	1
Utility Interruption (Comm/Power/Water/Sewage)	2	3	4	1
Wildfire	1	3	4	1
Winter Storm	2	4	2	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.7: Hamilton Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
Eric Varner	Letterkenny Township	6-21-17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	4	1
Dam Failure (High Hazard Dams)	1	1	4	1
Drought	3	4	1	3
Earthquake	2	2	2	2
Environmental Hazards (HAZMAT Release)	3	3	4	2
Extreme Temperature	3	4	1	1
Flood, Flash Flood, Ice Jam	3	3	2	1
Hailstorm	2	4	2	1
Hurricane, Tropical Storm, Nor'Easter	2	3	4	2
Invasive Species	1	1	1	1
Landslide	1	1	4	1
Lightning Strike	3	3	4	1
Mass Food and Animal Feed Contamination	1	2	1	1
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	1	1	1	1
Radon Exposure	3	4	1	1
Subsidence, Sinkhole	2	2	4	1
Terrorism	3	4	4	4
Tornado, Windstorm	3	3	4	1
Transportation Accident (Air/Rail/Highway)	4	2	4	1
Urban Fire and Explosion	2	2	4	2
Utility Interruption (Comm/Power/Water/Sewage)	3	3	4	1
Wildfire	4	2	4	2
Winter Storm	4	4	2	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.8: Letterkenny Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Chip Kolb	Organization: Lurgan Township			Date: 7/19/2017
Hazard	**(P) Probability of Occurrence**	**(Z) Percentage of Municipality Impacted**	**(W) Warning Time**	**(I) Impact of Occurrence**
Civil Disturbance	1	1	4	1
Dam Failure (High Hazard Dams)	2	4	3	4
Drought	1	3	1	1
Earthquake	1		4	2
Environmental Hazards (HAZMAT Release)	1	2	4	2
Extreme Temperature	1	4	3	2
Flood, Flash Flood, Ice Jam	2	2	4	2
Hailstorm	2	4	4	2
Hurricane, Tropical Storm, Nor'Easter	2	4	3	2
Invasive Species	1	4	1	1
Landslide	1	1	4	1
Lightning Strike	2	1	4	1
Mass Food and Animal Feed Contamination	1	3	4	1
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	1	1	1	1
Radon Exposure	2	1	1	1
Subsidence, Sinkhole	1	1	4	1
Terrorism	1	1	1	1
Tornado, Windstorm	2	3	4	2
Transportation Accident (Air/Rail/Highway)	3	2	4	1
Urban Fire and Explosion	2	1	4	1
Utility Interruption (Comm/Power/Water/Sewage)	2	3	4	1
Wildfire	2	3	2	1
Winter Storm	3	4	3	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.9: Lurgan Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
DEREK STOY	BOROUGH of MERCERSBURG	8/7/17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	2	4	1
Dam Failure (High Hazard Dams)	1	1	4	1
Drought	2	4	1	1
Earthquake	1	4	4	4
Environmental Hazards (HAZMAT Release)	1	1	1	1
Extreme Temperature	3	4	1	1
Flood, Flash Flood, Ice Jam	1	1	1	1
Hailstorm	2	4	4	1
Hurricane, Tropical Storm, Nor'Easter	2	4	1	1
Invasive Species	2	4	1	1
Landslide	1	1	1	1
Lightning Strike	3	4	4	1
Mass Food and Animal Feed Contamination	1	1	1	1
Nuclear Incident	1	1	4	4
Pandemic and Infectious Disease	1	1	1	1
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	4	1
Terrorism	1	4	4	4
Tornado, Windstorm	2	4	4	3
Transportation Accident (Air/Rail/Highway)	1	1	4	1
Urban Fire and Explosion	1	1	4	1
Utility Interruption (Comm/Power/Water/Sewage)	2	4	4	1
Wildfire	1	1	4	1
Winter Storm	3	4	1	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability	1 = Less that 1% of Municipality affected	1 = More than 24 hrs
2 = Possible: Between 1 and 49.9% Annual Probability	2 = Between 1 and 10% of Municipality affected	2 = 12 to 24 hrs
3 = Likely: Between 50 and 90% Annual Probability	3 = Between 10 and 50% of Municipality affected	3 = 6 to 12 hrs
4 = Highly Likely: Grater than 90% Annual Probability	4 = Between 50 and 100% of Municipality affected	4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.10: Mercersburg Borough Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Anna H. Swailes | Organization: Metal Twp | Date: 8/7/2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	1	1
Dam Failure (High Hazard Dams)	2	2	1	2
Drought	1	3	1	2
Earthquake	1	3	4	2
Environmental Hazards (HAZMAT Release)	2	2	4	2
Extreme Temperature	1	2	1	2
Flood, Flash Flood, Ice Jam	2	2	2	2
Hailstorm	1	1	3	1
Hurricane, Tropical Storm, Nor'Easter	2	2	1	1
Invasive Species	1	1	1	1
Landslide	1	2	4	2
Lightning Strike	2	1	4	2
Mass Food and Animal Feed Contamination	1	1	1	1
Nuclear Incident	1	1	4	1
Pandemic and Infectious Disease	2	2	1	3
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	4	2
Terrorism	2	2	4	1
Tornado, Windstorm	1	2	4	1
Transportation Accident (Air/Rail/Highway)	3	2	4	3
Urban Fire and Explosion	1	1	4	3
Utility Interruption (Comm/Power/Water/Sewage)	3	3	4	1
Wildfire	2	2	4	3
Winter Storm	2	3	1	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability	1 = Less that 1% of Municipality affected	1 = More than 24 hrs
2 = Possible: Between 1 and 49.9% Annual Probability	2 = Between 1 and 10% of Municipality affected	2 = 12 to 24 hrs
3 = Likely: Between 50 and 90% Annual Probability	3 = Between 10 and 50% of Municipality affected	3 = 6 to 12 hrs
4 = Highly Likely: Grater than 90% Annual Probability	4 = Between 50 and 100% of Municipality affected	4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.11: Metal Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: [illegible]
Organization: Boro MA Mont Alto
Date: 8-12-17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	1	1
Dam Failure (High Hazard Dams)	1	1	1	1
Drought	3	3	2	3
Earthquake	1	1	1	1
Environmental Hazards (HAZMAT Release)	2	2	2	2
Extreme Temperature	3	3	3	3
Flood, Flash Flood, Ice Jam	3	3	3	3
Hailstorm	2	2	2	2
Hurricane, Tropical Storm, Nor'Easter	2	2	2	2
Invasive Species	1	1	1	1
Landslide	1	1	1	1
Lightning Strike	4	4	4	4
Mass Food and Animal Feed Contamination	2	2	2	2
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	2	2	2	2
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	1	1
Terrorism	2	2	2	2
Tornado, Windstorm	2	2	2	2
Transportation Accident (Air/Rail/Highway)	2	2	2	2
Urban Fire and Explosion	1	1	1	1
Utility Interruption (Comm/Power/Water/Sewage)	4	4	4	4
Wildfire	3	3	2	3
Winter Storm	3	3	3	3

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability	1 = Less that 1% of Municipality affected	1 = More than 24 hrs
2 = Possible: Between 1 and 49.9% Annual Probability	2 = Between 1 and 10% of Municipality affected	2 = 12 to 24 hrs
3 = Likely: Between 50 and 90% Annual Probability	3 = Between 10 and 50% of Municipality affected	3 = 6 to 12 hrs
4 = Highly Likely: Grater than 90% Annual Probability	4 = Between 50 and 100% of Municipality affected	4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.12: Mont Alto Borough Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Greg Weller	Organization: montgomery TWP	Date: 7-24-17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	3	2	3	3
Dam Failure (High Hazard Dams)	1	2	4	2
Drought	3	4	1	1
Earthquake	1	4	4	2
Environmental Hazards (HAZMAT Release)	2	2	4	2
Extreme Temperature	3	4	1	2
Flood, Flash Flood, Ice Jam	3	3	2	1
Hailstorm	3	4	1	1
Hurricane, Tropical Storm, Nor'Easter	3	4	1	2
Invasive Species	3	4	1	1
Landslide	2	2	4	1
Lightning Strike	4	4	4	2
Mass Food and Animal Feed Contamination	3	4	2	3
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	2	3	4	4
Radon Exposure	2	3	4	1
Subsidence, Sinkhole	3	4	4	2
Terrorism	3	3	4	3
Tornado, Windstorm	3	4	4	3
Transportation Accident (Air/Rail/Highway)	2	2	4	2
Urban Fire and Explosion	3	2	4	2
Utility Interruption (Comm/Power/Water/Sewage)	4	3	4	2
Wildfire	2	2	4	2
Winter Storm	3	4	1	3

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.13: Montgomery Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
PAUL T. REED	ORRSTOWN BOROUGH	9/1/2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	3	1
Dam Failure (High Hazard Dams)	1	1	3	1
Drought	1	1	3	1
Earthquake	1	1	3	1
Environmental Hazards (HAZMAT Release)	1	1	3	1
Extreme Temperature	1	1	3	1
Flood, Flash Flood, Ice Jam	1	1	3	1
Hailstorm	2	1	3	1
Hurricane, Tropical Storm, Nor'Easter	2	1	3	1
Invasive Species	1	1	3	1
Landslide	1	1	3	1
Lightning Strike	2	1	3	1
Mass Food and Animal Feed Contamination	1	1	3	1
Nuclear Incident	1	1	3	1
Pandemic and Infectious Disease	1	1	3	1
Radon Exposure	1	1	3	1
Subsidence, Sinkhole	1	1	3	1
Terrorism	1	1	3	1
Tornado, Windstorm	1	1	3	1
Transportation Accident (Air/Rail/Highway)	1	1	3	1
Urban Fire and Explosion	1	1	3	1
Utility Interruption (Comm/Power/Water/Sewage)	1	1	3	1
Wildfire	1	1	3	1
Winter Storm	2	2	3	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.14: Orrstown Borough Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Peters Township	Organization: Peters Twp. Supervisors		Date:	8/29/17
Hazard	**(P) Probability of Occurrence**	**(Z) Percentage of Municipality Impacted**	**(W) Warning Time**	**(I) Impact of Occurrence**
Civil Disturbance	1	1	4	1
Dam Failure (High Hazard Dams)	1	1	4	1
Drought	1	4	1	1
Earthquake	1	1	4	1
Environmental Hazards (HAZMAT Release)	1	1	4	1
Extreme Temperature	2	4	2	1
Flood, Flash Flood, Ice Jam	2	3	4	1
Hailstorm	1	1	3	1
Hurricane, Tropical Storm, Nor'Easter	2	4	1	1
Invasive Species	1	1	4	1
Landslide	1	1	4	1
Lightning Strike	2	1	2	1
Mass Food and Animal Feed Contamination	1	1	2	1
Nuclear Incident	1	4	1	1
Pandemic and Infectious Disease	1	1	2	1
Radon Exposure	1	1	4	1
Subsidence, Sinkhole	1	1	4	1
Terrorism	1	1	4	1
Tornado, Windstorm	1	1	4	1
Transportation Accident (Air/Rail/Highway)	2	1	4	1
Urban Fire and Explosion	1	1	4	1
Utility Interruption (Comm/Power/Water/Sewage)	2	2	4	1
Wildfire	1	1	4	1
Winter Storm	2	4	2	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.15: Peters Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Quincy twp
Organization: Township
Date: 8-14-17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	2	4	1
Dam Failure (High Hazard Dams)	2	3	1	1
Drought	2	4	1	1
Earthquake	1	4	1	1
Environmental Hazards (HAZMAT Release)	2	3	4	2
Extreme Temperature	3	4	1	2
Flood, Flash Flood, Ice Jam	3	4	1	2
Hailstorm	2	4	2	1
Hurricane, Tropical Storm, Nor'Easter	3	4	1	2
Invasive Species	2	3	4	1
Landslide	1	1	4	1
Lightning Strike	3	1	4	2
Mass Food and Animal Feed Contamination	2	2	4	2
Nuclear Incident	1	4	1	2
Pandemic and Infectious Disease	2	4	1	3
Radon Exposure	2	2	4	2
Subsidence, Sinkhole	3	1	4	1
Terrorism	2	4	1	?
Tornado, Windstorm	3	4	1	2
Transportation Accident (Air/Rail/Highway)	2	2	4	3
Urban Fire and Explosion	1	1	4	2
Utility Interruption (Comm/Power/Water/Sewage)	3	4	4	2
Wildfire	2	2	4	2
Winter Storm	4	4	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.16: Quincy Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: David Lindemuth
Organization: Shippensburg Borough EMA
Date: 7/26/17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	2	2	4	1
Dam Failure (High Hazard Dams)	1	1	3	1
Drought	2	4	1	1
Earthquake	1	4	4	1
Environmental Hazards (HAZMAT Release)	2	3	4	2
Extreme Temperature	2	4	1	1
Flood, Flash Flood, Ice Jam	2	2	3	1
Hailstorm	2	4	2	1
Hurricane, Tropical Storm, Nor'Easter	2	4	1	2
Invasive Species	1	1	1	1
Landslide	1	1	2	1
Lightning Strike	2	1	2	1
Mass Food and Animal Feed Contamination	1	4	4	1
Nuclear Incident	1	4	4	2
Pandemic and Infectious Disease	1	4	1	2
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	4	1
Terrorism	1	2	4	1
Tornado, Windstorm	2	2	2	3
Transportation Accident (Air/Rail/Highway)	2	2	4	3
Urban Fire and Explosion	2	1	4	3
Utility Interruption (Comm/Power/Water/Sewage)	2	4	4	2
Wildfire	1	1	4	1
Winter Storm	2	4	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.17: Shippensburg Borough Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Douglas A. Shields	Organization: Southampton Twp	Date: 8/8/17

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	2	2	4	2
Dam Failure (High Hazard Dams)	2	2	4	2
Drought	3	3	2	1
Earthquake	2	2	4	4
Environmental Hazards (HAZMAT Release)	3	3	4	2
Extreme Temperature	2	2	3	1
Flood, Flash Flood, Ice Jam	3	2	4	1
Hailstorm	3	2	4	1
Hurricane, Tropical Storm, Nor'Easter	3	2	4	1
Invasive Species	1	1	3	1
Landslide	1	1	3	1
Lightning Strike	3	3	4	2
Mass Food and Animal Feed Contamination	1	1	3	2
Nuclear Incident	1	1	4	2
Pandemic and Infectious Disease	2	2	4	2
Radon Exposure	1	1	3	1
Subsidence, Sinkhole	3	3	4	2
Terrorism	2	2	4	2
Tornado, Windstorm	2	2	4	2
Transportation Accident (Air/Rail/Highway)	3	3	4	3
Urban Fire and Explosion	2	2	4	2
Utility Interruption (Comm/Power/Water/Sewage)	3	3	4	1
Wildfire	2	2	4	2
Winter Storm	3	3	4	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Greater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.18: Southampton Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: DONALD ESHLEMAN **Organization:** ST. THOMAS TWP. **Date:** 7/18/2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	2	1	4	1
Dam Failure (High Hazard Dams)	1	1	2	1
Drought	2	3	1	2
Earthquake	1	1	4	1
Environmental Hazards (HAZMAT Release)	2	2	4	2
Extreme Temperature	3	2	1	1
Flood, Flash Flood, Ice Jam	1	1	3	2
Hailstorm	2	3	4	2
Hurricane, Tropical Storm, Nor'Easter	1	3	1	2
Invasive Species	2	2	2	2
Landslide	1	1	4	1
Lightning Strike	4	1	4	1
Mass Food and Animal Feed Contamination	2	3	3	2
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	2	3	3	2
Radon Exposure	2	3	1	1
Subsidence, Sinkhole	2	1	4	1
Terrorism	2	2	4	2
Tornado, Windstorm	4	1	4	1
Transportation Accident (Air/Rail/Highway)	3	1	4	2
Urban Fire and Explosion	1	1	4	2
Utility Interruption (Comm/Power/Water/Sewage)	2	3	4	2
Wildfire	2	2	4	2
Winter Storm	3	3	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.19: St Thomas Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
john w ressler	warren township, franklin county, pa	20 august 2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	2	3	2
Dam Failure (High Hazard Dams)	2	2	3	2
Drought	2	4	2	2
Earthquake	1	2	4	4
Environmental Hazards (HAZMAT Release)	1	3	3	2
Extreme Temperature	2	4	2	2
Flood, Flash Flood, Ice Jam	2	3	2	2
Hailstorm	2	3	4	2
Hurricane, Tropical Storm, Nor'Easter	3	4	1	1
Invasive Species	2	3	3	1
Landslide	2	3	3	2
Lightning Strike	2	3	4	2
Mass Food and Animal Feed Contamination	2	3	3	3
Nuclear Incident	2	4	4	3
Pandemic and Infectious Disease	3	3	3	1
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	4	1
Terrorism	1	1	4	2
Tornado, Windstorm	2	3	4	2
Transportation Accident (Air/Rail/Highway)	1	2	3	1
Urban Fire and Explosion	1	2	4	2
Utility Interruption (Comm/Power/Water/Sewage)	3	3	4	2
Wildfire	2	2	4	3
Winter Storm	4	4	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.20: Warren Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name: Washington Township	Organization: Emergency Management	Date: Sept. 12, 2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	1	1
Dam Failure (High Hazard Dams)	2	3	4	2
Drought	2	2	1	1
Earthquake	1	1	1	1
Environmental Hazards (HAZMAT Release)	2	2	4	2
Extreme Temperature	2	2	1	1
Flood, Flash Flood, Ice Jam	2	3	4	2
Hailstorm	1	1	1	1
Hurricane, Tropical Storm, Nor'Easter	2	3	3	2
Invasive Species	1	1	1	1
Landslide	1	1	1	1
Lightning Strike	2	2	4	1
Mass Food and Animal Feed Contamination	1	1	1	1
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	1	1	1	1
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	1	1	1	1
Terrorism	1	1	1	1
Tornado, Windstorm	2	2	4	1
Transportation Accident (Air/Rail/Highway)	1	1	1	1
Urban Fire and Explosion	1	1	1	1
Utility Interruption (Comm/Power/Water/Sewage)	2	2	4	1
Wildfire	2	2	4	1
Winter Storm	2	3	3	1

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence
1 = Very few injuries; minor property damage; minimal impact to critical facilities 2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day 3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week 4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.21: Washington Township Hazard Assessment Survey

Franklin County, PA Municipal Hazard Mitigation Assessment Survey

Name:	Organization:	Date:
Jason Stains	Borough of Waynesboro	07/19/2017

Hazard	(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time	(I) Impact of Occurrence
Civil Disturbance	1	1	1	1
Dam Failure (High Hazard Dams)	1	1	4	4
Drought	2	4	1	2
Earthquake	2	4	4	2
Environmental Hazards (HAZMAT Release)	2	1	4	1
Extreme Temperature	3	4	1	1
Flood, Flash Flood, Ice Jam	2	1	4	1
Hailstorm	3	4	4	1
Hurricane, Tropical Storm, Nor'Easter	3	4	1	2
Invasive Species	2	4	1	1
Landslide	1	1	4	1
Lightning Strike	3	4	4	2
Mass Food and Animal Feed Contamination	1	1	1	1
Nuclear Incident	1	1	1	1
Pandemic and Infectious Disease	1	3	1	3
Radon Exposure	1	1	1	1
Subsidence, Sinkhole	2	1	4	1
Terrorism	2	1	4	2
Tornado, Windstorm	3	4	4	2
Transportation Accident (Air/Rail/Highway)	2	1	4	3
Urban Fire and Explosion	2	1	4	3
Utility Interruption (Comm/Power/Water/Sewage)	3	2	4	1
Wildfire	1	1	1	1
Winter Storm	3	4	1	2

(P) Probability of Occurrence	(Z) Percentage of Municipality Impacted	(W) Warning Time
1 = Unlikely: Less than 1% Annual Probability 2 = Possible: Between 1 and 49.9% Annual Probability 3 = Likely: Between 50 and 90% Annual Probability 4 = Highly Likely: Grater than 90% Annual Probability	1 = Less that 1% of Municipality affected 2 = Between 1 and 10% of Municipality affected 3 = Between 10 and 50% of Municipality affected 4 = Between 50 and 100% of Municipality affected	1 = More than 24 hrs 2 = 12 to 24 hrs 3 = 6 to 12 hrs 4 = Less than 6 hrs

(I) Impact of Occurrence

1 = Very few injuries; minor property damage; minimal impact to critical facilities
2 = Minor injuries; Greater than 10% property damage in Zone; critical facilities impacted for greater that 1 day
3 = Multiple deaths/injuries; Greater than 25% property damage in Zone; critical facilities impacted for greater than 1 week
4 = High number deaths/injuries; Greater than 50% property damage in Zone; critical facilities impacted for greater than 30 days

Figure G.22: Waynesboro Borough Hazard Assessment Survey

11/26/2019 Franklin County PA Mail - RE: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

RE: Municipal Preparations for the 2019 Franklin County HMP Update

1 message

Brad Graham <BGraham@twp.antrim.pa.us> Wed, Oct 16, 2019 at 11:33 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Hello Bob.

Sorry, late as usual. See attached. Not many changes, but there are a few.

Brad Graham

Township Administrator

Antrim Township

Greencastle, PA

Ph: 717-597-3818, ext. 103

Figure G.23.1: Antrim Township 2019 Annual HMP Update Survey Response – Page 1 of 2

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	1	30%	2	20%	1	10%	2	10%	1.3
Dam Failure	1	30%	2	30%	2	20%	2	10%	4	10%	1.9
Drought	2	30%	3	30%	3	20%	1	10%	4	10%	2.6
Earthquake	1	30%	2	30%	3	20%	4	10%	1	10%	2.0
Environmental Hazards (HAZMAT Release)	2	30%	2	30%	3	20%	4	10%	2	10%	2.4
Extreme Temperatures	2	30%	2	30%	4	20%	1	10%	3	10%	2.4
Flood, Flash Flood, Ice Jam	2	30%	2	30%	2	20%	1	10%	3	10%	2.0
Hailstorm	2	30%	2	30%	3	20%	2	10%	1	10%	2.1
Hurricane, Tropical Storm, Nor'easter	3	30%	2	30%	4	20%	1	10%	4	10%	2.8
Invasive species	2	30%	2	30%	3	20%	1	10%	4	10%	2.3
Landslide	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
Lightning Strike	3	30%	2	30%	2	20%	4	10%	1	10%	2.4
Mass Food and Animal Feed Contamination	1	30%	2	30%	2	20%	1	10%	2	10%	1.6
Nuclear Incident	2	30%	3	30%	3	20%	4	10%	4	10%	2.9
Pandemic and Infectious Disease	2	30%	2	30%	2	20%	1	10%	4	10%	2.1
Radon Exposure	2	30%	1	30%	3	20%	1	10%	4	10%	2.0
Subsidence, Sinkhole	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
Terrorism	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
Tornado, Windstorm	4	30%	3	30%	3	20%	2	10%	1	10%	3.0
Transportation Accident	4	30%	3	30%	3	20%	4	10%	1	10%	3.2
Urban Fire and Explosion	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
Utility Interruption	2	30%	2	30%	3	20%	4	10%	2	10%	2.4
Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
Winter Storm	4	30%	2	30%	4	20%	1	10%	3	10%	3.0

Figure G.23.2: Antrim Township 2019 Annual HMP Update Survey Response – Page 2 of 2

11/26/2019 Franklin County PA Mail - Re: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

Re: Municipal Preparations for the 2019 Franklin County HMP Update

Dave Finch <dfinch@chambersburgpa.gov> Fri, Oct 18, 2019 at 8:09 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Good Morning Bob:

For whatever reason, I had today marked as the day of the HMP update. Upon re-reading your e-mail, I see that you wanted a response by October 1st. My apologies for not doing so. At any rate, we have no changes to ask for in terms of threat assessment.

Also, this year, we finalized an update to our emergency Operations Plan. Did the County ever get a copy of this? If not, I'll make sure that gets done.

Finally, in the back of my mind, I've thought it might be a good idea to do some type of emergency drill for the Borough. Probably just table top, although a real-world component isn't out of the question. I can run it, but as the EMC I'm supposed to be involved in it, and I've always thought that if I'm running the exercise I can't realistically be one of the participants (as I will know the answer to all the problems if I'm the one who prepared the scenario.) Perhaps the County wants to be a part of this?

That's all for now. Thanks for all you guys do-

Dave Finch
Chambersburg

Figure G.24: Chambersburg Borough 2019 Annual HMP Update Survey Response

10/14/2019 Franklin County PA Mail - Threat Assessment

Robert Povlich <rwpovlich@franklincountypa.gov>

Threat Assessment

1 message

Shawn Corwell <SCorwell@greenetwp.us> Fri, Sep 13, 2019 at 8:39 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Bob,

The attachment contains the Municipal Threat Survey for 2019.

Thanks,

Shawn Corwell

Greene Township Supervisor/Emergency Management

1145 Garver Lane P.O. Box 215

Scotland, Pennsylvania 17254-0215

717-263-9160

scorwell@greenetwp.us

Copy of Municipal_Threat_Assessment_Survey_2019_HMP_Update (002).xlsx
30K

https://mail.google.com/mail/u/0?ik=164bd253a0&view=pt&search=all&permthid=thread-f%3A1644563837723414984%7Cmsg-f%3A164456383 7723... 1/1

Figure G.25.1: Greene Township 2019 Annual HMP Update Survey Response – Page 1 of 2

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
Dam Failure	2	30%	2	30%	3	20%	4	10%	4	10%	2.6
Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
Earthquake	3	30%	2	30%	3	20%	4	10%	1	10%	2.6
Environmental Hazards (HAZMAT Release)	3	30%	2	30%	1	20%	4	10%	2	10%	2.3
Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
Flood, Flash Flood, Ice Jam	3	30%	2	30%	2	20%	3	10%	3	10%	2.5
Hailstorm	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
Hurricane, Tropical Storm, Nor'easter	2	30%	3	30%	3	20%	1	10%	4	10%	2.6
Invasive Species	2	30%	1	30%	1	20%	1	10%	4	10%	1.6
Landslide	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
Lightning Strike	4	30%	2	30%	1	20%	4	10%	1	10%	2.5
Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
Nuclear Incident	1	30%	1	30%	3	20%	3	10%	4	10%	1.9
Pandemic and Infectious Disease	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Subsidence, Sinkhole	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
Terrorism	1	30%	2	30%	2	20%	4	10%	2	10%	1.9
Tornado, Windstorm	3	30%	3	30%	3	20%	4	10%	1	10%	2.9
Transportation Accident	2	30%	2	30%	1	20%	4	10%	1	10%	1.9
Urban Fire and Explosion	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
Utility Interruption	4	30%	2	30%	3	20%	3	10%	2	10%	2.9
Wildfire	2	30%	1	30%	1	20%	3	10%	2	10%	1.6
Winter Storm	3	30%	3	30%	4	20%	2	10%	3	10%	3.1

Figure G.25.2: Greene Township 2019 Annual HMP Update Survey Response – Page 2 of 2

8/30/2019 Franklin County PA Mail - Threat Assessment Rankings for Hamilton Twp.

Robert Povlich <rwpovlich@franklincountypa.gov>

Threat Assessment Rankings for Hamilton Twp.

1 message

HAMILTON TOWNSHIP <hamiltontwp@comcast.net> Tue, Aug 20, 2019 at 11:13 AM
Reply-To: HAMILTON TOWNSHIP <hamiltontwp@comcast.net>
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Mr. Povlich:

Please keep the threat assessment rankings for Hamilton Township unchanged. We will not be changing our mitigation actions at this time, nor do we have a need to add new mitigation actions. Should you have any questions, or need anything else regarding this matter, please don't hesitate to contact us.

Thanks so much,

Deb

Deborah J. Hollenshead
Secretary/Treasurer
Hamilton Township, Franklin County
1270 Crottlestown Road
Chambersburg, PA 17202
Telephone: (717) 264-2946
Fax: (717) 264-2134

NOTICE: Hamilton Township welcomes the opportunity to engage in discussions on matters involving public Township business. However, the Code for Townships of the Second Class requires an affirmative vote of a majority of the Board of Supervisors at a public meeting in order to transact any business. Accordingly, while Supervisors and staff may engage in discussions with those seeking comment, guidance, advice or direction, no such discussion shall constitute action by the Township unless there is an affirmative vote of the majority of the Board of Supervisors at a duly advertised public meeting.

Figure G.26: Hamilton Township 2019 Annual HMP Update Survey Response

11/20/2019 Franklin County PA Mail - Re: Fwd: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

Re: Fwd: Municipal Preparations for the 2019 Franklin County HMP Update

1 message

Anna Swailes <localgov100@embarqmail.com> Mon, Oct 21, 2019 at 1:11 PM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Bob,

Update is attached. Hope it's satisfactory!

Anna Swailes
Metal Twp.

Figure G.27.1: Metal Township 2019 Annual HMP Update Survey Response – Page 1 of 2

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
Dam Failure	2	30%	2	30%	2	20%	2	10%	4	10%	2.2
Drought	2	30%	1	30%	1	20%	1	10%	4	10%	1.6
Earthquake	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Environmental Hazards (HAZMAT Release)	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
Extreme Temperatures	1	30%	1	30%	1	20%	1	10%	3	10%	1.2
Flood, Flash Flood, Ice Jam	1	30%	1	30%	1	20%	1	10%	3	10%	1.2
Hailstorm	1	30%	1	30%	1	20%	2	10%	1	10%	1.1
Hurricane, Tropical Storm, Nor'easter	2	30%	2	30%	1	20%	1	10%	4	10%	1.9
Invasive species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Lightning Strike	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
Nuclear Incident	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
Pandemic and Infectious Disease	2	30%	1	30%	1	20%	1	10%	4	10%	1.6
Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Subsidence, Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Terrorism	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
Tornado, Windstorm	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
Transportation Accident	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Utility Interruption	3	30%	2	30%	1	20%	4	10%	2	10%	2.3
Wildfire	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
Winter Storm	2	30%	2	30%	1	20%	1	10%	3	10%	1.8

Figure G.27.2: Metal Township 2019 Annual HMP Update Survey Response – Page 2 of 2

8/30/2019 Franklin County PA Mail - RE: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

RE: Municipal Preparations for the 2019 Franklin County HMP Update
1 message

Peters Township Supervisors <peterstownship@comcast.net> Tue, Aug 20, 2019 at 8:40 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Our township does not have any changes to report.

Vicki Heckman

Administrative Assistant

Peters Township Supervisors, Franklin County

717-328-3352

Figure G.28: Peters Township 2019 Annual HMP Update Survey Response

8/30/2019 Franklin County PA Mail - Re: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

Re: Municipal Preparations for the 2019 Franklin County HMP Update
1 message

David Lindenmuth <djlindenmuth@gmail.com> Wed, Aug 28, 2019 at 9:43 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Robert,

The Borough of Shippensburg has no updates or additions.

Dave
LEMC

Figure G.29: Shippensburg Borough 2019 Annual HMP Update Survey Response

8/30/2019 Franklin County PA Mail - RE: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

RE: Municipal Preparations for the 2019 Franklin County HMP Update

1 message

Doug Shields <dshields@southamptontownship.org> Fri, Aug 23, 2019 at 9:49 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

Mr. Povlich,

Southampton Township assessment rankings are still valid for Southampton Township and need no change. If you can mark portion as complete for the township. If you have any questions please feel free to give me a call at your convenience.

Thanks

Doug

Figure G.30: Southampton Township 2019 Annual HMP Update Survey Response

10/14/2019 Franklin County PA Mail - Re: Municipal Preparations for the 2019 Franklin County HMP Update

Robert Povlich <rwpovlich@franklincountypa.gov>

Re: Municipal Preparations for the 2019 Franklin County HMP Update

1 message

Don Eshleman <deshleman28@gmail.com> Sat, Aug 31, 2019 at 6:28 AM
To: Robert Povlich <rwpovlich@franklincountypa.gov>

No known changes for St. Thomas Township

Possible hazard mitigation project for county level - Residential Hazardous Waste Collection. Last performed in 2001 and removed a substantial amount of old paint and other products.

Figure G.31: St Thomas Township 2019 Annual HMP Update Survey Response

10/15/2020 Franklin County PA Mail - Hazard Mitigation Plan Update

Mary Seville <mkseville@franklincountypa.gov>

Hazard Mitigation Plan Update

Shawn Corwell <SCorwell@greenetwp.us> Sat, Oct 10, 2020 at 10:30 AM
To: Mary Seville <mkseville@franklincountypa.gov>

Mary,

I have attached the plan update for Greene Township. It is amazing how things change in two years. Sorry about getting back to you so late.

Thanks,

Shawn Corwell

Greene Township

1145 Garver Lane

Chambersburg, Pennsylvania 17202

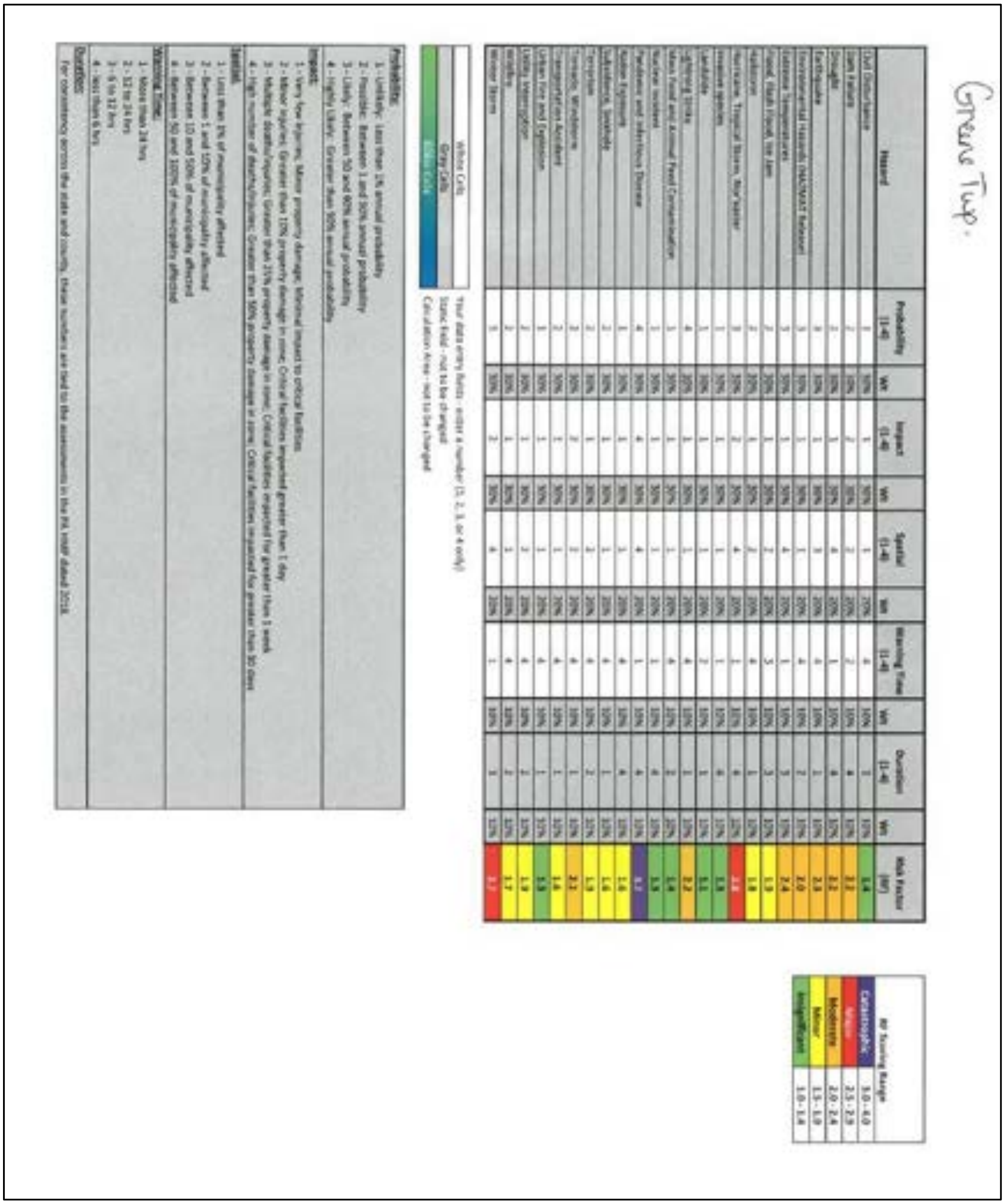
717-263-9160

scorwell@greenetwp.us

Copy of Municipal_Threat_Assessment_Survey_2020_HMP_Update.xlsx
27K

https://mail.google.com/mail/u/0?ik=87ab0311a0&view=pt&search=all&permmsgid=msg-f%3A1680175515033960678&simpl=msg-f%3A16801755150... 1/1

Figure G.32.1: Greene Township 2020 Annual HMP Update Survey Response – Page 1 of 2



Greene Twp.

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
Dam Failure	2	30%	2	30%	2	20%	2	10%	4	10%	2.2
Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
Earthquake	3	30%	1	30%	3	20%	4	10%	1	10%	2.3
Environmental Hazards (HAZMAT Release)	3	30%	1	30%	1	20%	4	10%	2	10%	2.0
Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
Flood, Flash Flood, Ice Jam	2	30%	1	30%	2	20%	3	10%	3	10%	1.9
Hailstorm	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
Hurricane, Tropical Storm, Nor'easter	3	30%	2	30%	4	20%	1	10%	4	10%	2.8
Invasive species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Landslide	1	30%	1	30%	1	20%	2	10%	1	10%	1.1
Lightning Strike	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Pandemic and Infectious Disease	4	30%	4	30%	4	20%	1	10%	4	10%	3.7
Radon Exposure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
Subsidence, Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Terrorism	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
Tornado, Windstorm	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
Transportation Accident	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Utility Interruption	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
Wildfire	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
Winter Storm	3	30%	2	30%	4	20%	1	10%	3	10%	2.7

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.32.2: Greene Township 2020 Annual HMP Update Survey Response – Page 2 of 2

10/23/2020 Franklin County PA Mail - Annual Hazard Mitigation Plan Update

Mary Seville <mkseville@franklincountypa.gov>

Annual Hazard Mitigation Plan Update

HAMILTON TOWNSHIP <hamiltontwp@comcast.net> Fri, Oct 23, 2020 at 2:34 PM
To: Mary Seville <mkseville@franklincountypa.gov>

Dear Ms. Seville:

In response to your email, please be advised that Hamilton Township does not wish to change the threat assessment numbers for our municipality, and there have been no changes to our municipal capabilities.

If you need anything further from Hamilton Township at this time, please let me know.

Thanks,
Deb

Deborah J. Hollenshead
Secretary/Treasurer
Hamilton Township, Franklin County
1270 Crottlestown Road
Chambersburg, PA 17202
Telephone: (717) 264-2946
Fax: (717) 264-2134

Figure G.33: Hamilton Township 2020 Annual HMP Update Survey Response

10/16/2020 Franklin County PA Mail - Annual Hazard Mitigation Plan Update

Mary Seville <mkseville@franklincountypa.gov>

Annual Hazard Mitigation Plan Update

Lurgan Township <lurgantwp@embarqmail.com> Thu, Oct 8, 2020 at 8:26 AM
To: Mary Seville <mkseville@franklincountypa.gov>

We have no changes as of this date. Thanks

Jo Anna (Josie) Miller
Secretary/ Treasurer
Lurgan Township
8650 McClays Mill Rd
Newburg, PA 17240
Phone: 717-532-7460
Fax: 717-532-7816
E-mail: lurgantwp@embarqmail.com

Figure G.34: Lurgan Township 2020 Annual HMP Update Survey Response

12/21/2020 Franklin County PA Mail - Municipal Assessment Report

Mary Seville <mkseville@franklincountypa.gov>

Municipal Assessment Report
2 messages

Anna Swailes <localgov100@yahoo.com> Wed, Dec 9, 2020 at 4:39 PM
To: "mkseville@franklincountypa.gov" <mkseville@franklincountypa.gov>

Our assessment is attached. Please verify that you received it - thanks!

Anna Swailes, Secretary
Metal Township Supervisors

Metal Municipal Threat Assessment Survey 2020 HMP Update 12.9.2020.xlsx
29K

Figure G.35.1: Metal Township 2020 Annual HMP Update Survey Response – Page 1 of 2

Metal Twp.

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	1	30%	1	20%	1	10%	2	10%	1.2
Dam Failure	2	30%	2	30%	2	20%	1	10%	4	10%	2.1
Drought	1	30%	2	30%	3	20%	1	10%	4	10%	2.0
Earthquake	1	30%	2	30%	3	20%	4	10%	1	10%	2.0
Environmental Hazards (HAZMAT Release)	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
Extreme Temperatures	1	30%	2	30%	2	20%	1	10%	3	10%	1.7
Flood, Flash Flood, Ice Jam	2	30%	2	30%	2	20%	2	10%	3	10%	2.1
Hailstorm	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
Hurricane, Tropical Storm, Nor'easter	2	30%	1	30%	2	20%	1	10%	4	10%	1.8
Invasive species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Landslide	1	30%	2	30%	2	20%	4	10%	1	10%	1.8
Lightning Strike	2	30%	2	30%	1	20%	4	10%	1	10%	1.9
Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.3
Nuclear Incident	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
Pandemic and Infectious Disease	2	30%	4	30%	2	20%	2	10%	4	10%	3.1
Radon Exposure	2	30%	1	30%	1	20%	1	10%	4	10%	1.3
Subsidence, Sinkhole	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
Terrorism	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
Tornado, Windstorm	1	30%	1	30%	2	20%	4	10%	1	10%	1.5
Transportation Accident	2	30%	3	30%	2	20%	4	10%	1	10%	2.7
Urban Fire and Explosion	1	30%	1	30%	1	20%	2	10%	1	10%	1.3
Utility Interruption	3	30%	2	30%	3	20%	4	10%	2	10%	2.7
Wildfire	2	30%	3	30%	2	20%	4	10%	2	10%	2.5
Winter Storm	2	30%	1	30%	3	20%	1	10%	3	10%	1.9

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.35.2: Metal Township 2020 Annual HMP Update Survey Response – Page 2 of 2

10/16/2020 Franklin County PA Mail - HMP update

Mary Seville <mkseville@franklincountypa.gov>

HMP update

Jeremy Fogelsonger <jeremy.fogelsonger@montaltoborough.com> Fri, Oct 9, 2020 at 9:55 AM
To: "mkseville@franklincountypa.gov" <mkseville@franklincountypa.gov>
Cc: Patti Stitely <patti.stitely@montaltoborough.com>

We have no new capabilities to add this year.

Thanks

Copy of Municipal_Threat_Assessment_Survey_2020_HMP_Update.xlsx
28K

Figure G.36.1: Mont Alto Borough 2020 Annual HMP Update Survey Response – Page 1 of 2

Mont Alto Borough

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	2	30%	2	20%	2	10%	2	10%	1.7
Dam Failure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
Drought	1	30%	2	30%	3	20%	1	10%	4	10%	2.0
Earthquake	1	30%	1	30%	1	20%	2	10%	1	10%	1.1
Environmental Hazards (HAZMAT Release)	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
Extreme Temperatures	1	30%	2	30%	3	20%	1	10%	3	10%	1.9
Flood, Flash Flood, Ice Jam	1	30%	1	30%	2	20%	2	10%	3	10%	1.5
Hailstorm	2	30%	1	30%	3	20%	3	10%	1	10%	1.9
Hurricane, Tropical Storm, Nor'easter	1	30%	2	30%	2	20%	1	10%	4	10%	1.8
Invasive species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Lightning Strike	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Mass Food and Animal Feed Contamination	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
Nuclear Incident	1	30%	1	30%	1	20%	2	10%	4	10%	1.4
Pandemic and Infectious Disease	2	30%	1	30%	2	20%	4	10%	4	10%	2.1
Radon Exposure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
Subsidence, Sinkhole	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
Terrorism	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
Tornado, Windstorm	2	30%	1	30%	3	20%	3	10%	1	10%	1.9
Transportation Accident	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
Urban Fire and Explosion	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
Utility Interruption	3	30%	1	30%	4	20%	4	10%	2	10%	2.6
Wildfire	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
Winter Storm	2	30%	2	30%	4	20%	1	10%	3	10%	2.4

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data-entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.36.2: Mont Alto Borough 2020 Annual HMP Update Survey Response – Page 2 of 2

10/20/2020 Franklin County PA Mail - Annual Hazard Mitigation Plan Update

Mary Seville <mkseville@franklincountypa.gov>

Annual Hazard Mitigation Plan Update

montgmerytwp@comcast.net <montgmerytwp@comcast.net> Tue, Oct 20, 2020 at 8:27 AM
To: Mary Seville <mkseville@franklincountypa.gov>

Mary,

No changes for Montgomery Township

Thanks,

Tammy L. Carbaugh

Montgomery Township Secretary/Treasure

11364 Fort Loudon Road

Mercersburg, Pa 17236

717-328-3743 (P)

717-328-3571 (F)

montgmerytwp@comcast.net

Figure G.37: Montgomery Township 2020 Annual HMP Update Survey Response

10/16/2020 Franklin County PA Mail - Annual Hazard Mitigation Plan Update

Mary Seville <mkseville@franklincountypa.gov>

Annual Hazard Mitigation Plan Update

Peters Township Supervisors <peterstownship@comcast.net> Tue, Oct 13, 2020 at 5:22 PM
To: Mary Seville <mkseville@franklincountypa.gov>

Our EMC looked over all the information and does not wish to make any changes.

Vicki Heckman

Administrative Assistant

Peters Township Supervisors, Franklin County

5000 Steele Avenue

P.O. Box 88

Lemasters, PA 17231

717-328-3352

Figure G.38: Peters Township 2020 Annual HMP Update Survey Response

10/16/2020 Franklin County PA Mail - Mitigation Update

Mary Seville <mkseville@franklincountypa.gov>

Mitigation Update

Don Eshleman <deshleman28@gmail.com> Sun, Oct 11, 2020 at 1:04 PM
To: mkseville@franklincountypa.gov
Cc: St Thomas Twp <stthomastwp@comcast.net>

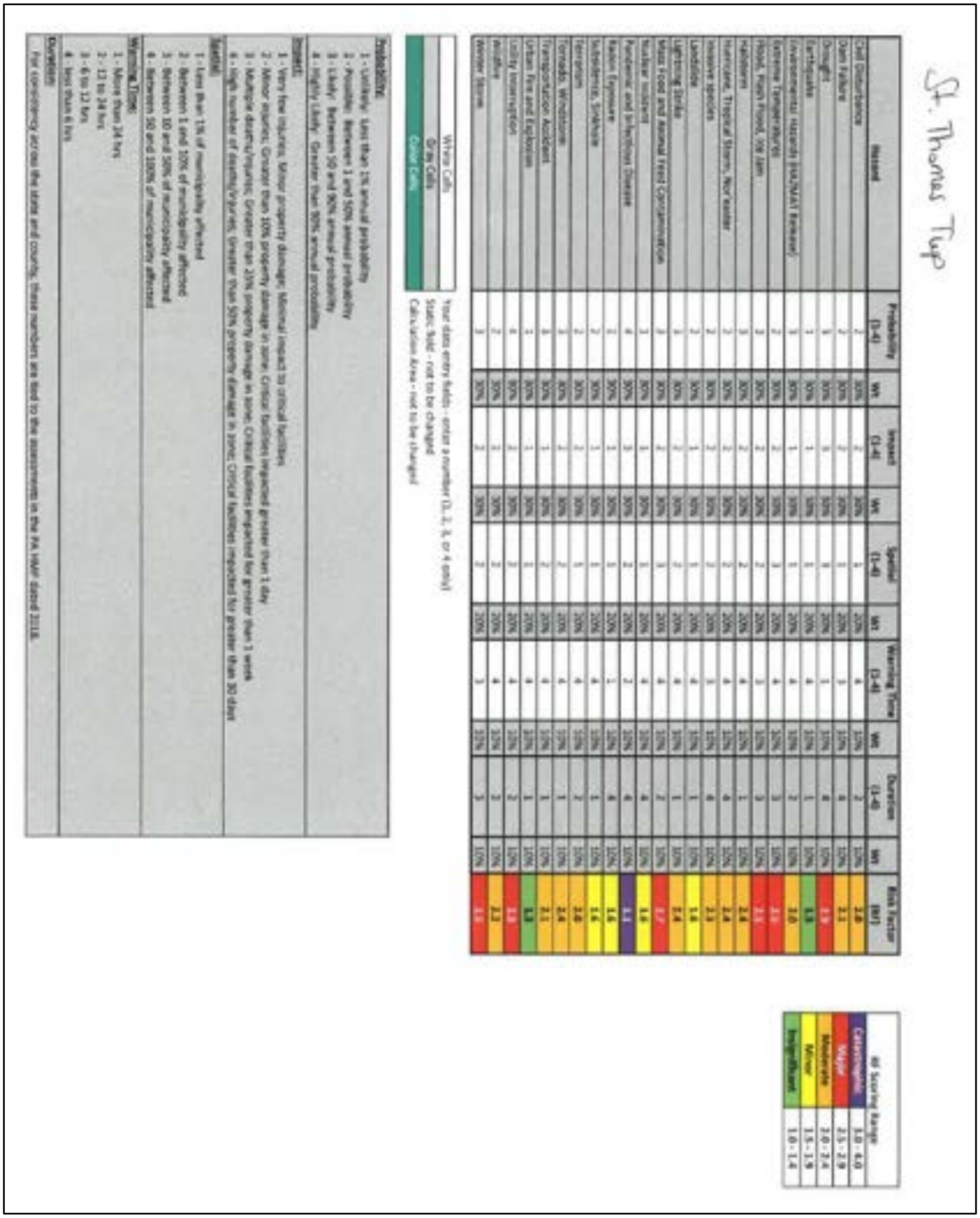
Attached is the St Thomas Threat Assessment

Let me know if anything should be adjusted.

--
Don Eshleman

St Thomas Municipal_Threat_Assessment_Survey_2020_HMP_Update.xlsx
21K

Figure G.39.1: St. Thomas Township 2020 Annual HMP Update Survey Response – Page 1 of 2



St. Thomas Twp

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
Dam Failure	2	30%	2	30%	1	20%	3	10%	4	10%	2.1
Drought	3	30%	3	30%	3	20%	1	10%	4	10%	2.9
Earthquake	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Environmental Hazards (HAZMAT Release)	3	30%	1	30%	1	20%	4	10%	2	10%	2.0
Extreme Temperatures	2	30%	2	30%	3	20%	4	10%	3	10%	2.5
Flood, Flash Flood, Ice Jam	3	30%	2	30%	2	20%	3	10%	3	10%	2.5
Hailstorm	3	30%	2	30%	2	20%	4	10%	1	10%	2.4
Hurricane, Tropical Storm, Nor'easter	2	30%	2	30%	2	20%	4	10%	4	10%	2.4
Invasive species	2	30%	2	30%	2	20%	3	10%	4	10%	2.3
Landslide	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Lightning Strike	3	30%	2	30%	2	20%	4	10%	1	10%	2.4
Mass Food and Animal Feed Contamination	3	30%	2	30%	3	20%	4	10%	2	10%	2.7
Nuclear Incident	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
Pandemic and Infectious Disease	4	30%	3	30%	2	20%	2	10%	4	10%	3.1
Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.6
Subsidence, Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Terrorism	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
Tornado, Windstorm	3	30%	2	30%	2	20%	4	10%	1	10%	2.4
Transportation Accident	3	30%	1	30%	2	20%	4	10%	1	10%	2.1
Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Utility Interruption	4	30%	2	30%	2	20%	4	10%	2	10%	2.8
Wildfire	2	30%	1	30%	2	20%	4	10%	3	10%	2.2
Winter Storm	3	30%	2	30%	2	20%	3	10%	3	10%	2.5

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.39.2: St. Thomas Township 2020 Annual HMP Update Survey Response – Page 2 of 2

Mary Seville <mkseville@franklincountypa.gov>

Greene Township HMP Update

1 message

Shawn Corwell <SCorwell@greenetwp.us> Thu, Jul 29, 2021 at 7:36 AM
To: Mary Seville <mkseville@franklincountypa.gov>

Mary,

I have attached an updated threat assessment survey completed by township staff.

Below are a list of completed or in process mitigation strategies.

- Page 332 IC16 Completed Signal Installed
- Page 333 IC17 In Process
- Page 334 IC21 Completed Stop Sign Installed
- Page 335 IC25 Completed Study Completed Penn dot Denied Speed Reduction (will try again later time)
- Page 335 IC26 In process Bid awarded to Lobar Construction $500,000 Construction Begin Sept, 2021
- Page 335 IC28 In Process Two Lights Still Need Battery Backup
- Page 338 IF2 Completed Study Completed Working on Implementing Recommendations

Future mitigation strategies.

- Create a snow emergency plan
- Flooding under bridge Kohler Road
- Flooding Sycamore Grove Road at Creekside Drive
- Extend Fifth Avenue out to Walker Road to Relieve future traffic congestion

Ordinance

A public hearing to enact a Hydrant Ordinance has been set for August 24th.

Figure G.40.1: Greene Township 2021 Annual HMP Update Survey Response – Page 1 of 2

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	2	30%	2	30%	1	20%	3	10%	2	10%	1.9
Dam Failure	1	30%	2	30%	2	20%	2	10%	4	10%	1.9
Drought	2	30%	2	30%	3	20%	1	10%	4	10%	2.3
Earthquake	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Environmental Hazards (HAZMAT Release)	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
Extreme Temperatures	2	30%	1	30%	3	20%	1	10%	3	10%	1.9
Flood, Flash Flood, Ice Jam	2	30%	1	30%	1	20%	3	10%	3	10%	1.7
Hailstorm	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
Hurricane, Tropical Storm, Nor'easter	2	30%	2	30%	4	20%	3	10%	4	10%	2.7
Invasive species	1	30%	1	30%	3	20%	1	10%	4	10%	1.7
Landslide	1	30%	1	30%	1	20%	2	10%	1	10%	1.1
Lightning Strike	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
Nuclear Incident	1	30%	1	30%	2	20%	4	10%	4	10%	1.8
Pandemic and Infectious Disease	2	30%	3	30%	4	20%	1	10%	4	10%	2.8
Radon Exposure	1	30%	1	30%	1	20%	2	10%	4	10%	1.4
Subsidence, Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Terrorism	1	30%	2	30%	1	20%	4	10%	2	10%	1.7
Tornado, Windstorm	3	30%	1	30%	2	20%	4	10%	1	10%	2.1
Transportation Accident	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
Urban Fire and Explosion	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Utility Interruption	3	30%	1	30%	2	20%	4	10%	2	10%	2.2
Wildfire	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
Winter Storm	3	30%	1	30%	4	20%	1	10%	3	10%	2.4

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.40.2: Greene Township 2021 Annual HMP Update Survey Response – Page 2 of 2

7/30/2021 Franklin County PA Mail - Re: Annual Hazard Mitigation Plan Update

Mary Seville <mkseville@franklincountypa.gov>

Re: Annual Hazard Mitigation Plan Update
1 message

Michael Kessinger <hamiltontwp@comcast.net> Tue, Jul 27, 2021 at 8:56 AM
To: Mary Seville <mkseville@franklincountypa.gov>

Hello Mary ~

Hamilton Township has reviewed the Threat Assessment spreadsheet, and at this time, the rankings are felt to still be accurate for our municipality.

We do not have any mitigation action requests.

Hamilton Township has not adopted any new ordinances that would affect our capabilities. There have been no other changes that would affect our municipal capabilities.

If you require any additional information, please do not hesitate to contact our office.

Thanks so much,
Deb

Deborah J. Hollenshead
Secretary/Treasurer
Hamilton Township, Franklin County
1270 Crottlestown Road
Chambersburg, PA 17202
Telephone: (717) 264-2946
Fax: (717) 264-2134

Figure G.41: Hamilton Township 2021 Annual HMP Update Survey Response

Mary Seville <mkseville@franklincountypa.gov>

Re: Annual Hazard Mitigation Plan Update
1 message

Anna Swailes <localgov100@yahoo.com> Wed, Aug 18, 2021 at 10:11 AM
To: Mary Seville <mkseville@franklincountypa.gov>

Hi Mary,

I have attached our up-dated list.

Anna Swailes, Secretary
Metal Township Supervisors
Phone 717-349-7452

Figure G.42.1: Metal Township 2021 Annual HMP Update Survey Response – Page 1 of 2

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
Dam Failure	2	30%	3	30%	1	20%	1	10%	4	10%	2.2
Drought	2	30%	2	30%	1	20%	2	10%	4	10%	2.0
Earthquake	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
Environmental Hazards (HAZMAT Release)	3	30%	2	30%	1	20%	3	10%	2	10%	2.2
Extreme Temperatures	2	30%	2	30%	1	20%	1	10%	3	10%	1.8
Flood, Flash Flood, Ice Jam	2	30%	2	30%	2	20%	2	10%	3	10%	2.1
Hailstorm	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
Hurricane, Tropical Storm, Nor'easter	1	30%	3	30%	1	20%	1	10%	4	10%	1.9
Invasive species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Landslide	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
Lightning Strike	2	30%	2	30%	2	20%	2	10%	1	10%	1.9
Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
Nuclear Incident	1	30%	2	30%	1	20%	1	10%	4	10%	1.6
Pandemic and Infectious Disease	3	30%	3	30%	2	20%	3	10%	4	10%	2.9
Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Subsidence, Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Terrorism	2	30%	2	30%	2	20%	3	10%	2	10%	2.1
Tornado, Windstorm	2	30%	2	30%	1	20%	1	10%	1	10%	1.6
Transportation Accident	4	30%	3	30%	2	20%	2	10%	1	10%	2.8
Urban Fire and Explosion	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
Utility Interruption	2	30%	3	30%	2	20%	4	10%	2	10%	2.5
Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
Winter Storm	2	30%	1	30%	1	20%	2	10%	3	10%	1.6

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.42.2: Metal Township 2021 Annual HMP Update Survey Response – Page 2 of 2

Municipal Leaders/Local EMCs,

It is time to start the process of the annual update to the Franklin County Hazard Mitigation Plan. As part of the update, we are opening up the threat assessment rankings for your jurisdictions. What this means is that you have the opportunity to re-assess the risks to your municipality for each of the identified threats in the 2020 HMP. This gives you an opportunity to capture any changes due to current events or developing trends, and this year has certainly been challenging! Attached is an Excel spreadsheet with the threat survey and definitions on it for you to use if you choose to re-run your risk assessment. I've also included the county threat assessment roll up from last year for your reference. As a reminder, this threat assessment represents all opinions on risk in your municipality and we encourage you to involve as many people as possible, including the public, in making these assessments. The spreadsheet is developed to allow you to see in real-time your Risk Factor (RF) for each threat, allowing you to see what is ranked as your top priority. This way you will know right away if the rankings seem right. When complete, simply return the completed spreadsheet to me and I will integrate these new assessments into the overall county assessment.

You do not have to change your threat assessment numbers. If they are still valid for your municipality, please let me know that there are no changes and I will mark this portion as complete. It should be understood that as municipal rankings change, that will change the overall county assessment of ranked threats and that is a good thing. We need to capture trends as they occur and not wait for the next full update in 2 years to start planning.

You should also start gathering updates (if any) to your mitigation actions or ideas for new mitigation actions you want added to the HMP as part of this update. We will address any requested mitigation action additions to help you compete for federal mitigation funding. This is the time to get those changes into the plan so you can compete for this funding next year.

Finally, we will need any changes to municipal capabilities that you have implemented since the plan was updated last December. These changes would be any new ordinances, zoning, building code, floodplain management, stormwater management, etc. Again, you may not have changes to either mitigation actions or municipal capabilities. If so, please respond that you have no changes and I will mark you complete.

We would like to get any updates back by September 13 so we can process them for the general discussion at the HMP update meeting. If you have any questions, please feel free to contact me. I look forward to working with you all through this process!

Thanks,
Mary K.

Quincy Twp – no changes
– per Kerry Gumbaugh
9/30/21

Figure G.43: Quincy Township 2021 Annual HMP Update Survey Response

Mary Seville <mkseville@franklincountypa.gov>

Re: Annual Hazard Mitigation Plan Update
1 message

Don Eshleman <deshleman28@gmail.com> Fri, Jul 30, 2021 at 10:37 AM
To: Mary Seville <mkseville@franklincountypa.gov>
Cc: St Thomas Twp <stthomastwp@comcast.net>

Threat assessment for St. Thomas Township attached. Most the same as previous, small variations.

Let me know if anything needs adjusting.

Figure G.44.1: St. Thomas Township 2021 Annual HMP Update Survey Response – Page 1 of 2

Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
Civil Disturbance	3	30%	2	30%	1	20%	4	10%	2	10%	2.3
Dam Failure	2	30%	1	30%	2	20%	2	10%	4	10%	1.9
Drought	3	30%	3	30%	3	20%	1	10%	4	10%	2.9
Earthquake	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Environmental Hazards (HAZMAT Release)	3	30%	2	30%	1	20%	4	10%	2	10%	2.3
Extreme Temperatures	3	30%	2	30%	3	20%	3	10%	3	10%	2.7
Flood, Flash Flood, Ice Jam	2	30%	2	30%	2	20%	2	10%	3	10%	2.1
Hailstorm	3	30%	3	30%	2	20%	4	10%	1	10%	2.7
Hurricane, Tropical Storm, Nor'easter	2	30%	2	30%	1	20%	4	10%	4	10%	2.2
Invasive species	3	30%	2	30%	3	20%	2	10%	4	10%	2.7
Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Lightning Strike	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
Mass Food and Animal Feed Contamination	3	30%	2	30%	2	20%	3	10%	2	10%	2.4
Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
Pandemic and Infectious Disease	3	30%	2	30%	3	20%	2	10%	4	10%	2.7
Radon Exposure	2	30%	1	30%	1	20%	1	10%	4	10%	1.6
Subsidence, Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
Terrorism	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
Tornado, Windstorm	4	30%	2	30%	2	20%	4	10%	1	10%	2.7
Transportation Accident	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
Utility Interruption	4	30%	2	30%	2	20%	4	10%	2	10%	2.8
Wildfire	3	30%	2	30%	2	20%	4	10%	2	10%	2.5
Winter Storm	3	30%	2	30%	2	20%	2	10%	3	10%	2.4

RF Scoring Range	
Catastrophic	3.0 - 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 - 1.9
Insignificant	1.0 - 1.4

White Cells	Your data entry fields - enter a number (1, 2, 3, or 4 only)
Gray Cells	Static field - not to be changed
Color Cells	Calculation Area - not to be changed

Probability:
1 - Unlikely: Less than 1% annual probability
2 - Possible: Between 1 and 50% annual probability
3 - Likely: Between 50 and 90% annual probability
4 - Highly Likely: Greater than 90% annual probability

Impact:
1 - Very few injuries; Minor property damage; Minimal impact to critical facilities
2 - Minor injuries; Greater than 10% property damage in zone; Critical facilities impacted greater than 1 day
3 - Multiple deaths/injuries; Greater than 25% property damage in zone; Critical facilities impacted for greater than 1 week
4 - High number of deaths/injuries; Greater than 50% property damage in zone; Critical facilities impacted for greater than 30 days

Spatial:
1 - Less than 1% of municipality affected
2 - Between 1 and 10% of municipality affected
3 - Between 10 and 50% of municipality affected
4 - Between 50 and 100% of municipality affected

Warning Time:
1 - More than 24 hrs
2 - 12 to 24 hrs
3 - 6 to 12 hrs
4 - less than 6 hrs

Duration:
For consistency across the state and county, these numbers are tied to the assessments in the PA HMP dated 2018.

Figure G.44.2: St. Thomas Township 2021 Annual HMP Update Survey Response – Page 2 of 2

Antrim Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	**Transportation Accident**	4	30%	3	30%	3	20%	4	10%	1	10%	3.2
2	**Tornado/Windstorm**	4	30%	3	30%	3	20%	2	10%	1	10%	3.0
3	**Winter Storm**	4	30%	2	30%	4	20%	1	10%	3	10%	3.0
4	**Nuclear Incident**	2	30%	3	30%	3	20%	4	10%	4	10%	2.9
5	**Hurricane/Tropical Storm, Nor'easter**	3	30%	2	30%	4	20%	1	10%	4	10%	2.8
6	**Drought**	2	30%	3	30%	3	20%	1	10%	4	10%	2.6
7	Lightning Strike	3	30%	2	30%	2	20%	4	10%	1	10%	2.4
8	Extreme Temperatures	2	30%	2	30%	4	20%	1	10%	3	10%	2.4
9	Utility Interruption	2	30%	2	30%	3	20%	4	10%	2	10%	2.4
10	Environmental Hazards	2	30%	2	30%	3	20%	4	10%	2	10%	2.4
11	Invasive Species	2	30%	2	30%	3	20%	1	10%	4	10%	2.3
12	Subsidence/Sinkhole	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
13	Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
14	Hailstorm	2	30%	2	30%	3	20%	2	10%	1	10%	2.1
15	Urban Fire and Explosion	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
16	Pandemic and Infectious Disease	2	30%	2	30%	2	20%	1	10%	4	10%	2.1
17	Flood/Flash Flood/Ice Jam	2	30%	2	30%	2	20%	1	10%	3	10%	2.0
18	Radon Exposure	2	30%	1	30%	3	20%	1	10%	4	10%	2.0
19	Earthquake	1	30%	2	30%	3	20%	4	10%	1	10%	2.0
20	Terrorism	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
21	Dam Failure	1	30%	2	30%	2	20%	2	10%	4	10%	1.9
22	Mass Food and Animal Feed Contamination	1	30%	2	30%	2	20%	1	10%	2	10%	1.6
23	Landslide	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
24	Civil Disturbance	1	30%	1	30%	2	20%	1	10%	2	10%	1.3

Figure H.1: Antrim Township Hazard Assessment Survey

Chambersburg Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Utility Interruption	4	30%	1	30%	4	20%	4	10%	2	10%	2.9
2	Hailstorm	4	30%	1	30%	4	20%	4	10%	1	10%	2.8
3	Winter Storm	4	30%	1	30%	4	20%	2	10%	3	10%	2.8
4	Invasive Species	4	30%	1	30%	4	20%	1	10%	4	10%	2.8
5	Earthquake	1	30%	4	30%	4	20%	4	10%	1	10%	2.8
6	Urban Fire and Explosion	4	30%	2	30%	2	20%	4	10%	1	10%	2.7
7	Extreme Temperatures	4	30%	1	30%	4	20%	1	10%	3	10%	2.7
8	Radon Exposure	4	30%	1	30%	3	20%	1	10%	4	10%	2.6
9	Dam Failure	1	30%	4	30%	3	20%	1	10%	4	10%	2.6
10	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	4	20%	1	10%	4	10%	2.5
11	Lightning Strike	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
12	Transportation Accident	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
13	Subsidence/Sinkhole	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
14	Tornado/Windstorm	2	30%	3	30%	2	20%	4	10%	1	10%	2.4
15	Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
16	Environmental Hazards	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
17	Pandemic and Infectious Disease	1	30%	1	30%	4	20%	1	10%	4	10%	1.9
18	Mass Food and Animal Feed Contamination	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
18	Civil Disturbance	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
20	Flood/Flash Flood/Ice Jam	2	30%	1	30%	1	20%	3	10%	3	10%	1.7
21	Wildfire	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
22	Nuclear Incident	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
23	Terrorism	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
24	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3

Figure H.2: Chambersburg Borough Hazard Assessment Survey

Fannett Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Tornado/Windstorm	2	30%	2	30%	4	20%	4	10%	1	10%	2.5
2	Lightning Strike	2	30%	2	30%	4	20%	4	10%	1	10%	2.5
3	Flood/Flash Flood/Ice Jam	2	30%	2	30%	3	20%	4	10%	3	10%	2.5
4	Winter Storm	2	30%	2	30%	4	20%	1	10%	3	10%	2.4
5	Extreme Temperatures	2	30%	2	30%	3	20%	1	10%	3	10%	2.2
6	Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
7	Transportation Accident	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
8	Hurricane/Tropical Storm, Nor'easter	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
9	Dam Failure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
10	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
11	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
12	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
13	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
14	Utility Interruption	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
15	Environmental Hazards	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
16	Terrorism	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
17	Wildfire	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
18	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
19	Civil Disturbance	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
20	Hailstorm	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
21	Earthquake	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
22	Subsidence/Sinkhole	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
23	Urban Fire and Explosion	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
24	Landslide	1	30%	1	30%	1	20%	1	10%	1	10%	1.0

Figure H.3: Fannett Township Hazard Assessment Survey

Greencastle Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	**Tornado/Windstorm**	2	30%	4	30%	4	20%	4	10%	1	10%	3.1
2	**Terrorism**	2	30%	4	30%	3	20%	4	10%	2	10%	3.0
3	**Hurricane/Tropical Storm, Nor'easter**	1	30%	3	30%	4	20%	4	10%	4	10%	2.8
4	**Utility Interruption**	2	30%	2	30%	4	20%	4	10%	2	10%	2.6
5	**Environmental Hazards**	2	30%	2	30%	4	20%	4	10%	2	10%	2.6
6	**Dam Failure**	2	30%	2	30%	4	20%	1	10%	4	10%	2.5
7	**Drought**	2	30%	2	30%	4	20%	1	10%	4	10%	2.5
8	**Flood/Flash Flood/Ice Jam**	2	30%	2	30%	3	20%	4	10%	3	10%	2.5
9	**Pandemic and Infectious Disease**	1	30%	2	30%	4	20%	4	10%	4	10%	2.5
10	**Invasive Species**	1	30%	2	30%	4	20%	4	10%	4	10%	2.5
11	**Nuclear Incident**	1	30%	2	30%	4	20%	4	10%	4	10%	2.5
12	Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
13	Hailstorm	2	30%	2	30%	4	20%	3	10%	1	10%	2.4
14	Winter Storm	2	30%	2	30%	4	20%	1	10%	3	10%	2.4
15	Earthquake	1	30%	3	30%	3	20%	4	10%	1	10%	2.3
16	Lightning Strike	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
17	Transportation Accident	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
18	Landslide	1	30%	2	30%	2	20%	4	10%	1	10%	1.8
19	Mass Food and Animal Feed Contamination	1	30%	3	30%	1	20%	1	10%	2	10%	1.7
20	Subsidence/Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
21	Radon Exposure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
22	Urban Fire and Explosion	1	30%	1	30%	2	20%	3	10%	1	10%	1.4
23	Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
24	Wildfire	1	30%	1	30%	1	20%	3	10%	2	10%	1.3

Figure H.4: Greencastle Borough Hazard Assessment Survey

Greene Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Pandemic and Infectious Disease	2	30%	3	30%	4	20%	1	10%	4	10%	2.8
2	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	4	20%	3	10%	4	10%	2.7
3	Winter Storm	3	30%	2	30%	4	20%	1	10%	3	10%	2.4
4	Drought	2	30%	2	30%	3	20%	1	10%	4	10%	2.3
5	Utility Interruption	3	30%	1	30%	2	20%	4	10%	2	10%	2.2
6	Lightning Strike	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
7	Tornado/Windstorm	3	30%	1	30%	2	20%	4	10%	1	10%	2.1
8	Civil Disturbance	2	30%	2	30%	1	20%	3	10%	2	10%	1.9
9	Dam Failure	1	30%	2	30%	2	20%	2	10%	4	10%	1.9
10	Extreme Temperatures	2	30%	1	30%	3	20%	1	10%	3	10%	1.9
11	Hailstorm	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
12	Nuclear Incident	1	30%	1	30%	2	20%	4	10%	4	10%	1.8
13	Transportation Accident	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
14	Environmental Hazards	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
15	Flood/Flash Flood/Ice Jam	2	30%	1	30%	1	20%	3	10%	3	10%	1.7
16	Invasive Species	1	30%	1	30%	3	20%	1	10%	4	10%	1.7
17	Terrorism	1	30%	2	30%	1	20%	4	10%	2	10%	1.7
18	Wildfire	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
19	Earthquake	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
20	Subsidence/Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
21	Urban Fire and Explosion	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
22	Radon Exposure	1	30%	1	30%	1	20%	2	10%	4	10%	1.4
23	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
24	Landslide	1	30%	1	30%	1	20%	2	10%	1	10%	1.1

Figure H.5: Greene Township Hazard Assessment Survey

Guilford Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Transportation Accident	4	30%	2	30%	4	20%	4	10%	1	10%	3.1
2	Utility Interruption	4	30%	1	30%	4	20%	4	10%	2	10%	2.9
3	Environmental Hazards	4	30%	2	30%	2	20%	4	10%	2	10%	2.8
4	Tornado/Windstorm	3	30%	2	30%	4	20%	4	10%	1	10%	2.8
5	Subsidence/Sinkhole	4	30%	2	30%	2	20%	4	10%	1	10%	2.7
6	Winter Storm	4	30%	1	30%	4	20%	1	10%	3	10%	2.7
7	Hailstorm	4	30%	1	30%	3	20%	4	10%	1	10%	2.6
8	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	4	20%	1	10%	4	10%	2.5
9	Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
10	Flood/Flash Flood/Ice Jam	3	30%	1	30%	3	20%	3	10%	3	10%	2.4
11	Pandemic and Infectious Disease	1	30%	3	30%	3	20%	1	10%	4	10%	2.3
12	Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
13	Terrorism	1	30%	3	30%	2	20%	4	10%	2	10%	2.2
14	Earthquake	1	30%	2	30%	3	20%	4	10%	1	10%	2.0
15	Mass Food and Animal Feed Contamination	1	30%	3	30%	2	20%	1	10%	2	10%	1.9
16	Nuclear Incident	1	30%	2	30%	1	20%	4	10%	4	10%	1.9
17	Dam Failure	1	30%	1	30%	2	20%	4	10%	4	10%	1.8
18	Lightning Strike	2	30%	1	30%	2	20%	3	10%	1	10%	1.7
19	Civil Disturbance	1	30%	2	30%	1	20%	4	10%	2	10%	1.7
20	Urban Fire and Explosion	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
21	Wildfire	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
22	Landslide	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
23	Radon Exposure	1	30%	1	30%	1	20%	2	10%	4	10%	1.4
24	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3

Figure H.6: Guilford Township Hazard Assessment Survey

Hamilton Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Tornado/Windstorm	2	30%	2	30%	4	20%	4	10%	1	10%	2.5
2	Winter Storm	2	30%	2	30%	4	20%	2	10%	3	10%	2.5
3	Lightning Strike	2	30%	1	30%	4	20%	4	10%	1	10%	2.2
4	Hailstorm	2	30%	1	30%	4	20%	4	10%	1	10%	2.2
5	Invasive Species	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
6	Utility Interruption	2	30%	1	30%	3	20%	4	10%	2	10%	2.1
7	Dam Failure	1	30%	1	30%	3	20%	4	10%	4	10%	2.0
8	Earthquake	1	30%	1	30%	4	20%	4	10%	1	10%	1.9
9	Extreme Temperatures	1	30%	1	30%	4	20%	2	10%	3	10%	1.9
10	Hurricane/Tropical Storm, Nor'easter	1	30%	1	30%	4	20%	1	10%	4	10%	1.9
11	Drought	1	30%	1	30%	4	20%	1	10%	4	10%	1.9
12	Flood/Flash Flood/Ice Jam	1	30%	1	30%	3	20%	4	10%	3	10%	1.9
13	Transportation Accident	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
14	Environmental Hazards	1	30%	1	30%	3	20%	4	10%	2	10%	1.8
15	Terrorism	1	30%	1	30%	3	20%	4	10%	2	10%	1.8
16	Wildfire	1	30%	1	30%	3	20%	4	10%	2	10%	1.8
17	Pandemic and Infectious Disease	1	30%	1	30%	3	20%	2	10%	4	10%	1.8
18	Radon Exposure	1	30%	1	30%	2	20%	4	10%	4	10%	1.8
19	Urban Fire and Explosion	1	30%	1	30%	3	20%	4	10%	1	10%	1.7
20	Mass Food and Animal Feed Contamination	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
21	Civil Disturbance	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
22	Nuclear Incident	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
23	Landslide	1	30%	1	30%	2	20%	4	10%	1	10%	1.5
24	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3

Figure H.7: Hamilton Township Hazard Assessment Survey

Letterkenny Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Terrorism	3	30%	4	30%	4	20%	4	10%	2	10%	3.5
2	Winter Storm	4	30%	2	30%	4	20%	2	10%	3	10%	3.1
3	Drought	3	30%	3	30%	4	20%	1	10%	4	10%	3.1
4	Wildfire	4	30%	2	30%	2	20%	4	10%	2	10%	2..8
5	Environmental Hazards	3	30%	2	30%	3	20%	4	10%	2	10%	2.7
6	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	3	20%	4	10%	4	10%	2.6
7	Radon Exposure	3	30%	1	30%	4	20%	1	10%	4	10%	2.5
8	Transportation Accident	4	30%	1	30%	2	20%	4	10%	1	10%	2.4
9	Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
10	Utility Interruption	3	30%	1	30%	3	20%	4	10%	2	10%	2.4
11	Tornado/Windstorm	3	30%	1	30%	3	20%	4	10%	1	10%	2.3
12	Lightning Strike	3	30%	1	30%	3	20%	4	10%	1	10%	2.3
13	Flood/Flash Flood/Ice Jam	3	30%	1	30%	3	20%	2	10%	3	10%	2.3
14	Urban Fire and Explosion	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
15	Hailstorm	2	30%	1	30%	4	20%	2	10%	1	10%	2.0
16	Earthquake	2	30%	2	30%	2	20%	2	10%	1	10%	1.9
17	Subsidence/Sinkhole	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
18	Dam Failure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
19	Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
20	Mass Food and Animal Feed Contamination	1	30%	1	30%	2	20%	1	10%	2	10%	1.3
21	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
22	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
23	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
24	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3

Figure H.8: Letterkenny Township Hazard Assessment Survey

Lurgan Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Dam Failure	2	30%	4	30%	4	20%	3	10%	4	10%	3.3
2	Winter Storm	3	30%	2	30%	4	20%	3	10%	3	10%	2.9
3	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	4	20%	3	10%	4	10%	2.7
4	Hailstorm	2	30%	2	30%	4	20%	4	10%	1	10%	2.5
5	Tornado/Windstorm	2	30%	2	30%	3	20%	4	10%	1	10%	2.3
6	Flood/Flash Flood/Ice Jam	2	30%	2	30%	2	20%	4	10%	3	10%	2.3
7	Extreme Temperatures	1	30%	2	30%	4	20%	3	10%	3	10%	2.3
8	Transportation Accident	3	30%	1	30%	2	20%	4	10%	1	10%	2.1
9	Utility Interruption	2	30%	1	30%	3	20%	4	10%	2	10%	2.1
10	Wildfire	2	30%	1	30%	3	20%	2	10%	2	10%	1.9
11	Environmental Hazards	1	30%	2	30%	2	20%	4	10%	2	10%	1.9
12	Invasive Species	1	30%	1	30%	4	20%	1	10%	4	10%	1.9
13	Mass Food and Animal Feed Contamination	1	30%	1	30%	3	20%	4	10%	2	10%	1.8
14	Lightning Strike	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
15	Urban Fire and Explosion	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
16	Radon Exposure	2	30%	1	30%	1	20%	1	10%	4	10%	1.6
17	Earthquake	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
18	Drought	1	30%	1	30%	2	20%	1	10%	4	10%	1.5
19	Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
20	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
21	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
22	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
23	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
24	Terrorism	1	30%	1	30%	1	20%	1	10%	2	10%	1.1

Figure H.9: Lurgan Township Hazard Assessment Survey

Mercersburg Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Terrorism	1	30%	4	30%	4	20%	4	10%	2	10%	2.9
2	Tornado/Windstorm	2	30%	3	30%	4	20%	4	10%	1	10%	2.8
3	Earthquake	1	30%	4	30%	4	20%	4	10%	1	10%	2.8
4	Lightning Strike	3	30%	1	30%	4	20%	4	10%	1	10%	2.5
5	Nuclear Incident	1	30%	4	30%	1	20%	4	10%	4	10%	2.5
6	Winter Storm	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
7	Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
8	Utility Interruption	2	30%	1	30%	4	20%	4	10%	2	10%	2.3
9	Hailstorm	2	30%	1	30%	4	20%	4	10%	1	10%	2.2
10	Hurricane/Tropical Storm, Nor'easter	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
11	Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
12	Invasive Species	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
13	Civil Disturbance	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
14	Dam Failure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
15	Wildfire	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
16	Transportation Accident	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
17	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
18	Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
19	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
20	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
21	Flood/Flash Flood/Ice Jam	1	30%	1	30%	1	20%	1	10%	3	10%	1.2
22	Environmental Hazards	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
23	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
24	Landslide	1	30%	1	30%	1	20%	1	10%	1	10%	1.0

Figure H.10: Mercersburg Borough Hazard Assessment Survey

Metal Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Pandemic and Infectious Disease	3	30%	3	30%	2	20%	3	10%	4	10%	2.9
2	Transportation Accident	4	30%	3	30%	2	20%	2	10%	1	10%	2.8
3	Utility Interruption	2	30%	3	30%	2	20%	4	10%	2	10%	2.5
4	Dam Failure	2	30%	3	30%	1	20%	1	10%	4	10%	2.2
5	Environmental Hazards	3	30%	2	30%	1	20%	3	10%	2	10%	2.2
6	Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
7	Earthquake	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
8	Flood/Flash Flood/Ice Jam	2	30%	2	30%	2	20%	2	10%	3	10%	2.1
9	Terrorism	2	30%	2	30%	2	20%	3	10%	2	10%	2.1
10	Drought	2	30%	2	30%	1	20%	2	10%	4	10%	2.0
11	Hurricane/Tropical Storm, Nor'easter	1	30%	3	30%	1	20%	1	10%	4	10%	1.9
12	Lightning Strike	2	30%	2	30%	2	20%	2	10%	1	10%	1.9
13	Extreme Temperatures	2	30%	2	30%	1	20%	1	10%	3	10%	1.8
14	Landslide	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
15	Nuclear Incident	1	30%	2	30%	1	20%	1	10%	4	10%	1.6
16	Tornado/Windstorm	2	30%	2	30%	1	20%	1	10%	1	10%	1.6
17	Winter Storm	2	30%	1	30%	1	20%	2	10%	3	10%	1.6
18	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
19	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
20	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
21	Civil Disturbance	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
22	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
23	Hailstorm	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
24	Urban Fire and Explosion	1	30%	1	30%	1	20%	1	10%	1	10%	1.0

Figure H.11: Metal Township Hazard Assessment Survey

Mont Alto Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Utility Interruption	3	30%	1	30%	4	20%	4	10%	2	10%	2.6
2	Winter Storm	2	30%	2	30%	4	20%	1	10%	3	10%	2.4
3	Environmental Hazards	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
4	Pandemic and Infectious Disease	2	30%	1	30%	2	20%	4	10%	4	10%	2.1
5	Drought	1	30%	2	30%	3	20%	1	10%	4	10%	2.0
6	Extreme Temperatures	1	30%	2	30%	3	20%	1	10%	3	10%	1.9
7	Hailstorm	2	30%	1	30%	3	20%	3	10%	1	10%	1.9
8	Tornado/Windstorm	2	30%	1	30%	3	20%	3	10%	1	10%	1.9
9	Hurricane/Tropical Storm, Nor'easter	1	30%	2	30%	2	20%	1	10%	4	10%	1.8
10	Transportation Accident	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
11	Urban Fire and Explosion	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
12	Civil Disturbance	1	30%	2	30%	2	20%	2	10%	2	10%	1.7
13	Dam Failure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
14	Lightning Strike	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
15	Radon Exposure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
16	Mass Food and Animal Feed Contamination	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
17	Flood/Flash Flood/Ice Jam	1	30%	1	30%	2	20%	2	10%	3	10%	1.5
18	Terrorism	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
19	Wildfire	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
20	Nuclear Incident	1	30%	1	30%	1	20%	2	10%	4	10%	1.4
21	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
22	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
23	Earthquake	1	30%	1	30%	1	20%	2	10%	1	10%	1.1
24	Subsidence/Sinkhole	1	30%	1	30%	1	20%	1	10%	1	10%	1.0

Figure H.12: Mont Alto Borough Hazard Assessment Survey

Montgomery Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Pandemic and Infectious Disease	2	30%	4	30%	3	20%	4	10%	4	10%	3.2
2	Lightning Strike	4	30%	2	30%	4	20%	4	10%	1	10%	3.1
3	Tornado/Windstorm	3	30%	3	30%	4	20%	4	10%	1	10%	3.1
4	Utility Interruption	4	30%	2	30%	3	20%	4	10%	2	10%	3.0
5	Mass Food and Animal Feed Contamination	3	30%	3	30%	4	20%	2	10%	2	10%	3.0
6	Winter Storm	3	30%	3	30%	4	20%	1	10%	3	10%	3.0
7	Terrorism	3	30%	3	30%	3	20%	4	10%	2	10%	3.0
8	Subsidence/Sinkhole	3	30%	2	30%	4	20%	4	10%	1	10%	2.8
9	Hurricane/Tropical Storm, Nor'easter	3	30%	2	30%	4	20%	1	10%	4	10%	2.8
10	Civil Disturbance	3	30%	3	30%	2	20%	3	10%	2	10%	2.7
11	Extreme Temperatures	3	30%	2	30%	4	20%	1	10%	3	10%	2.7
12	Drought	3	30%	1	30%	4	20%	1	10%	4	10%	2.5
13	Invasive Species	3	30%	1	30%	4	20%	1	10%	4	10%	2.5
14	Urban Fire and Explosion	3	30%	2	30%	2	20%	4	10%	1	10%	2.4
15	Flood/Flash Flood/Ice Jam	3	30%	1	30%	3	20%	2	10%	3	10%	2.3
16	Radon Exposure	2	30%	1	30%	3	20%	4	10%	4	10%	2.3
17	Hailstorm	3	30%	1	30%	4	20%	1	10%	1	10%	2.2
18	Environmental Hazards	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
19	Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
20	Earthquake	1	30%	2	30%	4	20%	4	10%	1	10%	2.2
21	Transportation Accident	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
22	Dam Failure	1	30%	2	30%	2	20%	4	10%	4	10%	2.1
23	Landslide	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
24	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3

Figure H.13: Montgomery Township Hazard Assessment Survey

Orrstown Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Winter Storm	2	30%	1	30%	2	20%	3	10%	3	10%	1.9
2	Hurricane/Tropical Storm, Nor'easter	2	30%	1	30%	1	20%	3	10%	4	10%	1.8
3	Lightning Strike	2	30%	1	30%	1	20%	3	10%	1	10%	1.5
4	Hailstorm	2	30%	1	30%	1	20%	3	10%	1	10%	1.5
5	Drought	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
6	Dam Failure	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
7	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
8	Invasive Species	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
9	Nuclear Incident	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
10	Radon Exposure	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
11	Extreme Temperatures	1	30%	1	30%	1	20%	3	10%	3	10%	1.4
12	Flood/Flash Flood/Ice Jam	1	30%	1	30%	1	20%	3	10%	3	10%	1.4
13	Utility Interruption	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
14	Environmental Hazards	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
15	Terrorism	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
16	Wildfire	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
17	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
18	Civil Disturbance	1	30%	1	30%	1	20%	3	10%	2	10%	1.3
19	Tornado/Windstorm	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
20	Transportation Accident	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
21	Earthquake	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
22	Subsidence/Sinkhole	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
23	Urban Fire and Explosion	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
24	Landslide	1	30%	1	30%	1	20%	3	10%	1	10%	1.2

Figure H.14: Orrstown Borough Hazard Assessment Survey

Peters Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Winter Storm	2	30%	1	30%	4	20%	2	10%	3	10%	2.2
2	Extreme Temperatures	2	30%	1	30%	4	20%	2	10%	3	10%	2.2
3	Hurricane/Tropical Storm, Nor'easter	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
4	Flood/Flash Flood/Ice Jam	2	30%	1	30%	3	20%	4	10%	3	10%	2.2
5	Utility Interruption	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
6	Drought	1	30%	1	30%	4	20%	1	10%	4	10%	1.9
7	Nuclear Incident	1	30%	1	30%	4	20%	1	10%	4	10%	1.9
8	Transportation Accident	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
9	Dam Failure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
10	Invasive Species	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
11	Radon Exposure	1	30%	1	30%	1	20%	4	10%	4	10%	1.6
12	Lightning Strike	2	30%	1	30%	1	20%	2	10%	1	10%	1.4
13	Environmental Hazards	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
14	Terrorism	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
15	Wildfire	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
16	Civil Disturbance	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
17	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	2	10%	4	10%	1.4
18	Tornado/Windstorm	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
19	Earthquake	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
20	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
21	Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
22	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
23	Hailstorm	1	30%	1	30%	1	20%	3	10%	1	10%	1.2
24	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	2	10%	2	10%	1.2

Figure H.15: Peters Township Hazard Assessment Survey

Quincy Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Winter Storm	4	30%	2	30%	4	20%	1	10%	3	10%	3.0
2	Utility Interruption	3	30%	2	30%	4	20%	4	10%	2	10%	2.9
3	Hurricane/Tropical Storm, Nor’easter	3	30%	2	30%	4	20%	1	10%	4	10%	2.8
4	Pandemic and Infectious Disease	2	30%	3	30%	4	20%	1	10%	4	10%	2.8
5	Extreme Temperatures	3	30%	2	30%	4	20%	1	10%	3	10%	2.7
6	Flood/Flash Flood/Ice Jam	3	30%	2	30%	4	20%	1	10%	3	10%	2.7
7	Tornado/Windstorm	3	30%	2	30%	4	20%	1	10%	1	10%	2.5
8	Transportation Accident	2	30%	3	30%	2	20%	4	10%	1	10%	2.4
9	Environmental Hazards	2	30%	2	30%	3	20%	4	10%	2	10%	2.4
10	Radon Exposure	2	30%	2	30%	2	20%	4	10%	4	10%	2.4
11	Terrorism	2	30%	2	30%	4	20%	1	10%	2	10%	2.3
12	Invasive Species	2	30%	1	30%	3	20%	4	10%	4	10%	2.3
13	Lightning Strike	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
14	Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
15	Mass Food and Animal Feed Contamination	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
16	Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
17	Nuclear Incident	1	30%	2	30%	4	20%	1	10%	4	10%	2.2
18	Hailstorm	2	30%	1	30%	4	20%	2	10%	1	10%	2.0
19	Dam Failure	2	30%	1	30%	3	20%	1	10%	4	10%	2.0
20	Subsidence/Sinkhole	3	30%	1	30%	1	20%	4	10%	1	10%	1.9
21	Urban Fire and Explosion	1	30%	2	30%	1	20%	4	10%	1	10%	1.6
22	Earthquake	1	30%	1	30%	4	20%	1	10%	1	10%	1.6
23	Civil Disturbance	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
24	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3

Figure H.16: Quincy Township Hazard Assessment Survey

Shippensburg Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Utility Interruption	2	30%	2	30%	4	20%	4	10%	2	10%	2.6
2	Nuclear Incident	1	30%	2	30%	4	20%	4	10%	4	10%	2.5
3	Transportation Accident	2	30%	3	30%	2	20%	4	10%	1	10%	2.4
4	Winter Storm	2	30%	2	30%	4	20%	1	10%	3	10%	2.4
5	Environmental Hazards	2	30%	2	30%	3	20%	4	10%	2	10%	2.4
6	Hurricane/Tropical Storm, Nor'easter	2	30%	1	30%	4	20%	2	10%	4	10%	2.3
7	Tornado/Windstorm	2	30%	3	30%	2	20%	2	10%	1	10%	2.2
8	Urban Fire and Explosion	2	30%	3	30%	1	20%	4	10%	1	10%	2.2
9	Drought	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
10	Pandemic and Infectious Disease	1	30%	2	30%	4	20%	1	10%	4	10%	2.2
11	Extreme Temperatures	2	30%	1	30%	4	20%	1	10%	3	10%	2.1
12	Hailstorm	2	30%	1	30%	4	20%	2	10%	1	10%	2.0
13	Mass Food and Animal Feed Contamination	1	30%	1	30%	4	20%	4	10%	2	10%	2.0
14	Civil Disturbance	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
15	Flood/Flash Flood/Ice Jam	2	30%	1	30%	2	20%	3	10%	3	10%	1.9
16	Earthquake	1	30%	1	30%	4	20%	4	10%	1	10%	1.9
17	Terrorism	1	30%	1	30%	2	20%	4	10%	2	10%	1.6
18	Dam Failure	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
19	Lightning Strike	2	30%	1	30%	1	20%	2	10%	1	10%	1.4
20	Wildfire	1	30%	1	30%	1	20%	4	10%	2	10%	1.4
21	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
22	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
23	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
24	Landslide	1	30%	1	30%	1	20%	2	10%	1	10%	1.1

Figure H.17: Shippensburg Borough Hazard Assessment Survey

Southampton Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Transportation Accident	3	30%	3	30%	3	20%	4	10%	1	10%	2.9
2	Winter Storm	3	30%	2	30%	3	20%	4	10%	3	10%	2.8
3	Environmental Hazards	3	30%	2	30%	3	20%	4	10%	2	10%	2.7
4	Earthquake	2	30%	4	30%	2	20%	4	10%	1	10%	2.7
5	Lightning Strike	3	30%	2	30%	3	20%	4	10%	1	10%	2.6
6	Subsidence/Sinkhole	3	30%	2	30%	3	20%	4	10%	1	10%	2.6
7	Drought	3	30%	1	30%	3	20%	2	10%	4	10%	2.4
8	Utility Interruption	3	30%	1	30%	3	20%	4	10%	2	10%	2.4
9	Hurricane/Tropical Storm, Nor'easter	3	30%	1	30%	2	20%	4	10%	4	10%	2.4
10	Dam Failure	2	30%	2	30%	2	20%	4	10%	4	10%	2.4
11	Pandemic and Infectious Disease	2	30%	2	30%	2	20%	4	10%	4	10%	2.4
12	Flood/Flash Flood/Ice Jam	3	30%	1	30%	2	20%	4	10%	3	10%	2.3
13	Terrorism	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
14	Wildfire	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
15	Civil Disturbance	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
16	Hailstorm	3	30%	1	30%	2	20%	4	10%	1	10%	2.1
17	Tornado/Windstorm	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
18	Urban Fire and Explosion	2	30%	2	30%	2	20%	4	10%	1	10%	2.1
19	Extreme Temperatures	2	30%	1	30%	2	20%	3	10%	3	10%	1.9
20	Nuclear Incident	1	30%	2	30%	1	20%	4	10%	4	10%	1.9
21	Mass Food and Animal Feed Contamination	1	30%	2	30%	1	20%	3	10%	2	10%	1.6
22	Invasive Species	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
23	Radon Exposure	1	30%	1	30%	1	20%	3	10%	4	10%	1.5
24	Landslide	1	30%	1	30%	1	20%	3	10%	1	10%	1.2

Figure H.18: Southampton Township Hazard Assessment Survey

St Thomas Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Drought	3	30%	3	30%	3	20%	1	10%	4	10%	2.9
2	Utility Interruption	4	30%	2	30%	2	20%	4	10%	2	10%	2.8
3	Extreme Temperatures	3	30%	2	30%	3	20%	3	10%	3	10%	2.7
4	Hailstorm	3	30%	3	30%	2	20%	4	10%	1	10%	2.7
5	Invasive Species	3	30%	2	30%	3	20%	2	10%	4	10%	2.7
6	Pandemic and Infectious Disease	3	30%	2	30%	3	20%	2	10%	4	10%	2.7
7	Tornado/Windstorm	4	30%	2	30%	2	20%	4	10%	1	10%	2.7
8	Wildfire	3	30%	2	30%	2	20%	4	10%	2	10%	2.5
9	Winter Storm	3	30%	2	30%	2	20%	2	10%	3	10%	2.4
10	Mass Food and Animal Feed Contamination	3	30%	2	30%	2	20%	3	10%	2	10%	2.4
11	Civil Disturbance	3	30%	2	30%	1	20%	4	10%	2	10%	2.3
12	Environmental Hazards	3	30%	2	30%	1	20%	4	10%	2	10%	2.3
13	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	1	20%	4	10%	4	10%	2.2
14	Lightning Strike	4	30%	1	30%	1	20%	4	10%	1	10%	2.2
15	Transportation Accident	3	30%	2	30%	1	20%	4	10%	1	10%	2.2
16	Flood/Flash Flood/Ice Jam	2	30%	2	30%	2	20%	2	10%	3	10%	2.1
17	Terrorism	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
18	Dam Failure	2	30%	1	30%	2	20%	2	10%	4	10%	1.9
19	Radon Exposure	2	30%	1	30%	1	20%	1	10%	4	10%	1.6
20	Subsidence/Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
21	Earthquake	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
22	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
23	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
24	Urban Fire and Explosion	1	30%	1	30%	1	20%	4	10%	1	10%	1.3

Figure H.19: St Thomas Township Hazard Assessment Survey

Warren Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Nuclear Incident	2	30%	3	30%	4	20%	4	10%	4	10%	3.1
2	Winter Storm	4	30%	2	30%	4	20%	1	10%	3	10%	3.0
3	Utility Interruption	3	30%	2	30%	3	20%	4	10%	2	10%	2.7
4	Mass Food and Animal Feed Contamination	2	30%	3	30%	3	20%	3	10%	2	10%	2.6
5	Drought	2	30%	2	30%	4	20%	2	10%	4	10%	2.6
6	Hurricane/Tropical Storm, Nor'easter	3	30%	1	30%	4	20%	1	10%	4	10%	2.5
7	Pandemic and Infectious Disease	3	30%	1	30%	3	20%	3	10%	4	10%	2.5
8	Wildfire	2	30%	3	30%	2	20%	4	10%	2	10%	2.5
9	Extreme Temperatures	2	30%	2	30%	4	20%	2	10%	3	10%	2.5
10	Earthquake	1	30%	4	30%	2	20%	4	10%	1	10%	2.4
11	Tornado/Windstorm	2	30%	2	30%	3	20%	4	10%	1	10%	2.3
12	Lightning Strike	2	30%	2	30%	3	20%	4	10%	1	10%	2.3
13	Hailstorm	2	30%	2	30%	3	20%	4	10%	1	10%	2.3
14	Flood/Flash Flood/Ice Jam	2	30%	2	30%	3	20%	2	10%	3	10%	2.3
15	Dam Failure	2	30%	2	30%	2	20%	3	10%	4	10%	2.3
16	Landslide	2	30%	2	30%	3	20%	3	10%	1	10%	2.2
17	Invasive Species	2	30%	1	30%	3	20%	3	10%	4	10%	2.2
18	Environmental Hazards	1	30%	2	30%	3	20%	3	10%	2	10%	2.0
19	Urban Fire and Explosion	1	30%	2	30%	2	20%	4	10%	1	10%	1.8
20	Civil Disturbance	1	30%	2	30%	2	20%	3	10%	2	10%	1.8
21	Terrorism	1	30%	2	30%	1	20%	4	10%	2	10%	1.7
22	Transportation Accident	1	30%	1	30%	2	20%	3	10%	1	10%	1.4
23	Subsidence/Sinkhole	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
24	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3

Figure H.20: Warren Township Hazard Assessment Survey

Washington Township, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Dam Failure	2	30%	2	30%	3	20%	4	10%	4	10%	2.6
2	Flood/Flash Flood/Ice Jam	2	30%	2	30%	3	20%	4	10%	3	10%	2.5
3	Hurricane/Tropical Storm, Nor'easter	2	30%	2	30%	3	20%	3	10%	4	10%	2.5
4	Environmental Hazards	2	30%	2	30%	2	20%	4	10%	2	10%	2.2
5	Winter Storm	2	30%	1	30%	3	20%	3	10%	3	10%	2.1
6	Utility Interruption	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
7	Wildfire	2	30%	1	30%	2	20%	4	10%	2	10%	1.9
8	Tornado/Windstorm	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
9	Lightning Strike	2	30%	1	30%	2	20%	4	10%	1	10%	1.8
10	Drought	2	30%	1	30%	2	20%	1	10%	4	10%	1.8
11	Extreme Temperatures	2	30%	1	30%	2	20%	1	10%	3	10%	1.7
12	Pandemic and Infectious Disease	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
13	Invasive Species	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
14	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
15	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
16	Terrorism	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
17	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
18	Civil Disturbance	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
19	Transportation Accident	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
20	Hailstorm	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
21	Earthquake	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
22	Subsidence/Sinkhole	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
23	Urban Fire and Explosion	1	30%	1	30%	1	20%	1	10%	1	10%	1.0
24	Landslide	1	30%	1	30%	1	20%	1	10%	1	10%	1.0

Figure H.21: Washington Township Hazard Assessment Survey

Waynesboro Borough, Franklin County Hazard Threat Risk Assessment

Risk Factor Scale	
Catastrophic	3.0 – 4.0
Major	2.5 - 2.9
Moderate	2.0 - 2.4
Minor	1.5 – 1.9
Insignificant	1.0 – 1.4

Rank	Hazard	Probability (1-4)	Wt	Impact (1-4)	Wt	Spatial (1-4)	Wt	Warning Time (1-4)	Wt	Duration (1-4)	Wt	Risk Factor (RF)
1	Tornado/Windstorm	3	30%	2	30%	4	20%	4	10%	1	10%	2.8
2	Lightning Strike	3	30%	2	30%	4	20%	4	10%	1	10%	2.8
3	Hurricane/Tropical Storm, Nor'easter	3	30%	2	30%	4	20%	1	10%	4	10%	2.8
4	Winter Storm	3	30%	2	30%	4	20%	1	10%	3	10%	2.7
5	Hailstorm	3	30%	1	30%	4	20%	4	10%	1	10%	2.5
6	Earthquake	2	30%	2	30%	4	20%	4	10%	1	10%	2.5
7	Dam Failure	2	30%	2	30%	4	20%	1	10%	4	10%	2.5
8	Drought	1	30%	4	30%	1	20%	4	10%	4	10%	2.5
9	Extreme Temperatures	3	30%	1	30%	4	20%	1	10%	3	10%	2.4
10	Pandemic and Infectious Disease	1	30%	3	30%	3	20%	1	10%	4	10%	2.3
11	Utility Interruption	3	30%	1	30%	2	20%	4	10%	2	10%	2.2
12	Transportation Accident	2	30%	3	30%	1	20%	4	10%	1	10%	2.2
13	Urban Fire and Explosion	2	30%	3	30%	1	20%	4	10%	1	10%	2.2
14	Invasive Species	2	30%	1	30%	4	20%	1	10%	4	10%	2.2
15	Terrorism	2	30%	2	30%	1	20%	4	10%	2	10%	2.0
16	Flood/Flash Flood/Ice Jam	2	30%	1	30%	1	20%	4	10%	3	10%	1.8
17	Environmental Hazards	2	30%	1	30%	1	20%	4	10%	2	10%	1.7
18	Subsidence/Sinkhole	2	30%	1	30%	1	20%	4	10%	1	10%	1.6
19	Landslide	1	30%	1	30%	1	20%	4	10%	1	10%	1.3
20	Nuclear Incident	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
21	Radon Exposure	1	30%	1	30%	1	20%	1	10%	4	10%	1.3
22	Wildfire	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
23	Mass Food and Animal Feed Contamination	1	30%	1	30%	1	20%	1	10%	2	10%	1.1
24	Civil Disturbance	1	30%	1	30%	1	20%	1	10%	2	10%	1.1

Figure H.22: Waynesboro Borough Hazard Assessment Survey