

## **Flooding**

### **General**

Flooding is the leading cause of death among all types of natural disasters throughout the United States, with its ability to roll boulders the size of cars, tear out trees, and destroy buildings and bridges. Typically the result of heavy precipitation, snowmelts, and ice jams, major flood events can last several days or even weeks. Unfortunately, many homeowners fail to realize that the average insurance policy does not cover flooding. For this reason, floods are a costly hazard.

**TABLE C.6  
FLOOD PROBABILITY SUMMARY**

<b>Flood Recurrence Intervals</b>	<b>Annual Chance of Occurrence</b>
10-year	10.00%
50-year	2.00%
100-year	1.00%
500-year	0.20%

*Source: FEMA*

A property's vulnerability to a flood depends on its location in the floodplain. The properties that lie along the banks of a waterway are the most vulnerable. The property within the floodplain is broken into sections depending on its distance from the waterway. The 10-year flood zone is the area that has a 10 percent chance of being flooded every year. However, this label does not mean that this area cannot flood **more than** once every 10 years. It simply designates the probability of a flood of this magnitude every year. Further away from this area is the 50-year floodplain. This area includes the 10-year floodplain, plus additional property. The probability of a flood of this magnitude occurring during a one-year period is two percent. A summary of flood probability is shown in the table above.

In the past, heavy rains caused most of Perry County's flood problems. Heavy rains cause small creeks and streams to overflow their banks, leading to road closures and other damages.

Flooding poses the biggest threat to those who reside or conduct business in the floodplain. The most significant hazard exists for businesses in the floodplain that process, use, and/or store hazardous materials. A flood could potentially allow for hazardous materials to leak out of these areas. As the water recedes, it would spread the hazardous materials throughout the area. Also threatened are the agricultural areas in the floodplain. Most flood damage to property and structures located in the floodplain is caused by water exposure to the interior, high-velocity water, and debris flow.

Perry County is prone to two types of floods:

- Riverine Flood – Occurs in the floodplain of a river or stream when the amount of water and the rate at which it is moving increases.

- Flash Flood – A type of riverine flood that occurs after a heavy storm, when the ground cannot absorb the high amount of precipitation. This can occur when heavy precipitation falls on frozen or already-saturated soil.

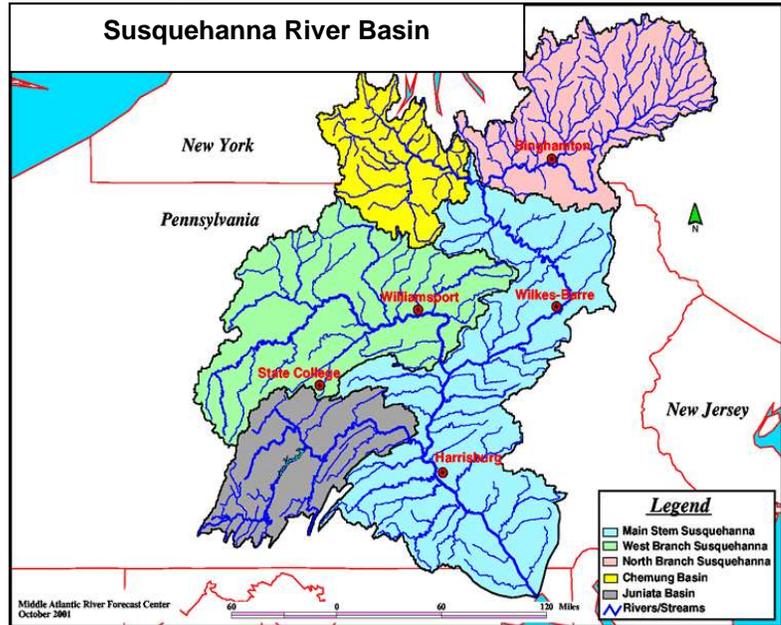
### **Flooding – Susquehanna River Basin**

The Susquehanna River Basin encompasses much of Pennsylvania and portions of New York to the north and Maryland to the South. It is composed of the Main Stem Susquehanna, North Branch Susquehanna, West Branch Susquehanna, Chemung Sub-basin and Juniata Sub-basin. Perry County is located along the border of the Susquehanna River Basin and the Juniata Basin to the west.

The Susquehanna River Basin is one of the most flood-prone watersheds in the entire nation.

The main stem of the Susquehanna and its many tributaries drain 27,510 square miles of New York, Pennsylvania, and Maryland. Since the early 1800s, the main stem of the Susquehanna has flooded every 20 years, on average. The Susquehanna Basin also is vulnerable to frequent, localized flash floods every year. Since flood records were first kept in 1810, the Susquehanna River Basin's most devastating floods occurred in: 1936 (St. Patrick's Day Flood); 1955 (Hurricanes Connie and Diane); 1972 (Hurricane Agnes); 1975 (Hurricane Eloise); 1996 (January flooding); and 2004 (Tropical Storm Ivan). In 1972, Hurricane Agnes caused the worst recorded flooding in the basin. The flooding caused 72 deaths and \$2.8 billion in damage; flood levels exceeded the record levels of 1936 by as much as six feet in some places.

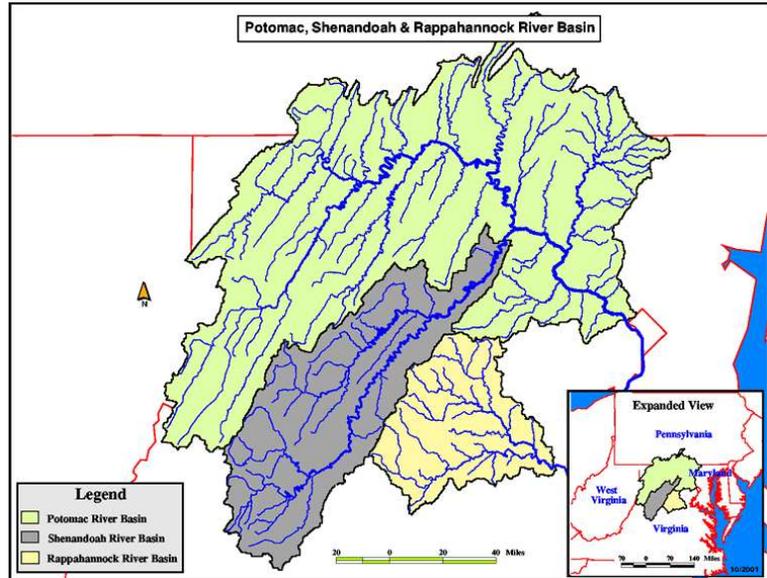
Despite frequent flooding, seven upstream dams contribute to the reduction of flood hazards on the Susquehanna River: Stillwater Reservoir, located approximately nine miles north of Carbondale, Pennsylvania, on the Lackawanna River; East Sidney Lake, located approximately eight miles east of Sidney, New York, on Ouleout Creek; Whitney Point Dam, located approximately one mile north of Whitney Point, New York, on the Otselic River; Almond Dam, located approximately two miles northwest of Hornell, New York, on Canacadea Creek; Arkport Dam, located approximately five miles northeast of Hornell, New York, on the Canisteo River; Tioga-Hammond Dam, located approximately 20 miles southwest of Elmira, New York, on the Tioga River and Crooked Creek; and Cowanesque Lake, located on the Cowanesque River approximately two miles above the confluence with the Tioga River at Lawrenceville, Pennsylvania.



### **Flooding – Potomac River Basin**

While the Potomac River does not flow through the Commonwealth of Pennsylvania, the Potomac basin is actually Pennsylvania's fourth largest. The total size of the Potomac basin is 14,670 square miles. Approximately 11 percent of the basin is located within Pennsylvania. A tiny portion reaches into Perry County.

Pennsylvania has ten tributaries to the Potomac: Wills Creek, Evitts Creek, Town Creek, Sideling Creek, Tonoloway Creek, Licking Creek, Conococheague Creek, Monocacy River, the Marsh Creek, and Rock Creek.



According to the United States Geological Survey (USGS), the Potomac River Basin is experiencing rapid growth and development. According to a recent study from the Chesapeake Bay Program, population in the basin is expected to increase by almost twenty percent from 2000 to 2020. Some areas of the basin, especially those within commuting distance of Washington, DC, are projected to grow much faster.

### **History**

#### **Flooding – Municipal Hazard Analysis**

In Perry County, 29 of the 30 municipalities are flood prone. The National Climatic Data Center maintains a historical record of flooding since 1993 in its Storm Event Database. This database measures all weather events. According to the Storm Event Database, Perry County has experienced 38 flood events since 1993. Of these, 16 events were categorized as flash floods, 20 as floods, and 2 as a combination flood/flash flood. The most significant occurrence of flooding was due to heavy rains. A summary of the flood history of Perry County since November 1993 can be seen below.

The major cause of flooding in Perry County is slow moving rain storms, originating from the south or southwest, with an abundance of moisture that has been transported from the Gulf of Mexico and resupplied with Atlantic Ocean moisture by strong, stationary Bermuda highs. A blocking high pressure area to the northeast of Pennsylvania contributes to these conditions. Intense local flash floods are most likely to occur in squall lines just to the east of a slow moving north-south oriented cold front. These are usually warm weather phenomena, where afternoon heating adds to the instability of the already unstable, moist air mass. Storms of tropical origin affect the Susquehanna River valley an average of once in three years. Their usual path is from the south to the northeast,

but a few have traveled from the southeast to the northwest. The tropical storm season runs from June to November.

The Pennsylvania Emergency Management Agency (PEMA) maintains historical records of declared disasters since 1954. According to PEMA, five flooding events since 1954 have resulted in a declared disaster. Tropical Depression Ivan in 2004 required a President’s Declaration of Major Disaster, and resulted in individual and public assistance to Perry County. The extensive winter flooding in January 1996, Hurricane Agnes in June 1972, Hurricane Eloise in September 1975, and Hurricane Floyd in September 1999, all resulted in a Governor’s Proclamation and President’s Declaration of Major Disaster.

**Table C.7  
Perry County Flooding Event History  
1993-2012**

<b>LOCATION</b>	<b>DATE</b>	<b>TYPE</b>
n/a	11/28/1993	Flood/Flash Flood
n/a	1/20/1995	Flood
n/a	10/21/1995	Flood/Flash Flood
n/a	1/19/1996	Flood
n/a	1/19/1996	Flash Flood
n/a	9/6/1996	Flash Flood
n/a	9/13/1996	Flash Flood
n/a	12/13/1996	Flash Flood
n/a	9/11/1997	Flash Flood
n/a	11/8/1997	Flash Flood
n/a	1/8/1998	Flash Flood
n/a	3/21/1998	Flash Flood
n/a	9/6/1999	Flash Flood
n/a	9/16/1999	Flash Flood
Duncannon	9/1/2000	Flash Flood
Duncannon	8/14/2001	Flash Flood
Blain	8/9/2003	Flash Flood
Perry (Zone)	12/11/2003	Flood
Blain	7/12/2004	Flash Flood
Perry (Zone)	9/17/2004	Flood
Perry (Zone)	9/18/2004	Flood
Perry (Zone)	9/18/2004	Flood
Perry (Zone)	9/28/2004	Flood
Perry (Zone)	3/28/2005	Flood
Perry (Zone)	3/29/2005	Flood
Perry (Zone)	4/2/2005	Flood
Perry (Zone)	4/2/2005	Flood
Perry (Zone)	11/30/2005	Flood
Countywide	6/27/2006	Flash Flood

Shermans Dale	6/27/2006	Flood
Blain	3/5/2008	Flood
Blain	5/28/2009	Flash Flood
Shermans Dale	5/29/2009	Flood
Blain	5/29/2009	Flood
Duncannon	3/10/2011	Flood
Shermans Dale	3/10/2011	Flood
Shermans Dale	4/16/2011	Flood
Cove	9/7/2011	Flood

*Source: National Climatic Data Center (NCDC)*

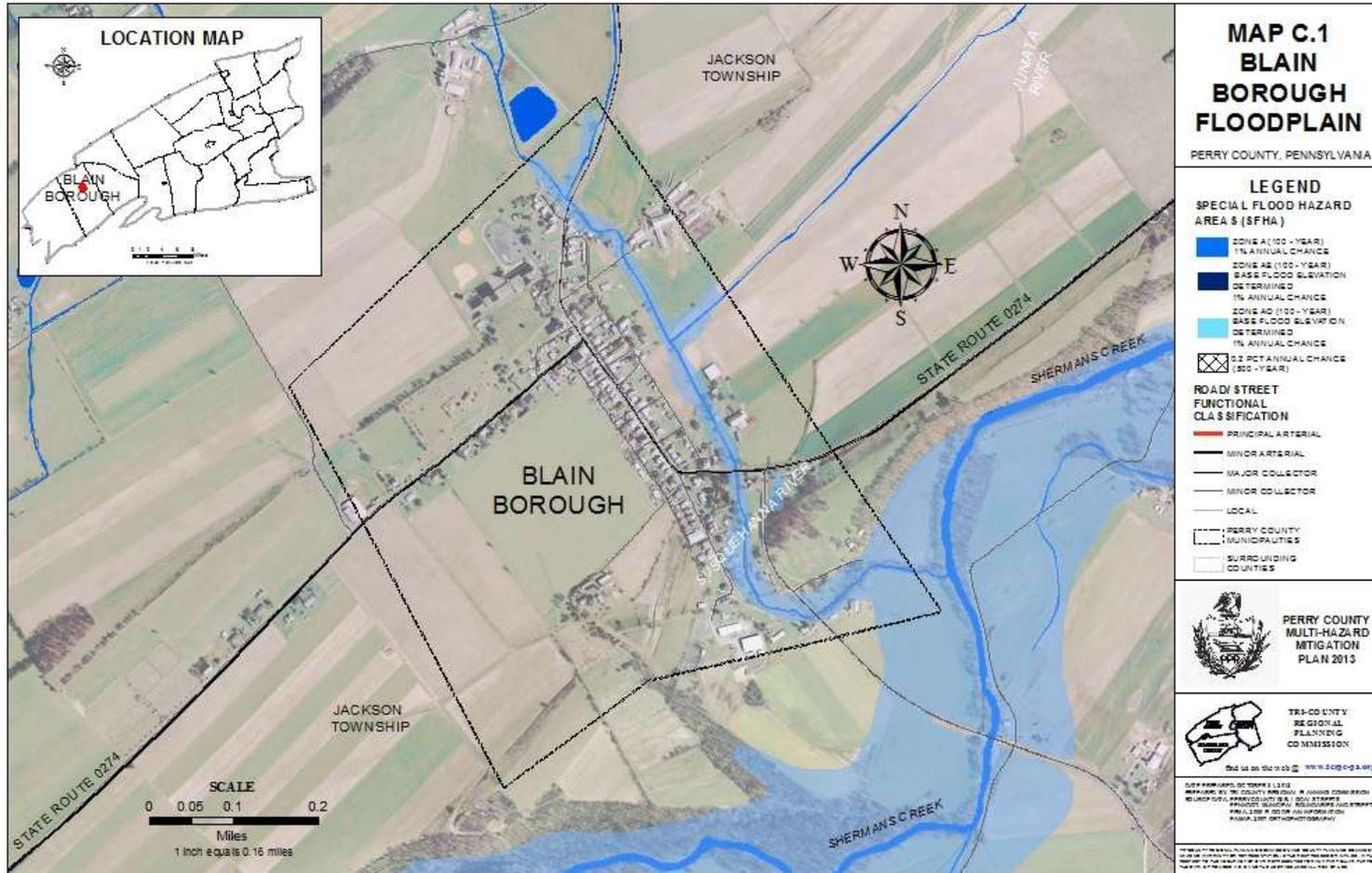
### **Vulnerability**

The following municipal summaries detail flood threats within Perry County. This analysis was taken from the Federal Emergency Management Agency (FEMA) Flood Insurance Study. Additional information was gathered from the United States Census Bureau, and the Perry County Emergency Management Agency Office.

#### **Blain Borough**

The Borough of Blain is located in the western portion of Perry County. It is encompassed by Jackson Township and is approximately 0.35 square miles in size. Recent flooding data for Blain Borough is provided in the above Table C.7.

The map on the following page presents the 100-year floodplain risk for Blain Borough.

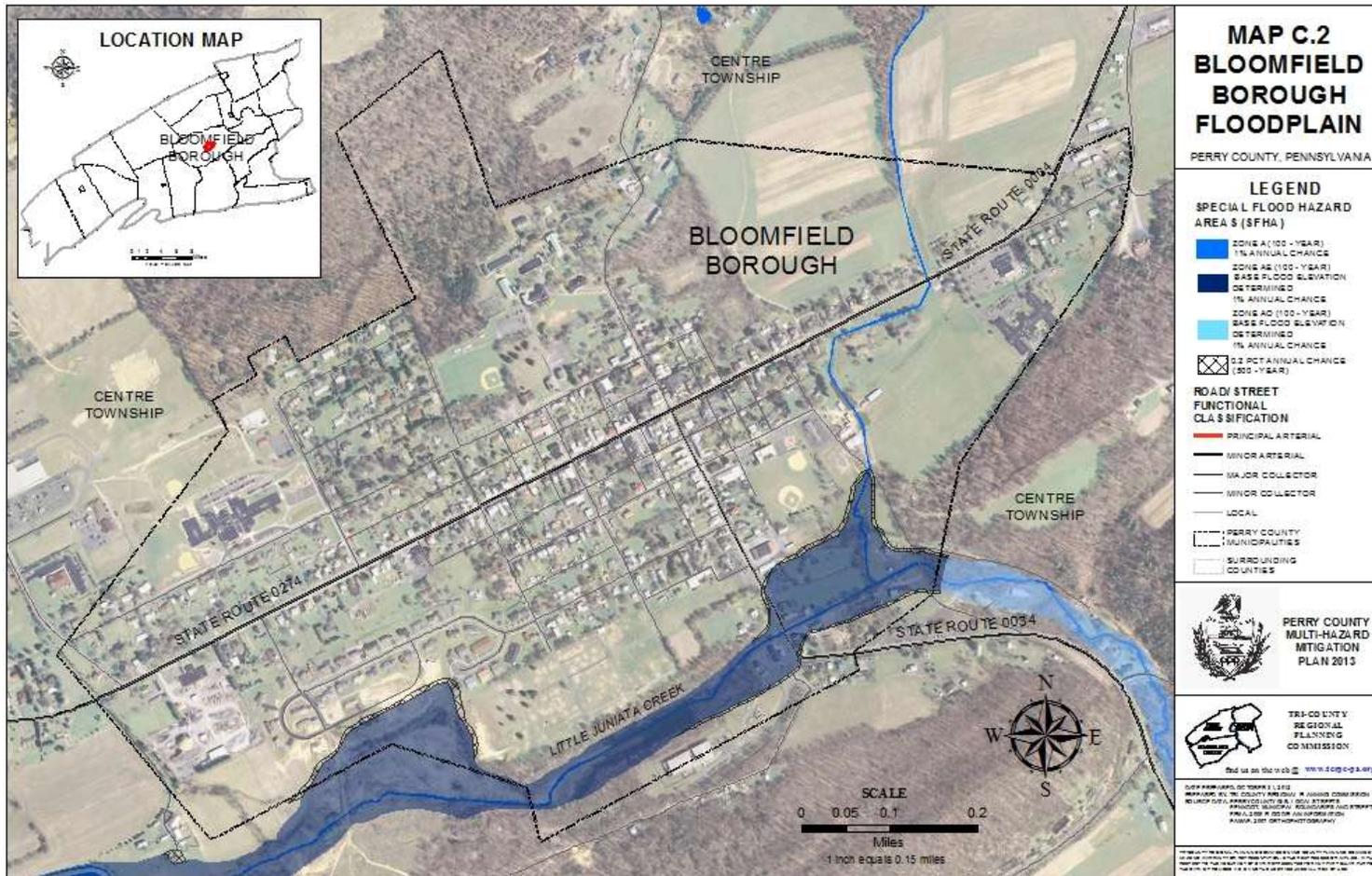


**Bloomfield Borough**

The Borough of Bloomfield is located in the central portion of Perry County. The Borough is surrounded by Centre Township and consists of about 0.53 square miles.

Little Juniata Creek is a tributary of the Susquehanna River and runs along the west side of the borough, with a drainage area of 30.3 square miles. Bloomfield Borough's recent flooding occurrences have been the result of major storm passing through the area, with cases reported in 1936, 1955, 1972, and 1975.

The map on the following page presents the 100-year floodplain risk for Bloomfield Borough.

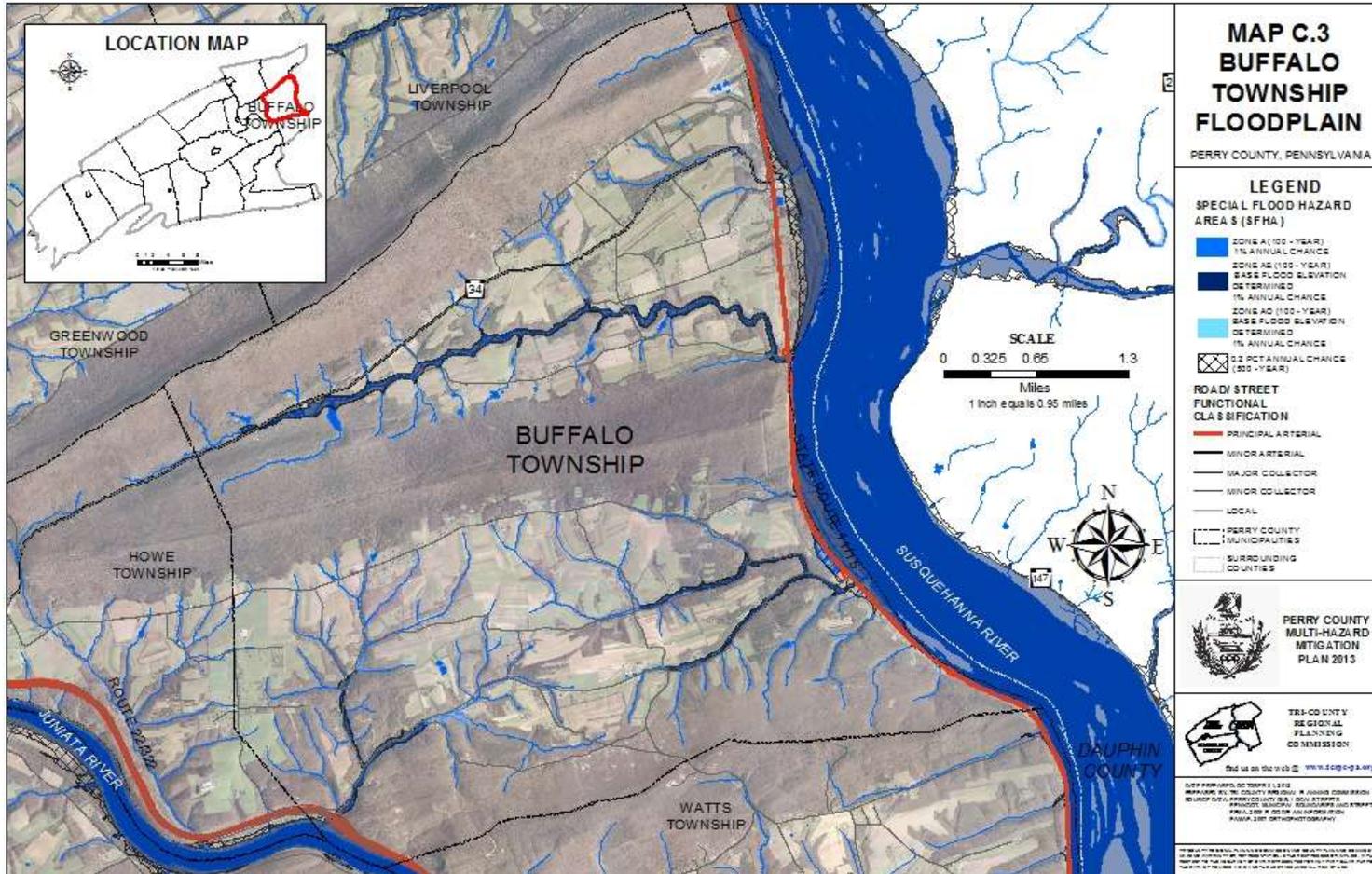


**Buffalo Township**

The Township of Buffalo is located in the northeastern corner of Perry County, in central Pennsylvania, approximately 16 miles north of Harrisburg. Buffalo is surrounded by the Townships of Liverpool and Greenwood to the north, the Township of Howe and a small section of the Juniata River to the west, the Township of Watts to the south, and the Susquehanna River forms the entire eastern boundary.

One major mountain ridge line, Berry Mountain, acts as a fall line to divide Buffalo approximately in half by dissecting the north from the south. Although the township is divided it is all part of the Susquehanna River drainage basin. Minor tributaries drain the areas north and south of Berry Mountain and enter the Susquehanna River either directly or by way of the Juniata River. This minor ridge line gives a more localized picture of the direction in which the smaller sections of the township drain.

The map on the following page presents the 100-year floodplain risk for Buffalo Township.

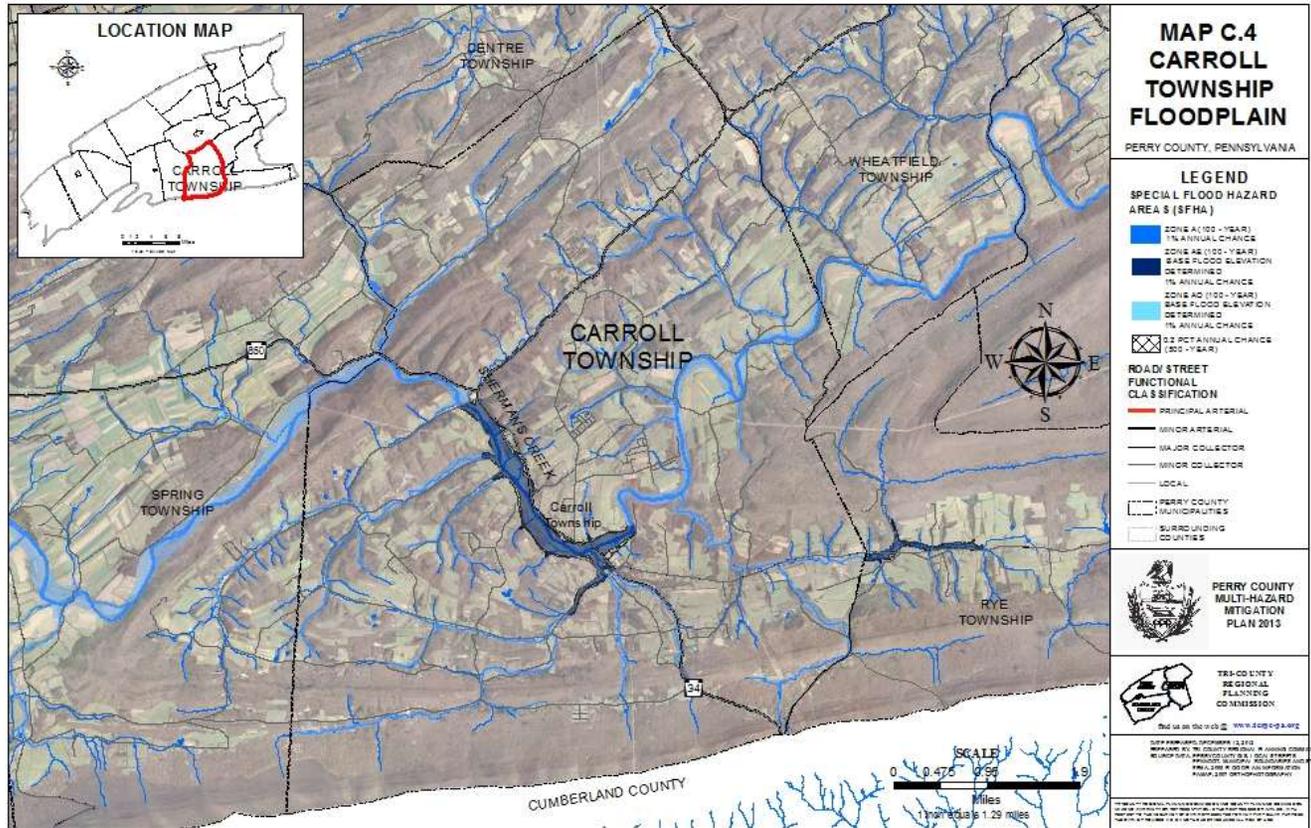


**Carroll Township**

The Township of Carroll is located in southeastern Perry County in south central Pennsylvania, approximately 19 miles west of Harrisburg. It is bordered by the Township of Spring to the west, the Township of Centre to the north, the Townships of Wheatfield and Rye to the east, and the Townships of Middlesex and North Middleton to the south.

Low-lying areas are subject to periodic flooding caused by overflow of Sherman Creek and numerous small tributaries within the township. The largest recorded flood on Sherman Creek occurred in 1972 as a result of Tropical Storm Agnes.

The map on the following page presents the 100-year floodplain risk for Carroll Township.

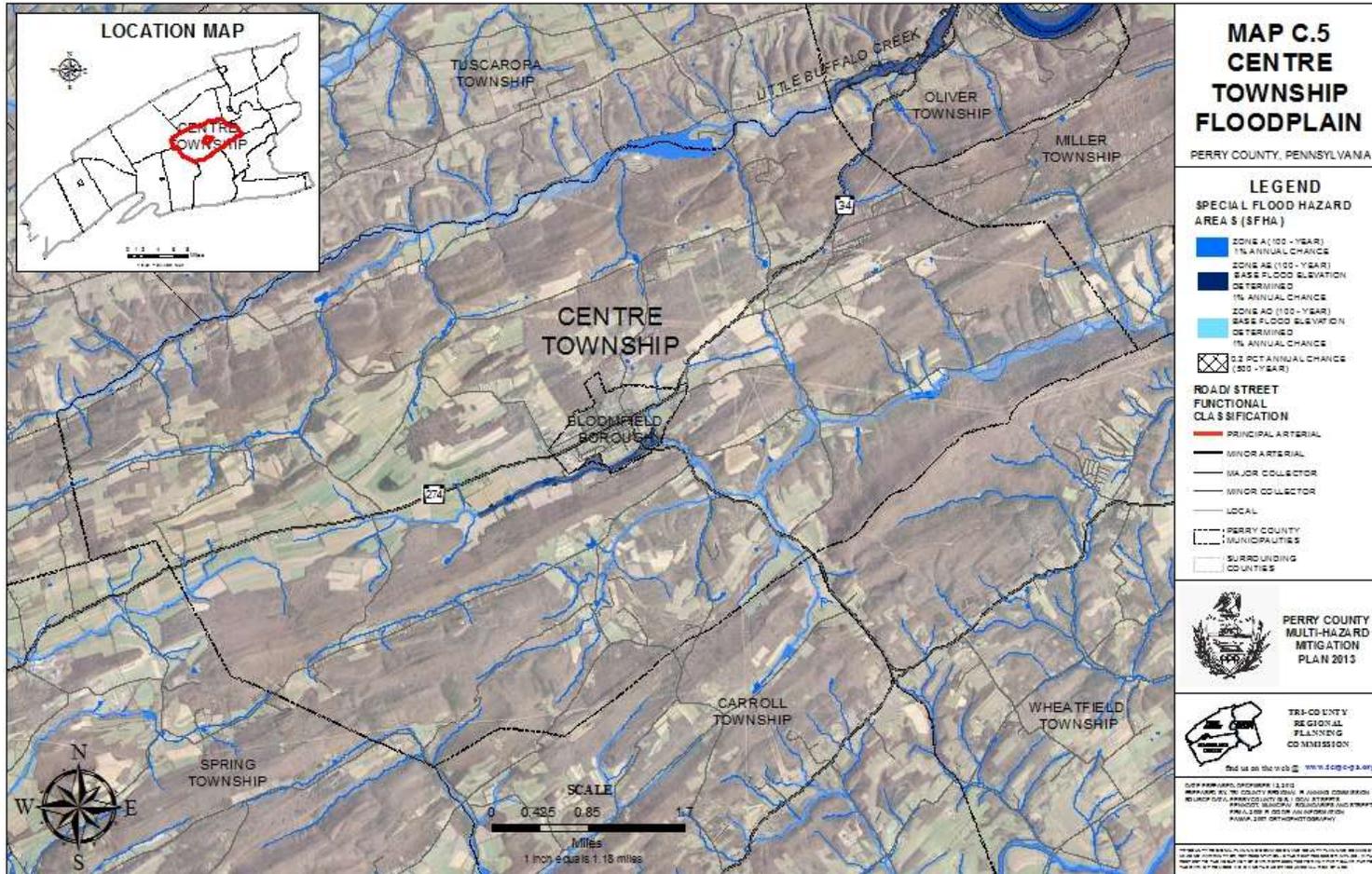


**Centre Township**

The Township of Centre is located in the central portion of Perry County in south-central Pennsylvania. It is bordered by the Townships of Juniata and Oliver to the north, the Township of Saville to the west, the Township of Spring to the southwest, the Township of Carroll to the south, the Township of Wheatfield to the southeast, and the Township of Miller to the east.

Little Juniata Creek is the principal source of flooding in Centre. Major storms caused flooding conditions in March 1936, August 1955, June 1972, and September 1975.

The map on the following page presents the 100-year floodplain risk for Centre Township.

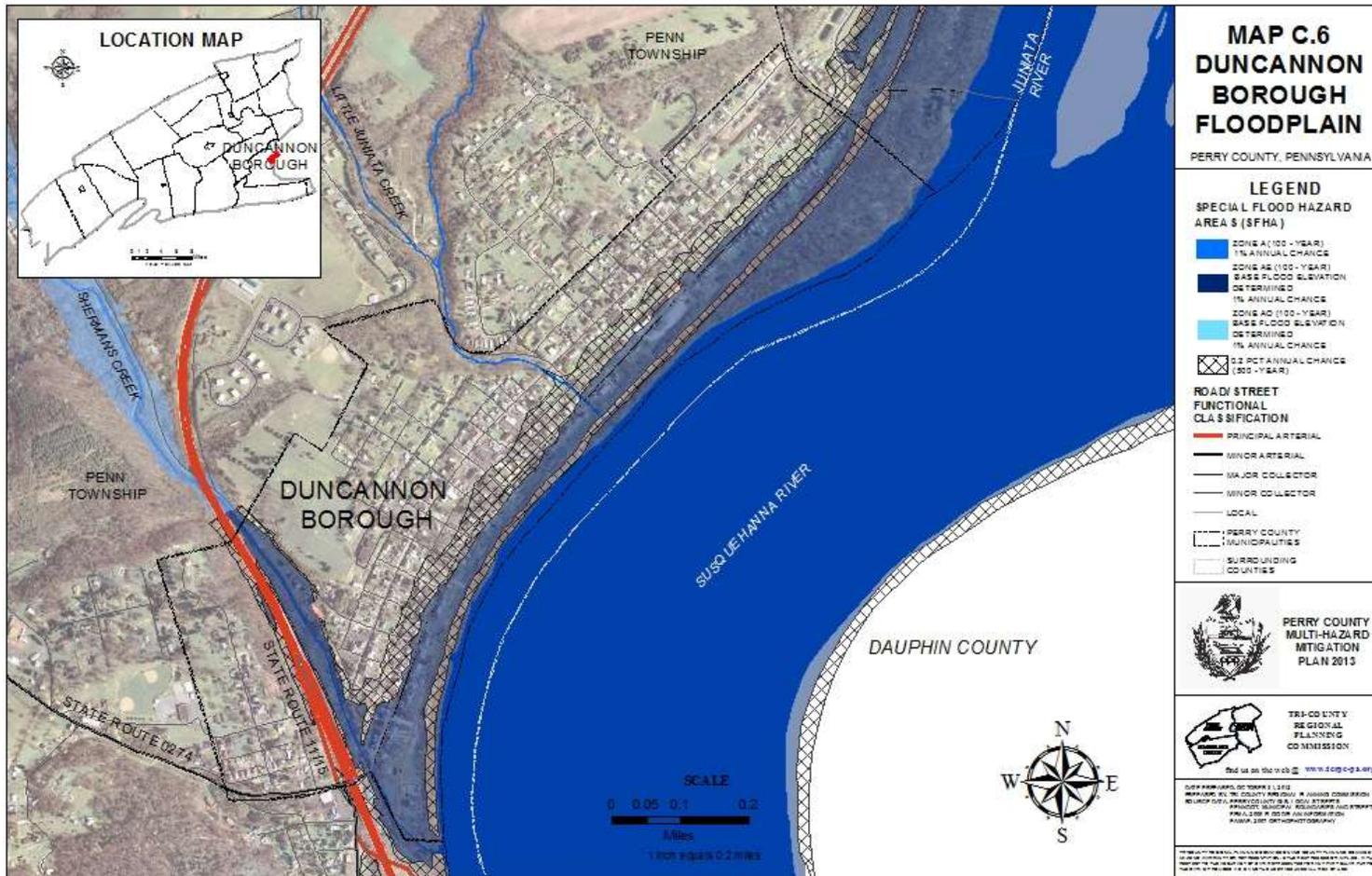


**Duncannon Borough**

The Borough of Duncannon is located on the west bank of the Susquehanna River in eastern Parry County. The Borough is bordered by Penn Township to the west; Wheatfield Township to the northwest; and to the east by the Susquehanna River and Middle Paxton Township.

The principal source of flooding in the Borough is the Susquehanna River, with its long history of flood disasters. Major flooding occurred in 1889, 1936, and 1972. A recent flood history is in Table C.7

The map on the following page presents the 100-year floodplain risk for Duncannon Borough.



**Greenwood Township**

The Township of Greenwood is located in the northern portion of Perry County in south-central Pennsylvania. It is bordered by the Townships of Delaware and Greenwood (Juniata County) to the north, the Townships of Delaware, Tuscarora, and Oliver and the borough of Millerstown to the west, the Townships of Howe and Buffalo to the south, and the Township of Liverpool to the east.

The Juniata River forms the western corporate boundary of the township. A small area in the eastern portion of the township drains into Bargers Run which flows east into the Susquehanna River. Most of the drainage pattern in the township is of the subparallel form, with uniform slopes in steeply folded sedimentary rocks.

The map on the following page presents the 100-year floodplain risk for Greenwood Township.

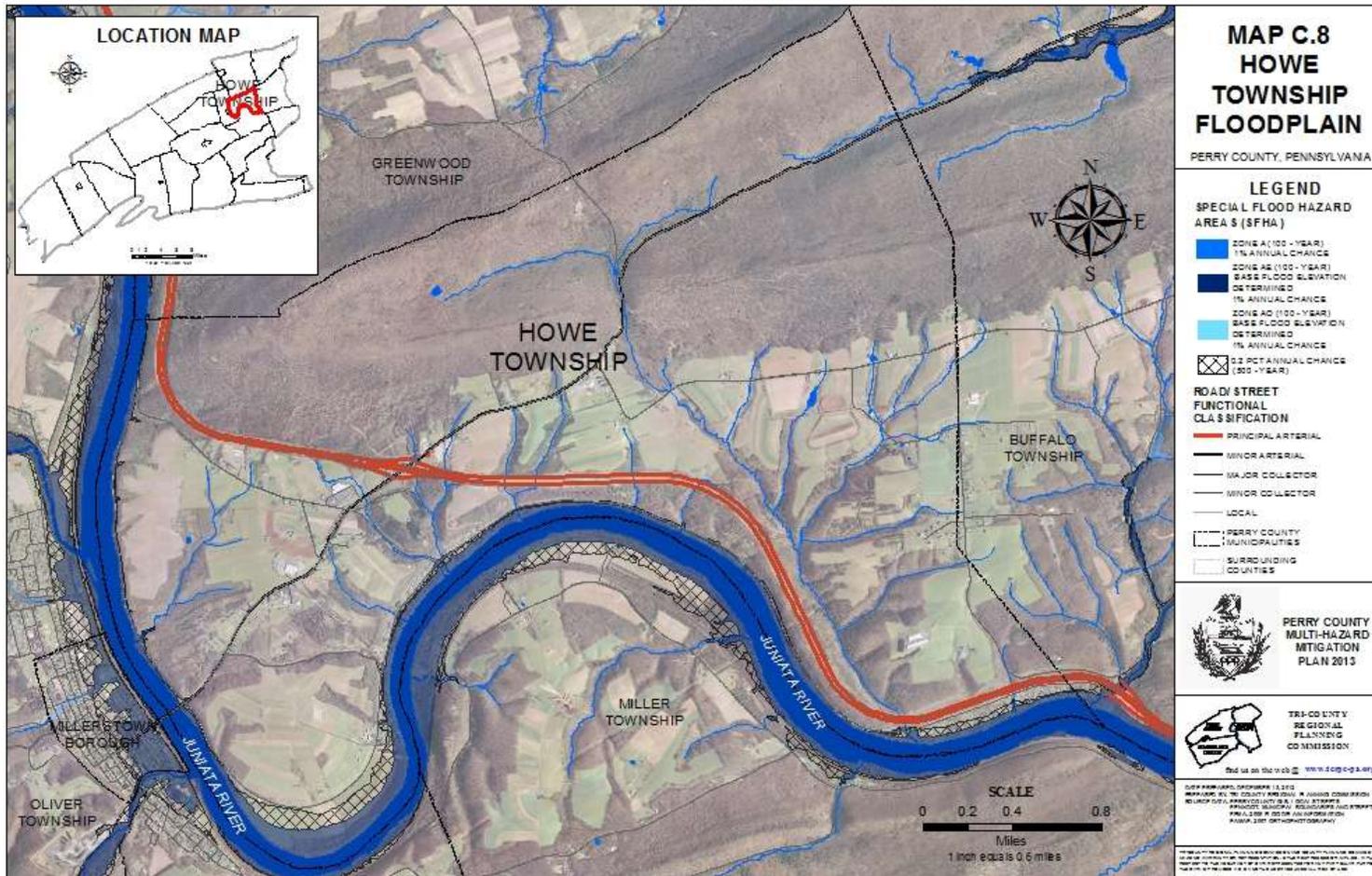


**Howe Township**

The township of Howe is located in the northeastern section of Perry County, in south-central Pennsylvania just across the Juniata River from Newport, Pennsylvania. It is bordered on the north by the Township of Greenwood and on the east by the Township of Buffalo. The Juniata River encompasses the southern and western borders.

The Juniata River is the most prominent drainage feature. Other small streams and the tributaries also traverse the Township of Howe.

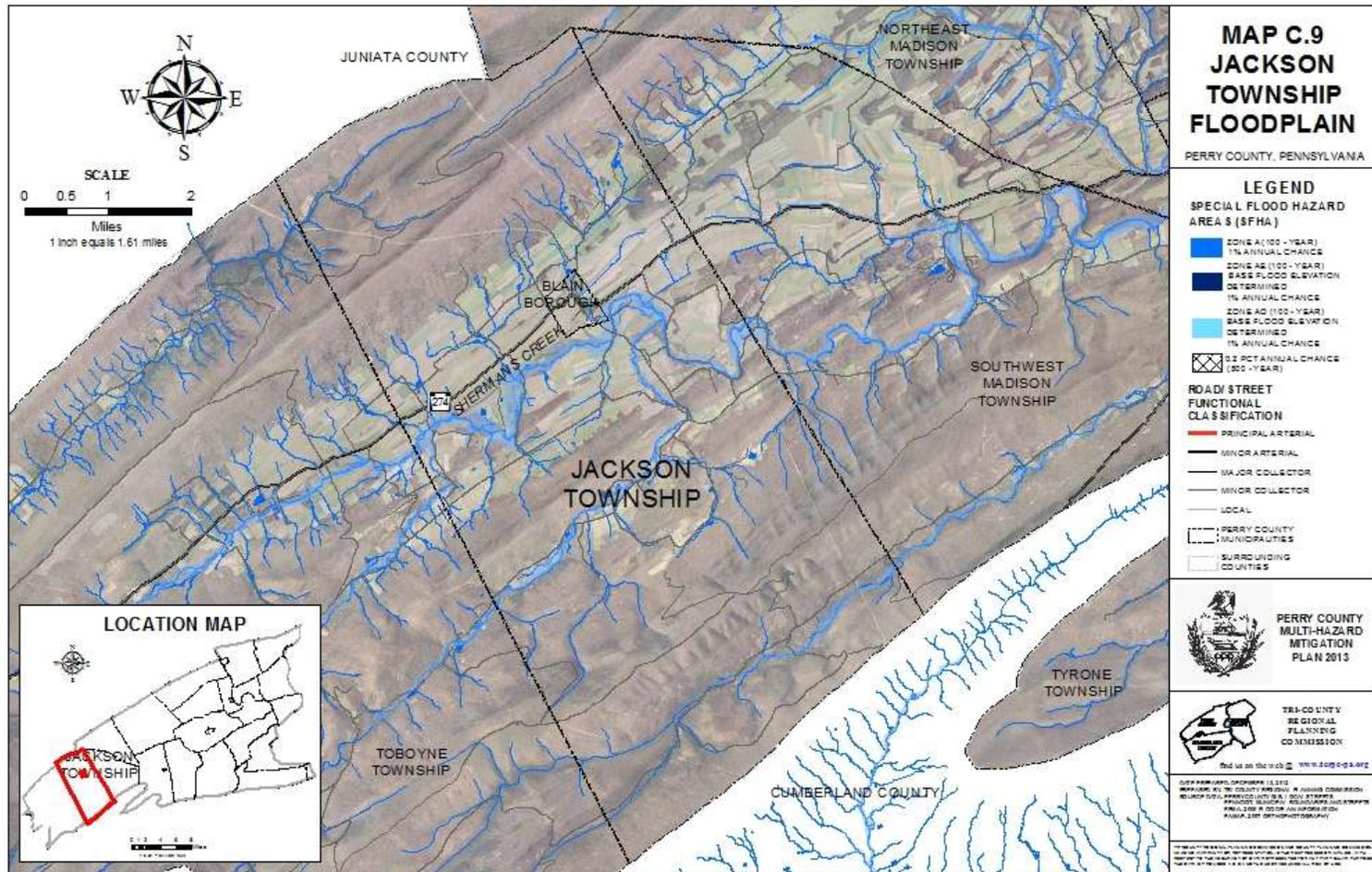
The map on the following page presents the 100-year floodplain risk for Howe Township.



**Jackson Township**

Jackson Township is located in the western portion of Perry County. It is bordered by Toboyne Township to the west; Southwest Madison Township to the east; Northeast Madison Township and Tuscarora Township, Juniata County to the north; and Lower Mifflin Township, Cumberland County to the south. Jackson Township encompasses Blain Borough. No flooding data for Jackson Township was included in the FEMA Flood Insurance Study.

The map on the following page presents the 100-year floodplain risk for Jackson Township.



**Juniata Township**

The Township of Juniata is located in northeastern Perry County in south-central Pennsylvania, midway between Harrisburg and Lewistown, Pennsylvania. It is bordered on the north by Tuscarora Township, on the east by Oliver Township, on the south by Centre Township, and on the west by Saville Township.

Buffalo Creek is a tributary of the Juniata River. From its headwaters in the Conococheague Mountains, it meanders 32 miles in a northeasterly direction to its confluence with the Juniata River, north of Newport. The drainage area encompasses 71.6 square miles.

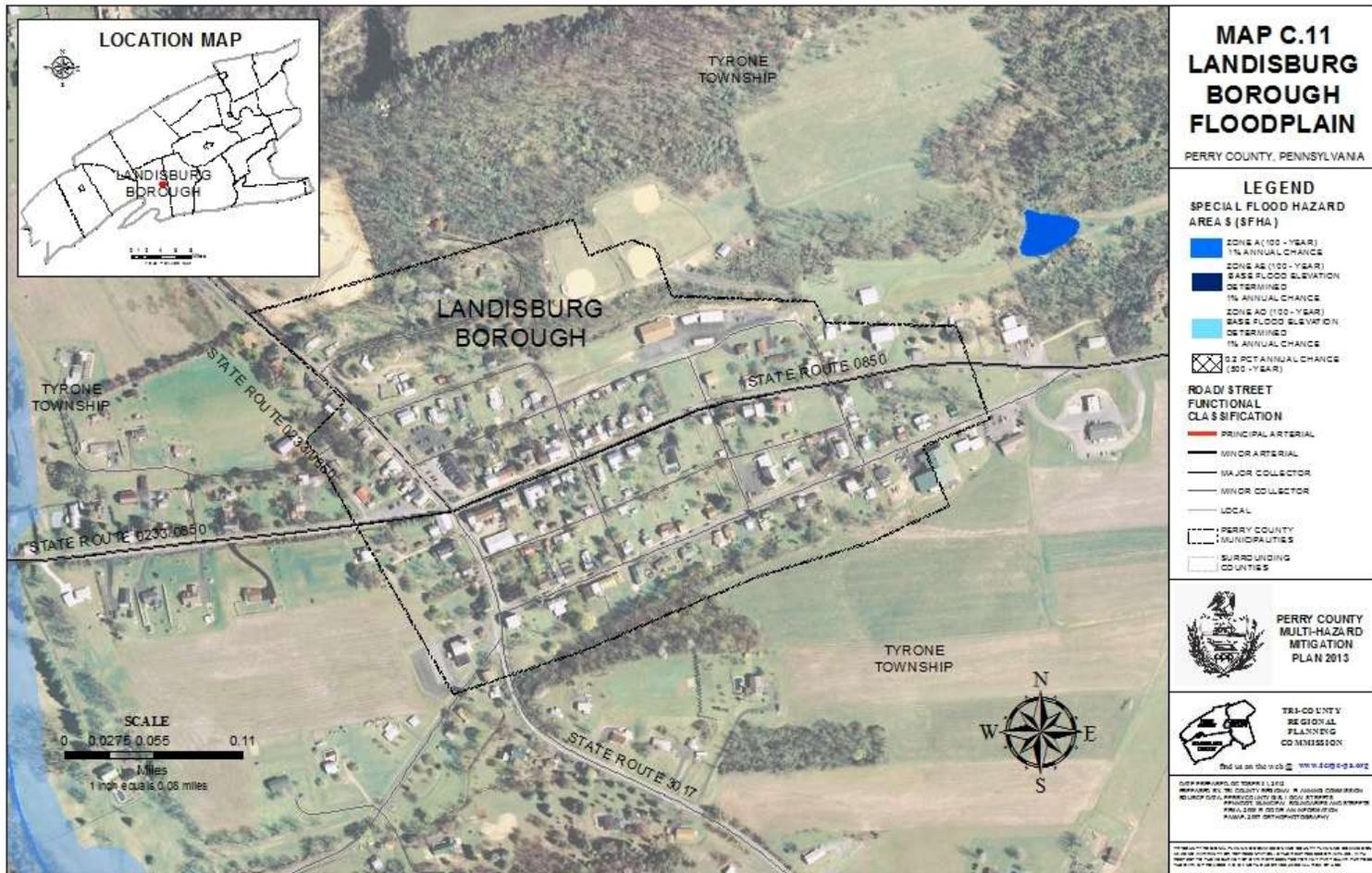
The map on the following page presents the 100-year floodplain risk for Juniata Township.



**Landisburg Borough**

The Borough of Landisburg is located in central Perry County. It is encompassed by Tyrone Township and is approximately 0.1 square miles in size. No flooding data for Landisburg Borough was included in the FEMA Flood Insurance Study.

The map on the following page presents the 100-year floodplain risk for Landisburg Borough.

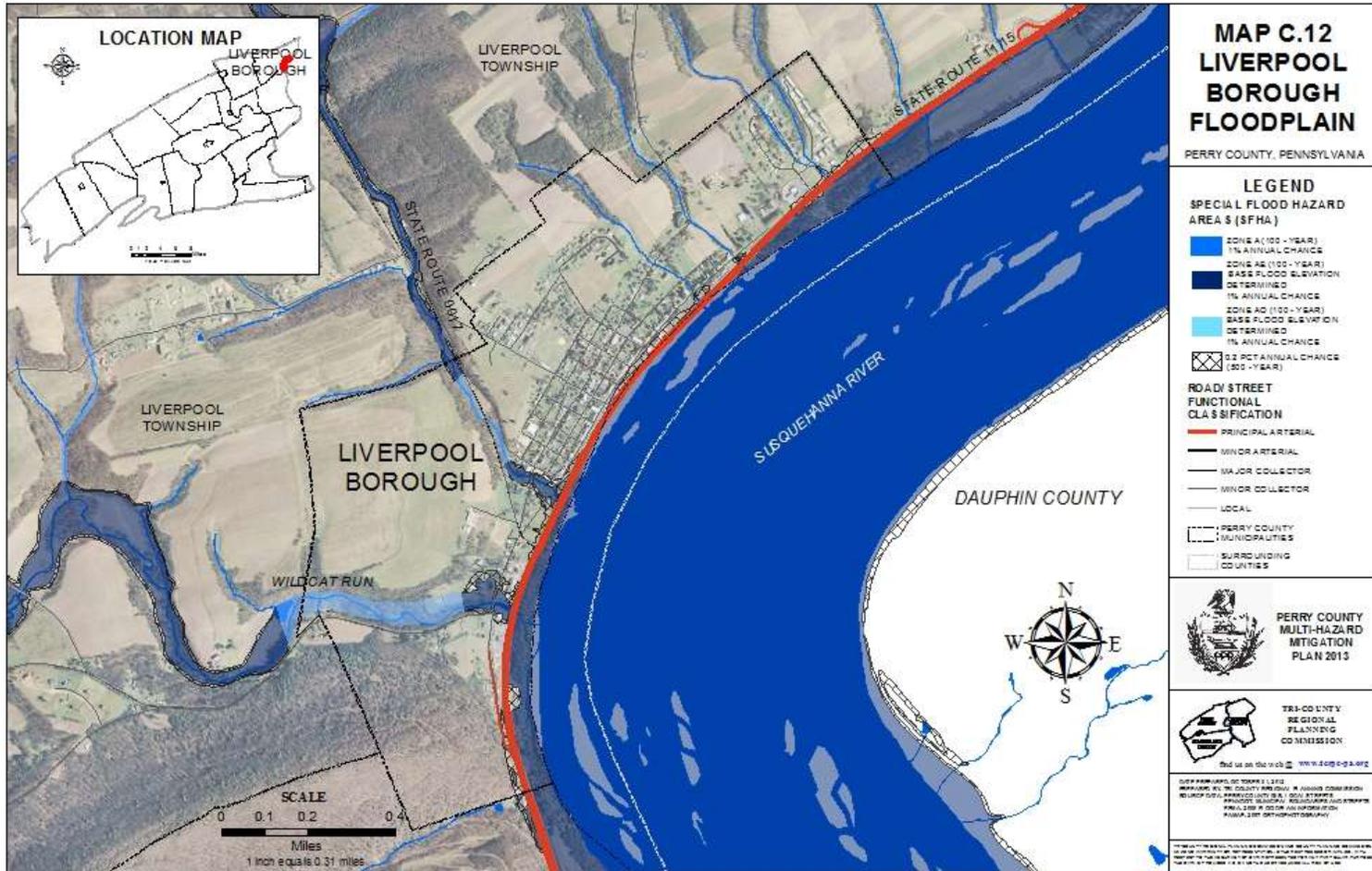


**Liverpool Borough**

The Borough of Liverpool is located in the northeastern section of Perry County, on the west bank of the Susquehanna River. The Borough is bordered on the north, west, and south by Liverpool Township and on the east by the Susquehanna River and Upper Paxton Township.

The Susquehanna River is Liverpool Borough's most prominent drainage feature. The principal source of flooding for the Borough is the Susquehanna River, with its long history of flood disasters. Major flooding occurred in 1889, 1936, and 1972.

The map on the following page presents the 100-year floodplain risk for Liverpool Borough.



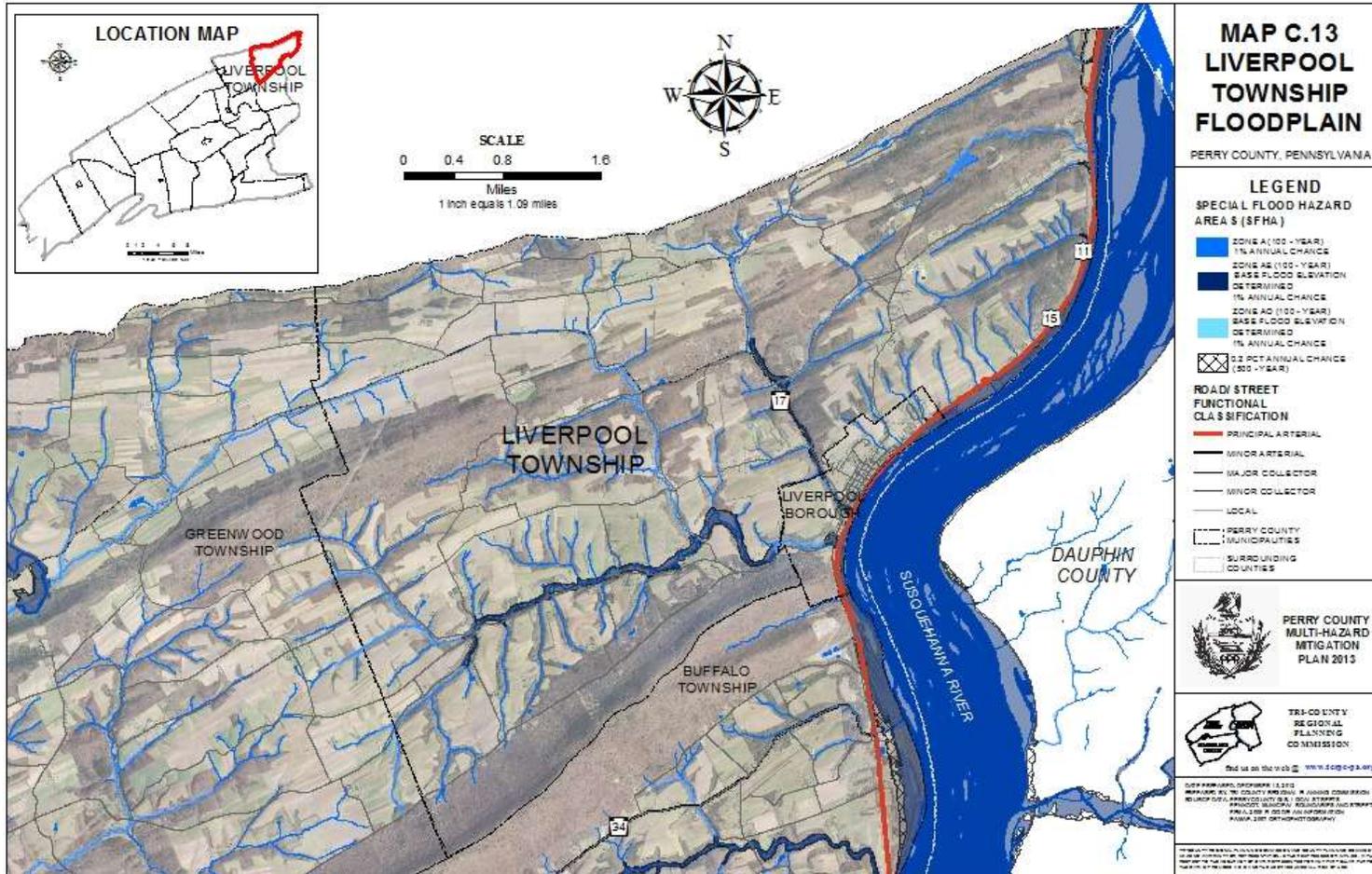
**Liverpool Township**

The Township of Liverpool is located in northeastern Perry County in central Pennsylvania. It is bordered by the Township of Susquehanna to the north, the Township of Greenwood on the west, the Township of Buffalo to the south, the Borough of Liverpool, and the Susquehanna River on the east.

Principal waterways located within the Township of Liverpool include the Susquehanna River, Bangers Run, Pfoutz run and numerous unnamed tributaries which are branched throughout the township. The Susquehanna River flows south and eventually empties into the Chesapeake Bay. Bangers Run and Pfoutz Run flow easterly and southeasterly into the Susquehanna River and drain the southern portion of the township.

The most devastating floods of record occurred in 1937 and 1972 (Tropical Storm Agnes).

The map on the following page presents the 100-year floodplain risk for Liverpool Township.

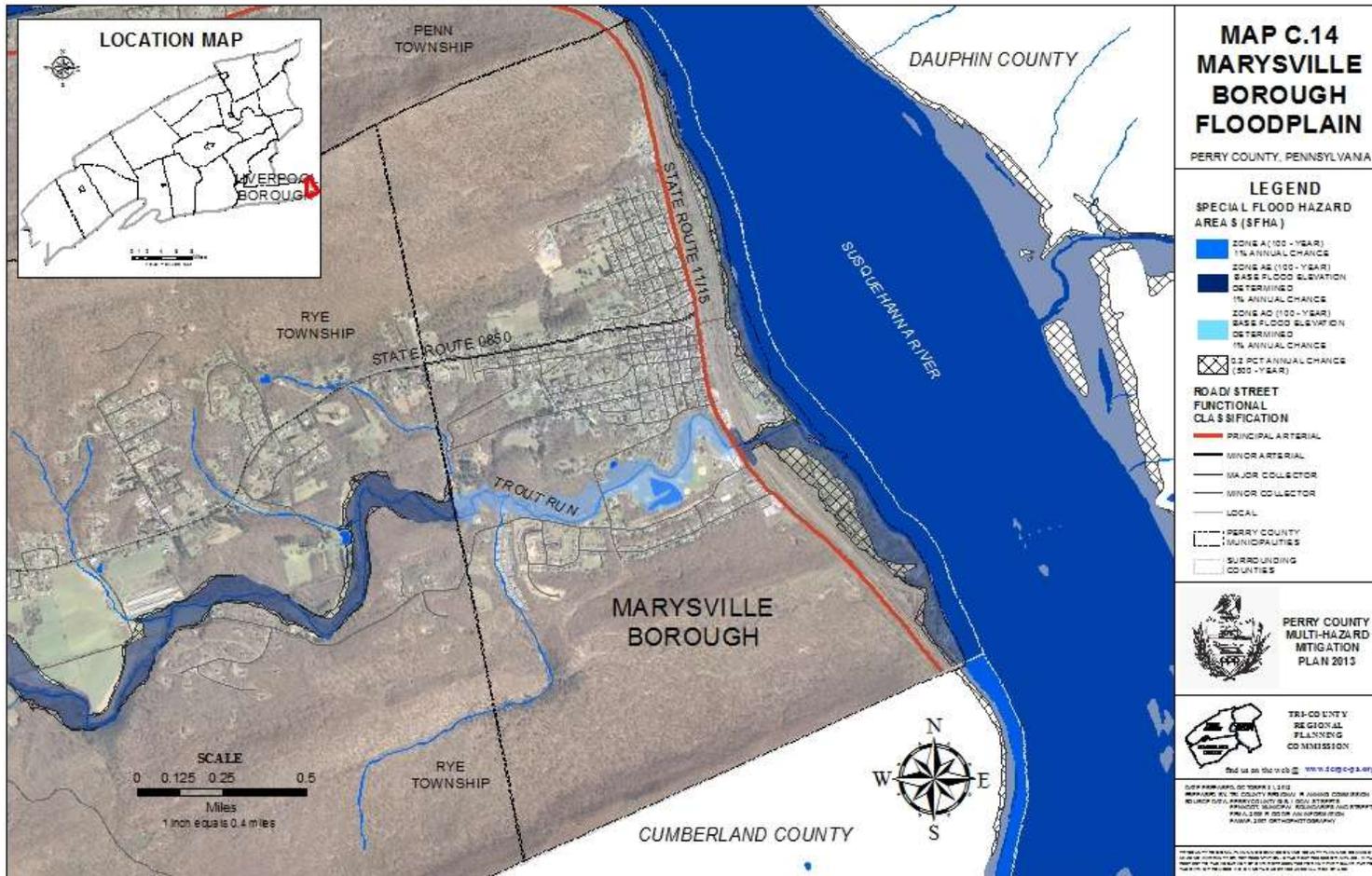


**Marysville Borough**

The Borough of Marysville is located on the lower slopes and valley land between Cove Mountain and Little Mountain, and is bordered on the east by the Susquehanna River.

The Susquehanna River is Marysville Borough's most principal source of flooding, though Fishing Creek constitutes the major flooding problem west of the State Road. The Borough's highest flood on record occurred in 1972.

The map on the following page presents the 100-year floodplain risk for Marysville Borough.

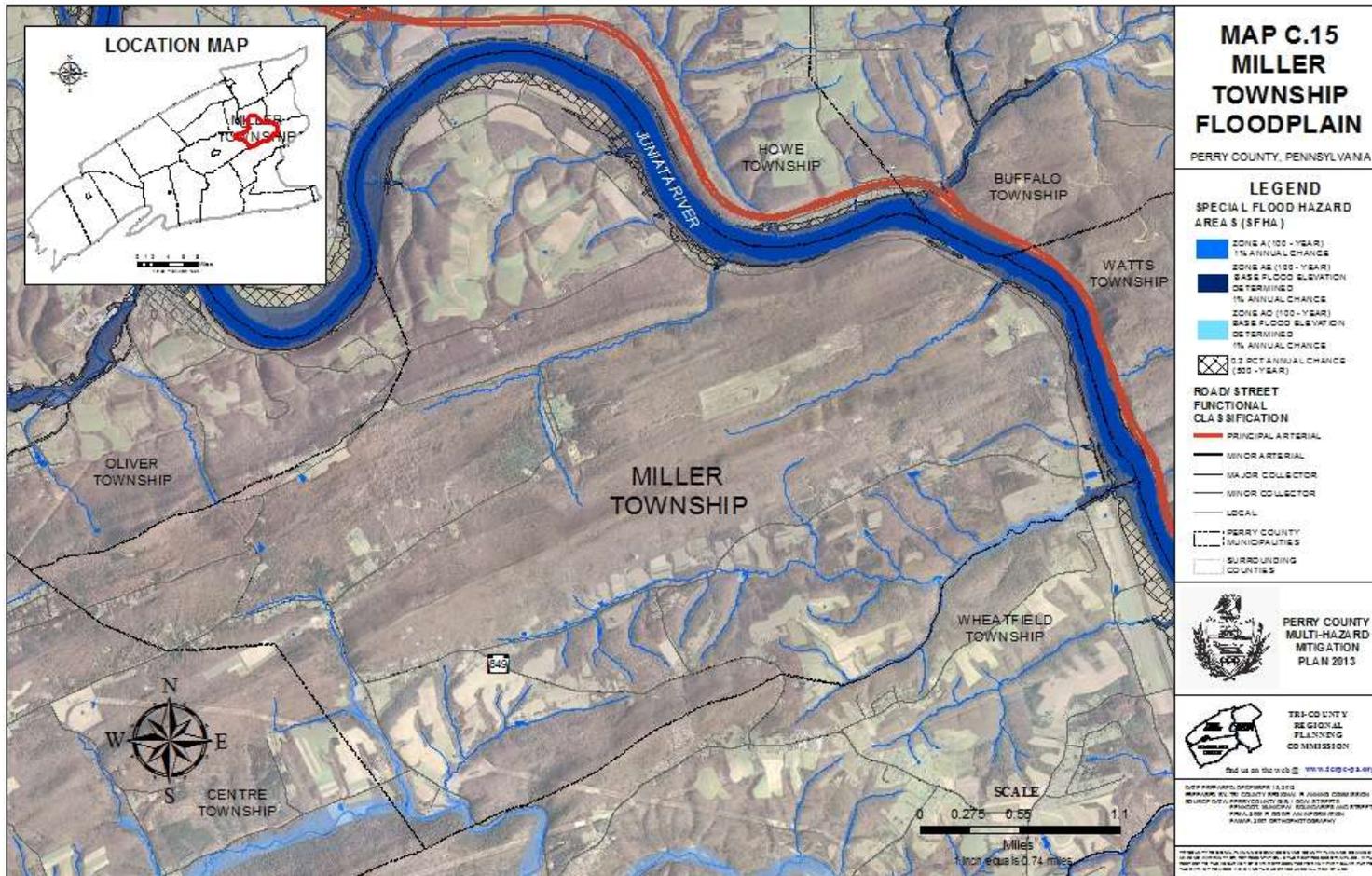


**Miller Township**

The Township of Miller is located in the northeastern portion of Perry County in south-central Pennsylvania. It is bordered by the Townships of Howe and Buffalo to the north, the Townships of Centre and Oliver to the west, the Township of Wheatfield to the south, and the Township of Watts to the east.

The Juniata River is the principal source of flooding in Miller. The flood of record occurred in June 1889.

The map on the following page presents the 100-year floodplain risk for Miller Township.

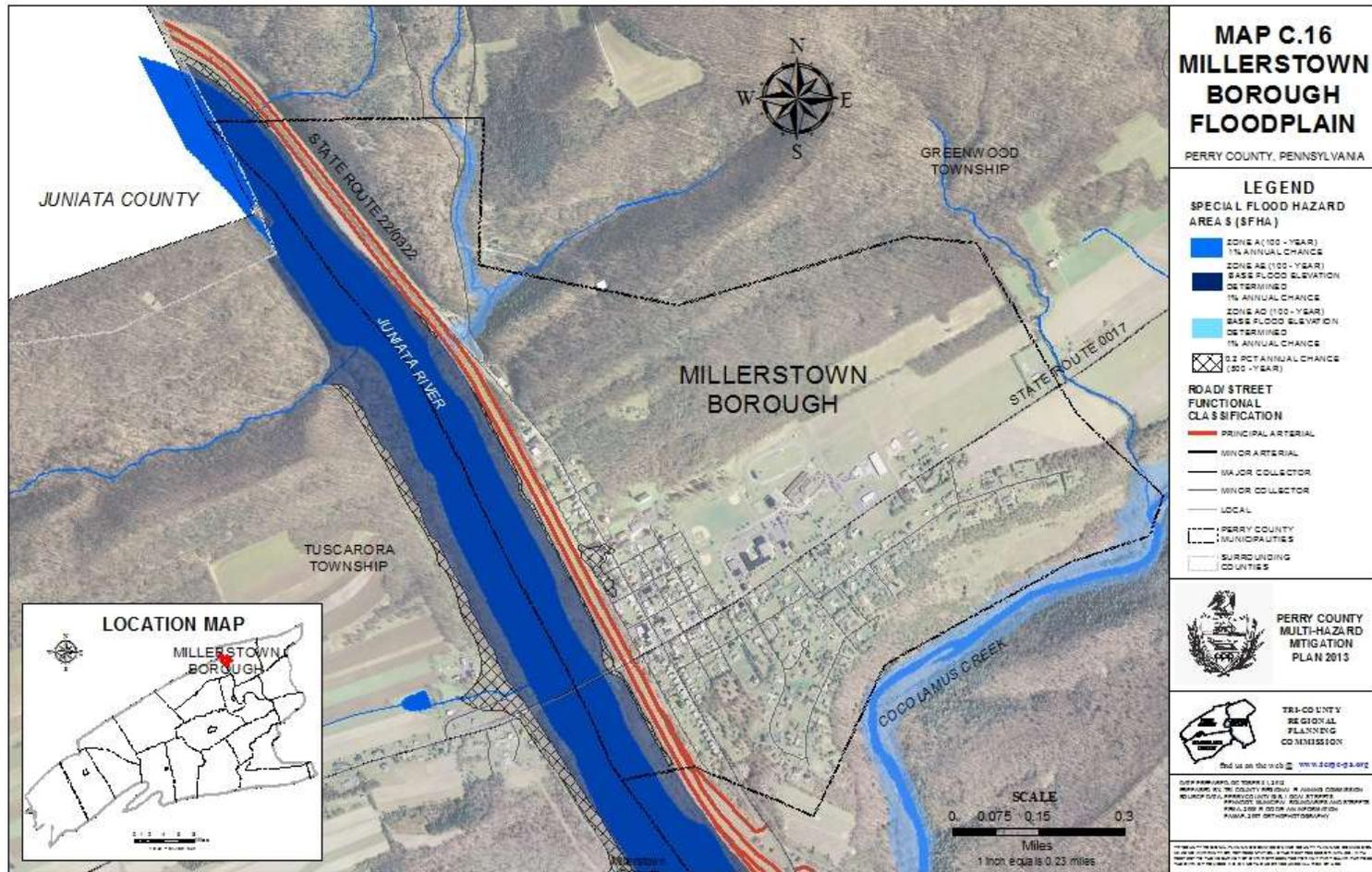


**Millerstown Borough**

The Borough of Millerstown is located in the northern portion of Perry County. The Borough is bordered by Greenwood Township to the east and Tuscarora and Delaware Townships to the west.

The Juniata River is Millerstown Borough's principal source of flooding. Major flooding occurred in 1889, 1936, 1972, and 1975.

The map on the following page presents the 100-year floodplain risk for Millerstown Borough.

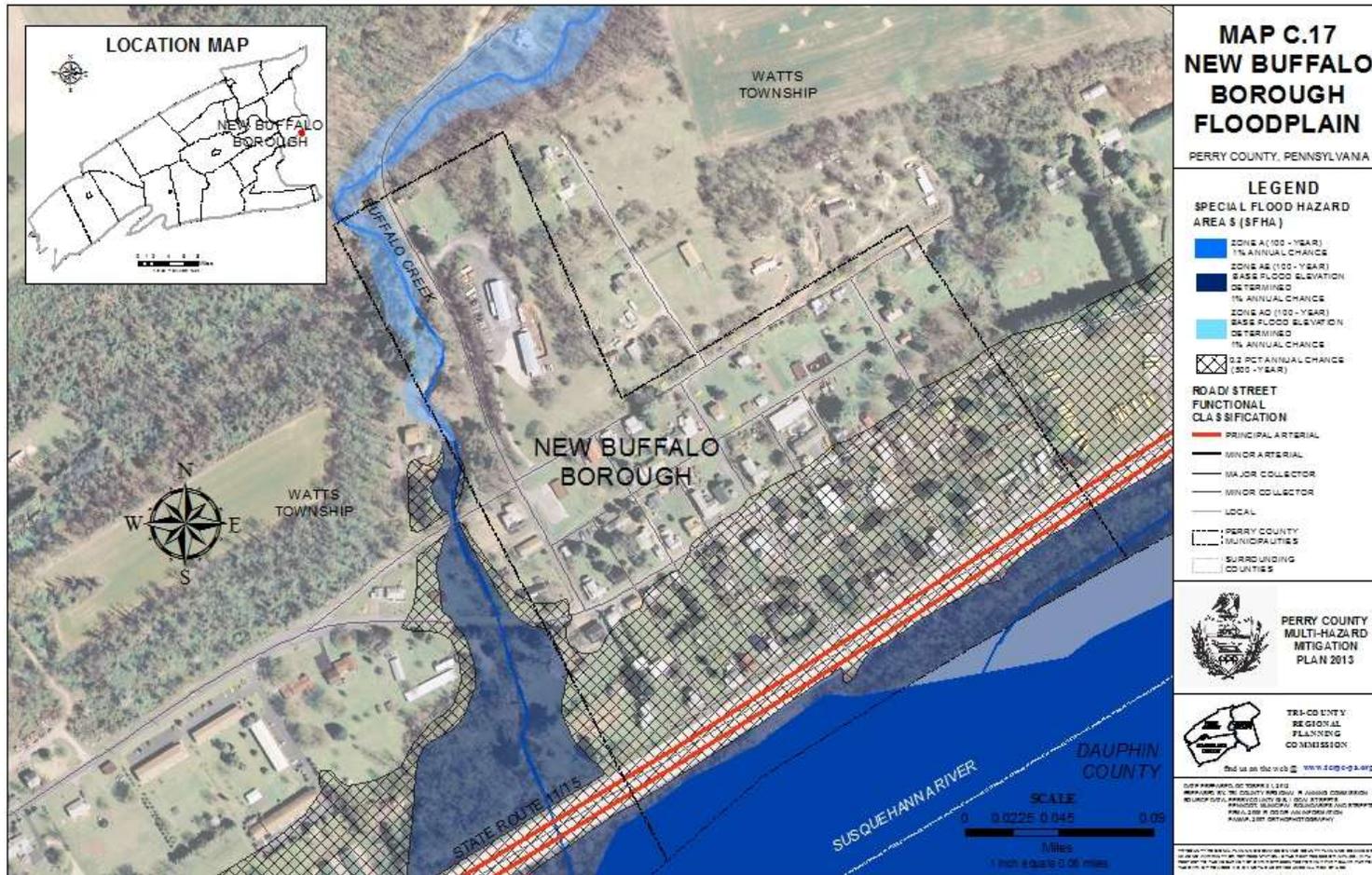


**New Buffalo Borough**

The Borough of New Buffalo is located in the eastern section of Perry County, on the west bank of the Susquehanna River. The Borough is bordered on the north, east, and west by Watts Township and to the south by the Susquehanna River.

The Susquehanna River is New Buffalo Borough's principal source of flooding. The Borough's worst flood on record occurred in 1972.

The map on the following page presents the 100-year floodplain risk for New Buffalo Borough.

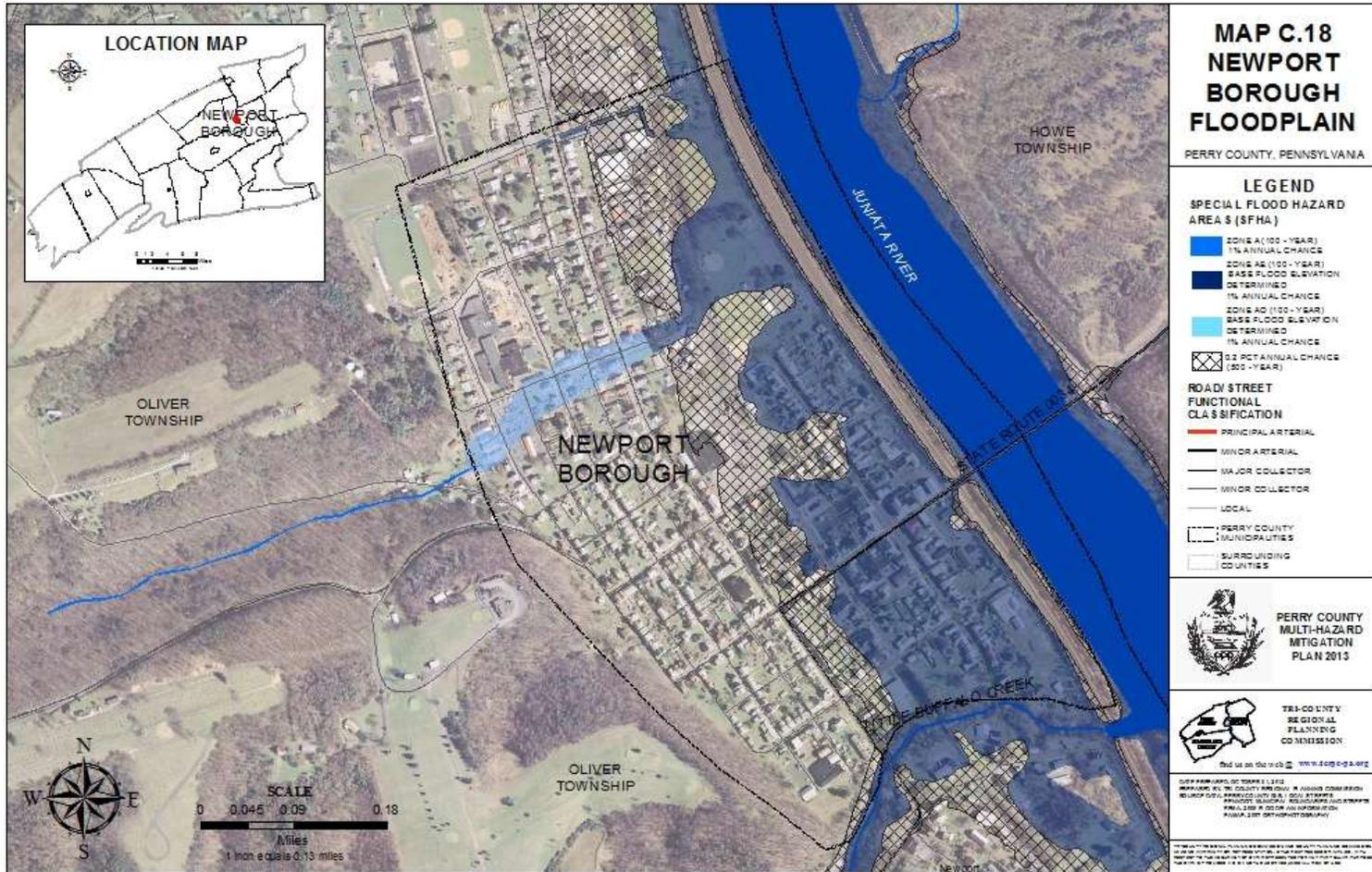


**Newport Borough**

The Borough of Newport is located in north-central Perry County, on the west bank of the Juniata River.

The Juniata River, the Borough's eastern border is its most prominent drainage feature. The Juniata River is Newport Borough's principal source of flooding. Flood disasters during the years 1889, 1936, and 1972 caused significant damage to residences and homes in the Borough.

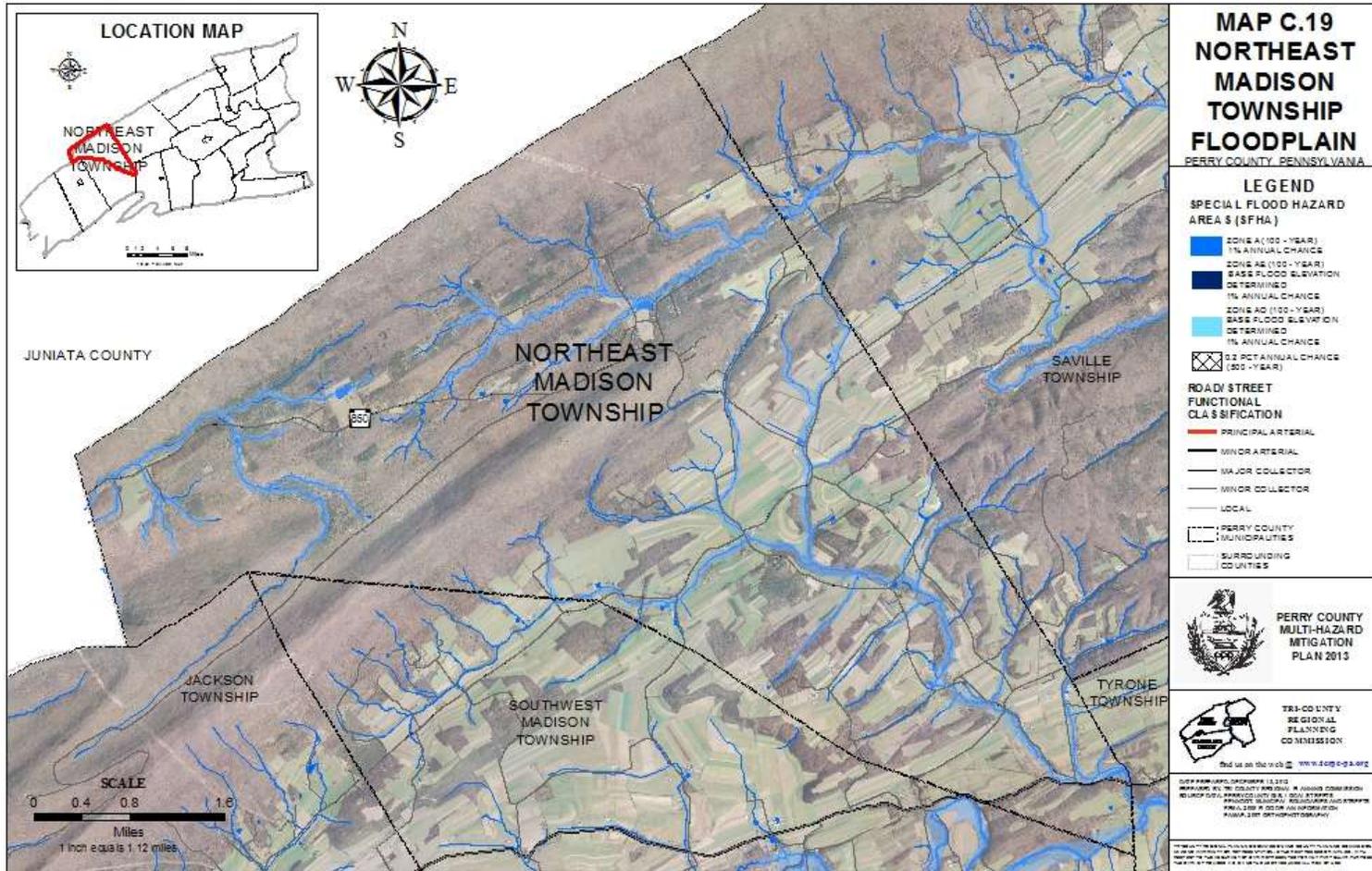
The map on the following page presents the 100-year floodplain risk for Newport Borough.



**Northeast Madison Township**

Northeast Madison Township is located in north central portion of Perry County. The Township is bordered by Jackson Township and Southwest Madison Township to the south and west; Tyrone Township and Saville Township to the east; and Tuscarora Township and Spruce Hill Township, Juniata County to the north. No flooding data for Northeast Madison Township was included in the FEMA Flood Insurance Study.

The map on the following page presents the 100-year floodplain risk for Northeast Madison Township.

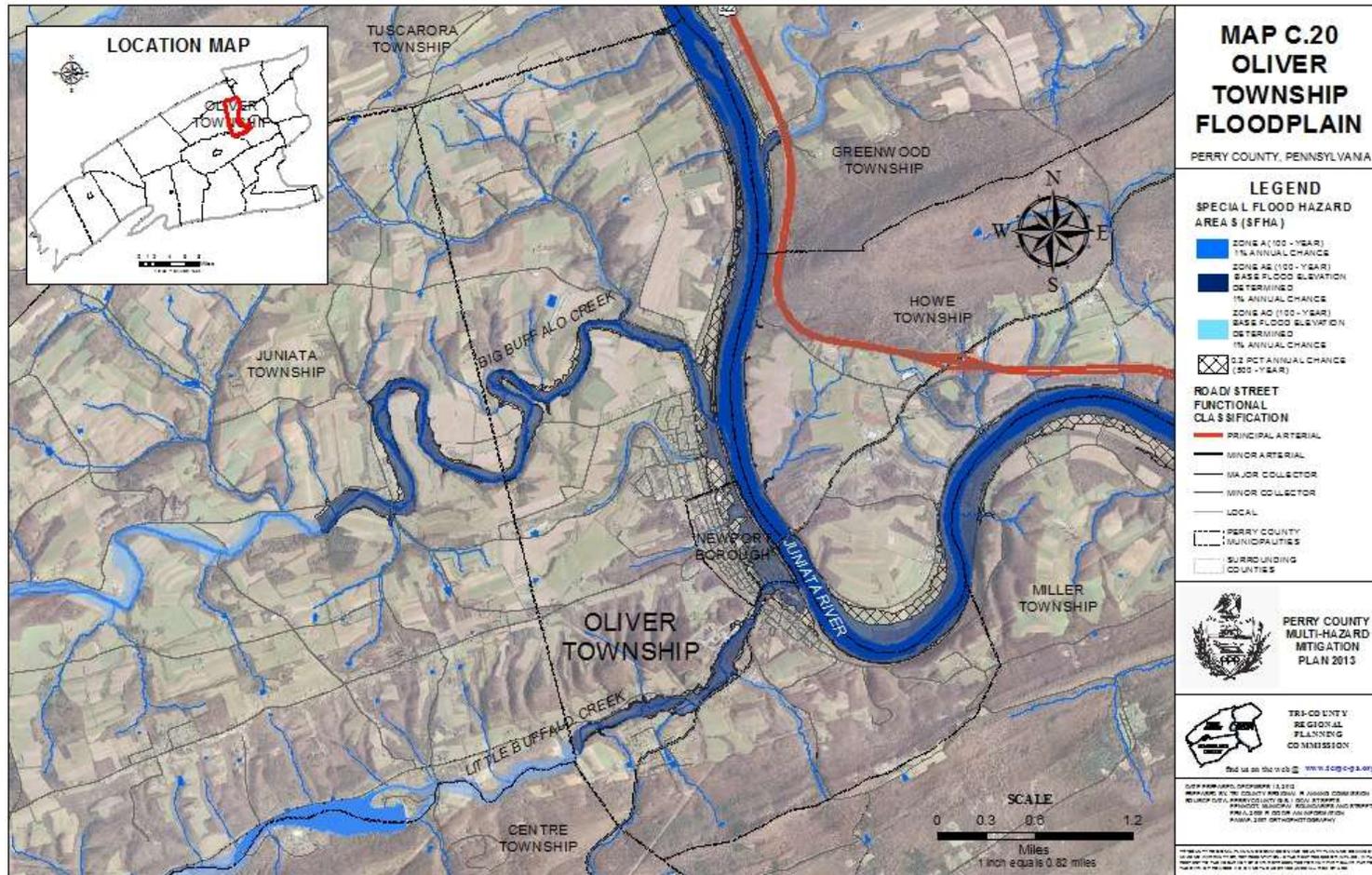


**Oliver Township**

The Township of Oliver is located in the north-central section of Perry County. The Borough borders Newport Borough on all four sides.

The Juniata River is the most prominent drainage feature in Oliver Township. The Juniata River is Oliver Township's principal source of flooding, with major flooding occurrences recorded in 1889 and 1972.

The map on the following page presents the 100-year floodplain risk for Oliver Township.

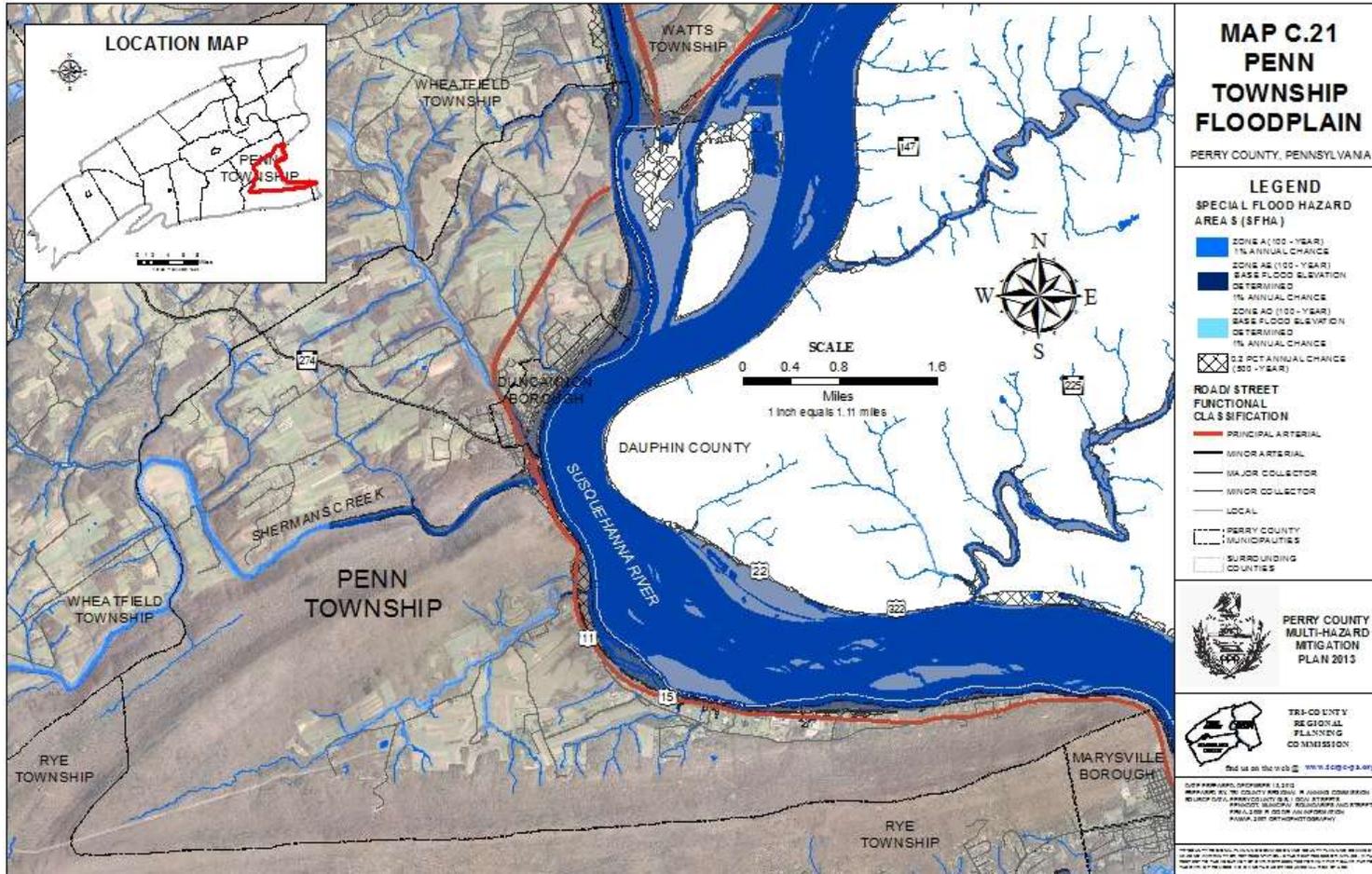


**Penn Township**

The Township of Penn is located in the eastern section of Perry County. The Borough is bordered by Wheatfield Township on the north and west; by Rye Township on the south and west; on the south by Marysville Borough and on the east by Reed and Middle Paxton Townships, and Dauphin Borough.

The Susquehanna and Juniata Rivers are the two most prominent drainage features in Penn Township. The Juniata River and the Susquehanna Rivers are Penn Township's principal sources of flooding, with major flooding occurrences recorded in 1889, 1936, and 1972.

The map on the following page presents the 100-year floodplain risk for Penn Township.

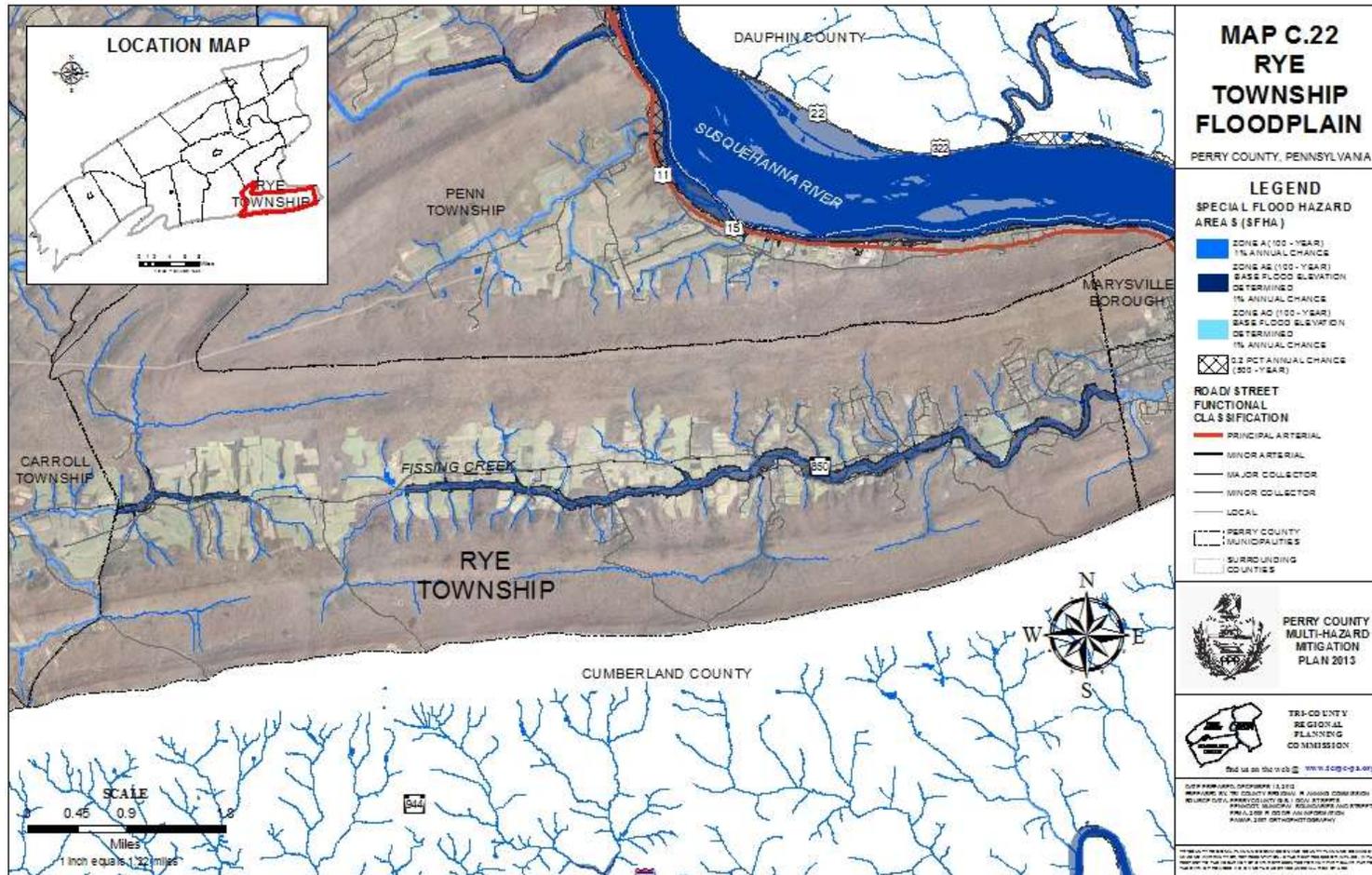


**Rye Township**

The Township of Rye is located in the southeastern section of Perry County, just west of Marysville Borough. The Township is bordered on the north by Penn and Wheatfield Townships, on the east by Marysville Borough, on the south by Hampden, East Pennsboro, Silver Spring, and Middlesex Townships, and on the west by Carroll Township.

The two major drainage features for Rye Township are Fishing Creek West, and Fishing Run. Flooding problems typically occur with heavy rainfall or rapid snowmelt. Neither of Rye Township's draining streams have a history of recorded flooding.

The map on the following page presents the 100-year floodplain risk for Rye Township.

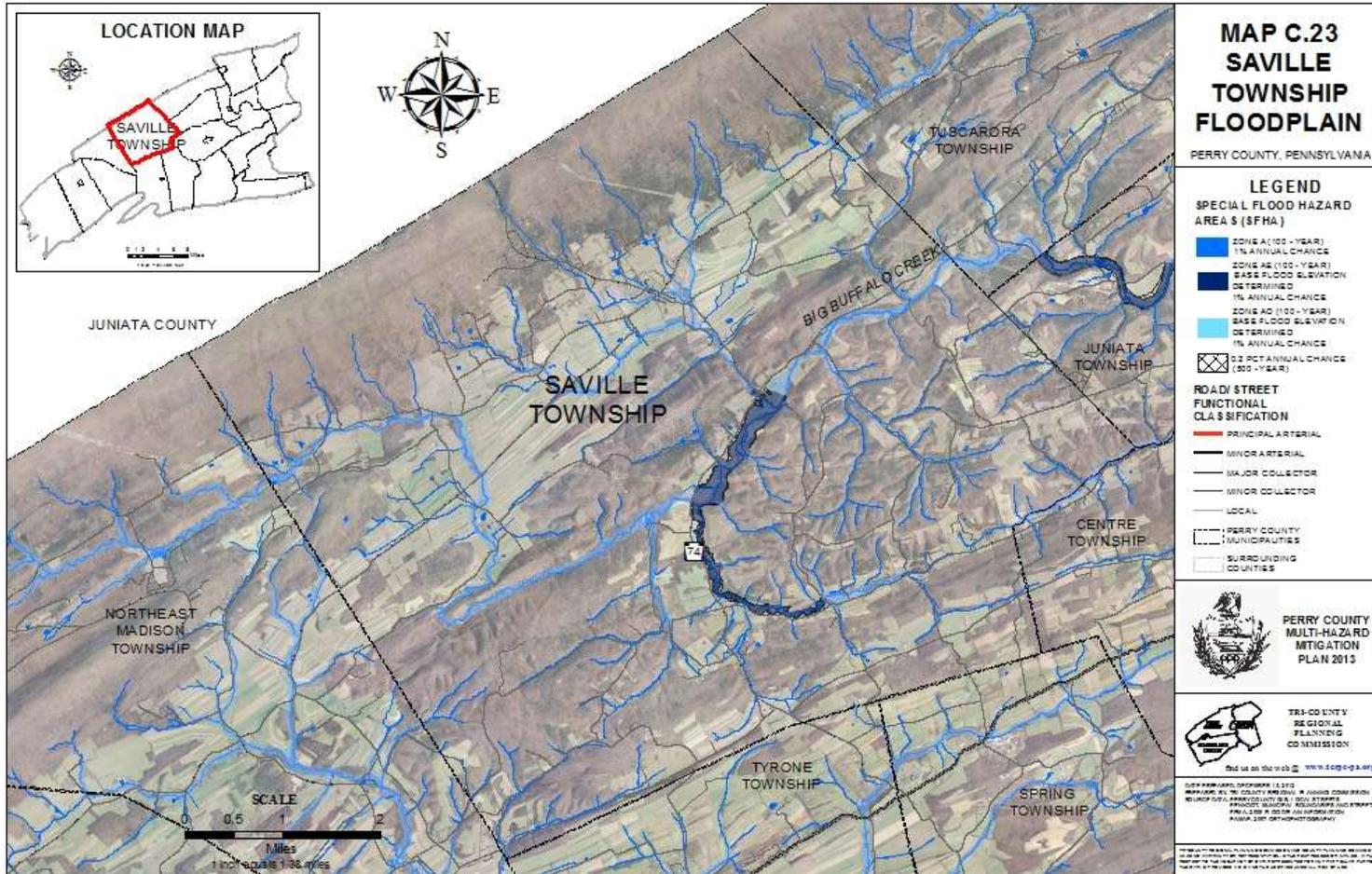


**Saville Township**

The Township of Saville is located in the northern portion of Perry County in south-central Pennsylvania. Ickesburg is located 2 miles to the north and Harrisburg is located 28 miles southeast of Saville. It is bordered by the Township of Northeast Madison to the west; the Townships of Spruce Hill and Turbett to the north; the Townships of Tuscarora, Juniata, and Centre to the east; and the Township of Spring and Tyrone to the south.

Low-lying areas are subject to periodic flooding caused by overflow of Buffalo Creek and many small tributaries within the township.

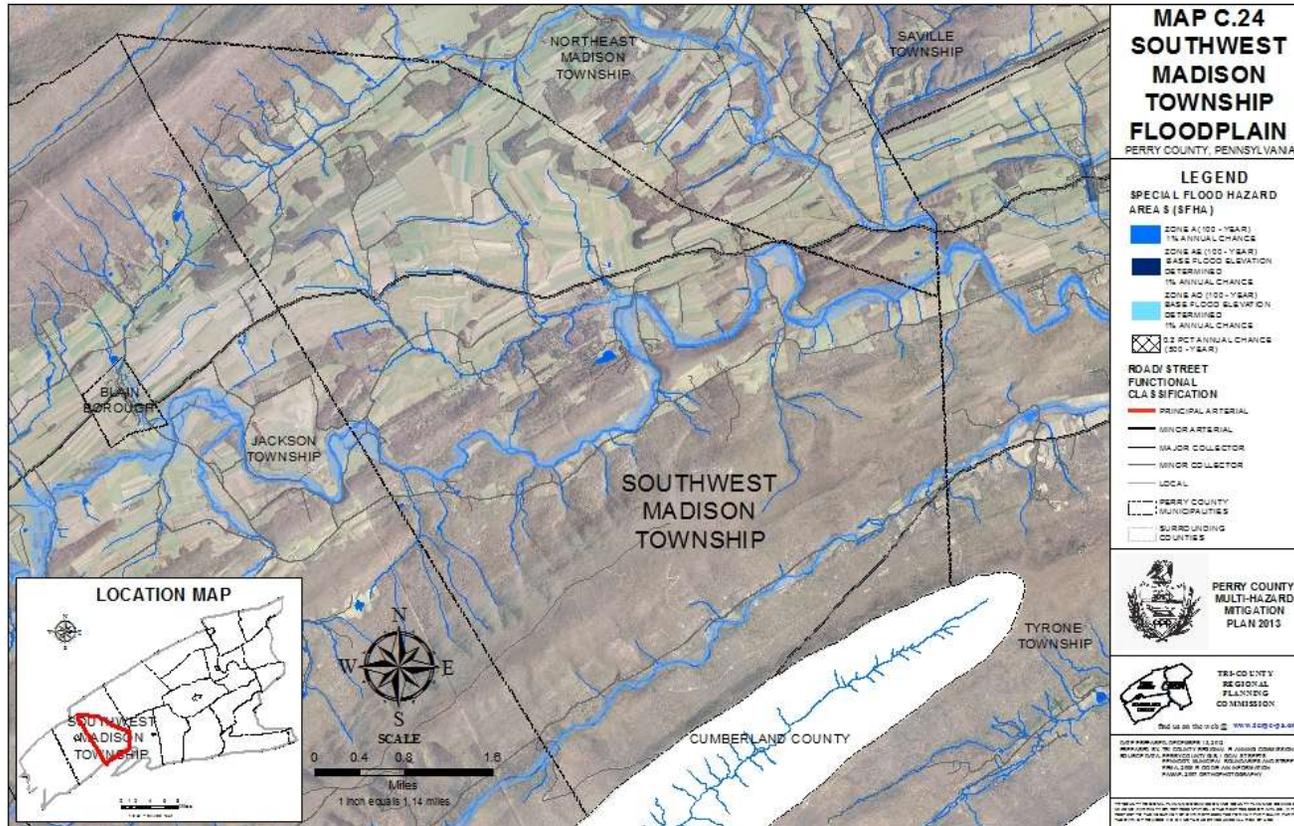
The map on the following page presents the 100-year floodplain risk for Saville Township.



**Southwest Madison Township**

Southwest Madison Township is located in central Perry County. It is bordered by Jackson Township to the west; Northeast Madison Township to the north and east; Tyrone Township to the east; and Lower Mifflin Township, Cumberland County, to the south. No flooding data for Southwest Madison Township was included in the FEMA Flood Insurance Study.

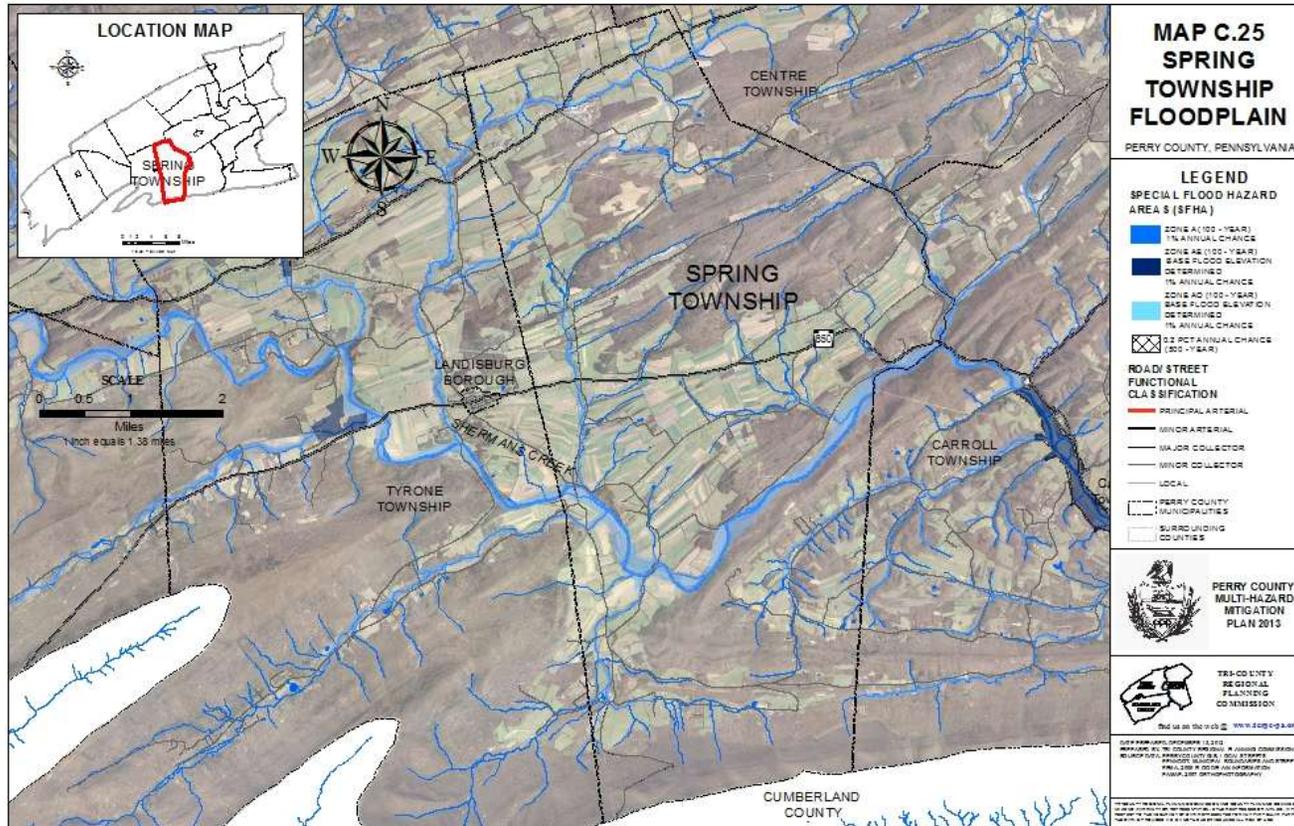
The map on the following page presents the 100-year floodplain risk for Southwest Madison Township.



**Spring Township**

Spring Township is located in south central Perry County. It is bordered by Tyrone Township to the west; Saville Township and Centre Township to the north; Carroll Township to the east; and Lower Frankford Township and North Middletown Township, Cumberland County, to the south. No flooding data for Spring Township was included in the FEMA Flood Insurance Study.

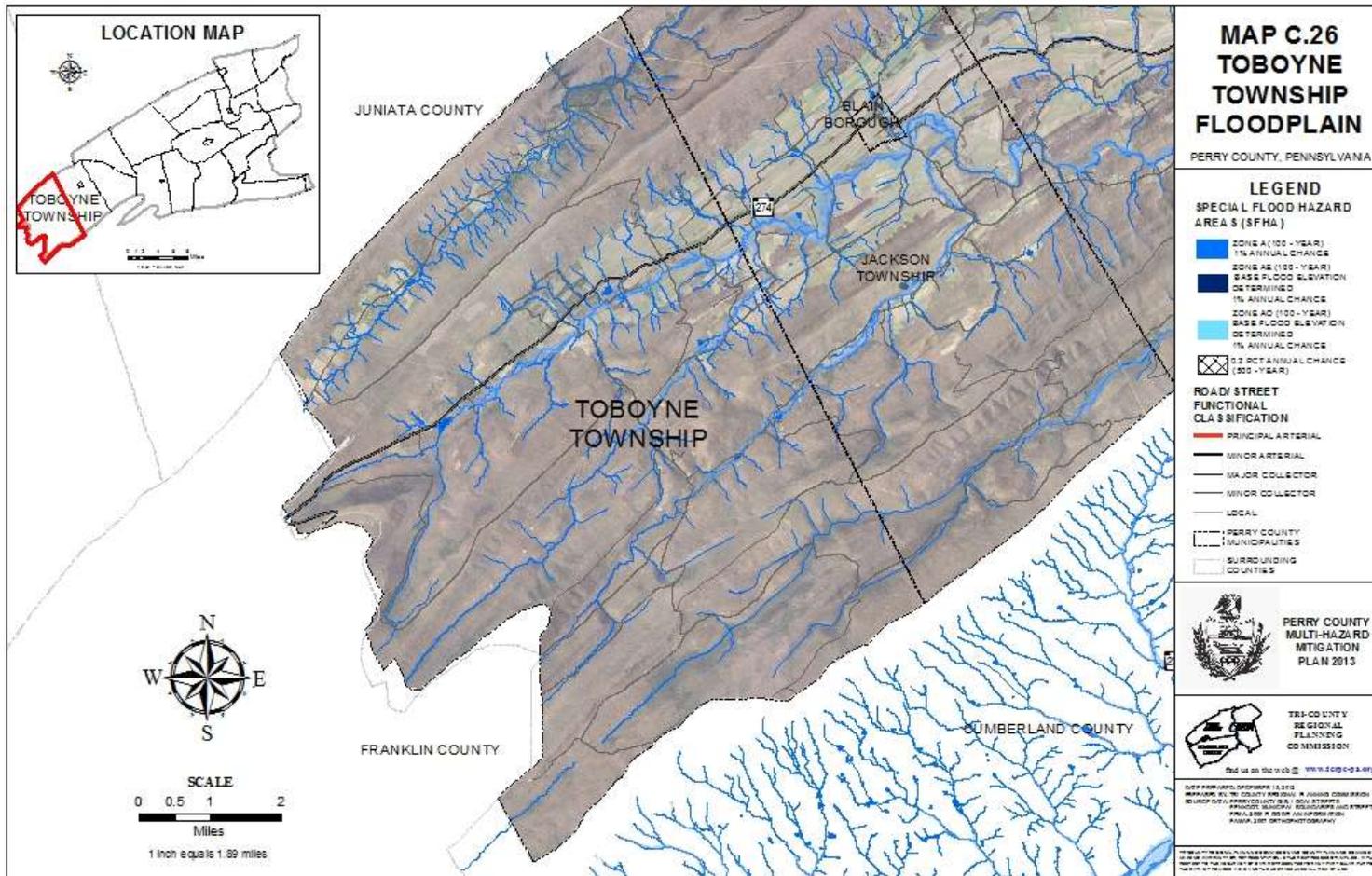
The map on the following page presents the 100-year floodplain risk for Spring Township.



**Toboyne Township**

Toboyne Township is located on the western border of Perry County. It is bordered by Fannett Township, Franklin County, to the west; Lack Township and Tuscarora Township, Juniata County, to the north Jackson Township to the east; and Hopewell Township and Lower Mifflin Township, Cumberland County, to the south. No flooding data for Toboyne Township was included in the FEMA Flood Insurance Study.

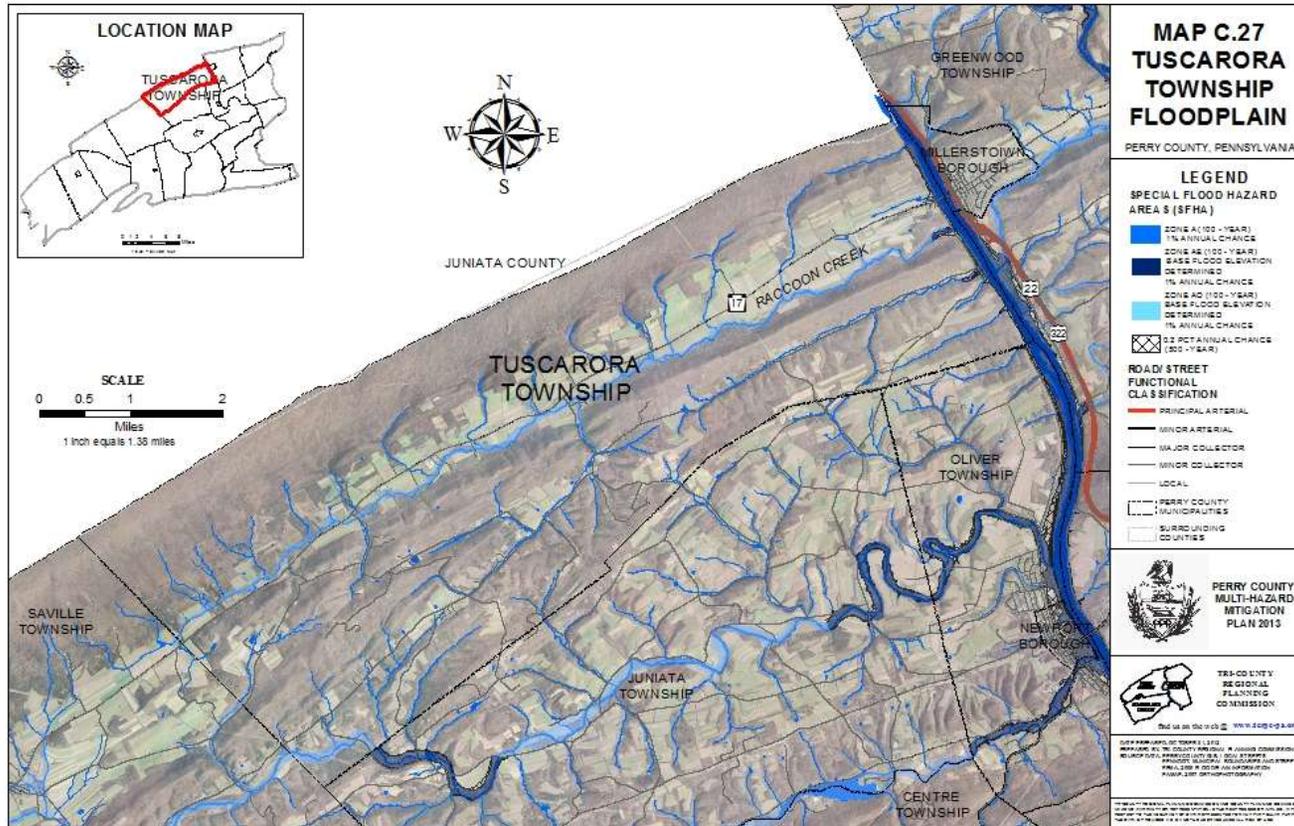
The map on the following page presents the 100-year floodplain risk for Toboyne Township.



**Tuscarora Township**

Tuscarora Township is located along the northern border of Perry County. The Township is bordered by Saville Township to the west; Juniata Township and Oliver Township to the south; Greenwood Township and Millerstown Borough to the east; and Turbett Township, Walker Township, and Delaware Township, Juniata County, to the north. No flooding data for Tuscarora Township was included in the FEMA Flood Insurance Study.

The map on the following page presents the 100-year floodplain risk for Tuscarora Township.



**Tyrone Township**

The Township of Tyrone is located in Perry County in south-central Pennsylvania. It is bordered to the north by the Township of Saville; to the east by the Township of Spring; to the south by the Townships of Lower Frankford, Upper Frankford, and Lower Mifflin; and to the west by the Townships of Northeast Madison and Southwest Madison.

Major floods cause localized inundation of structures along Muddy Run in the Village of Loysville and along Laurel Run near its confluence with Sherman Creek.

The map on the following page presents the 100-year floodplain risk for Tyrone Township.

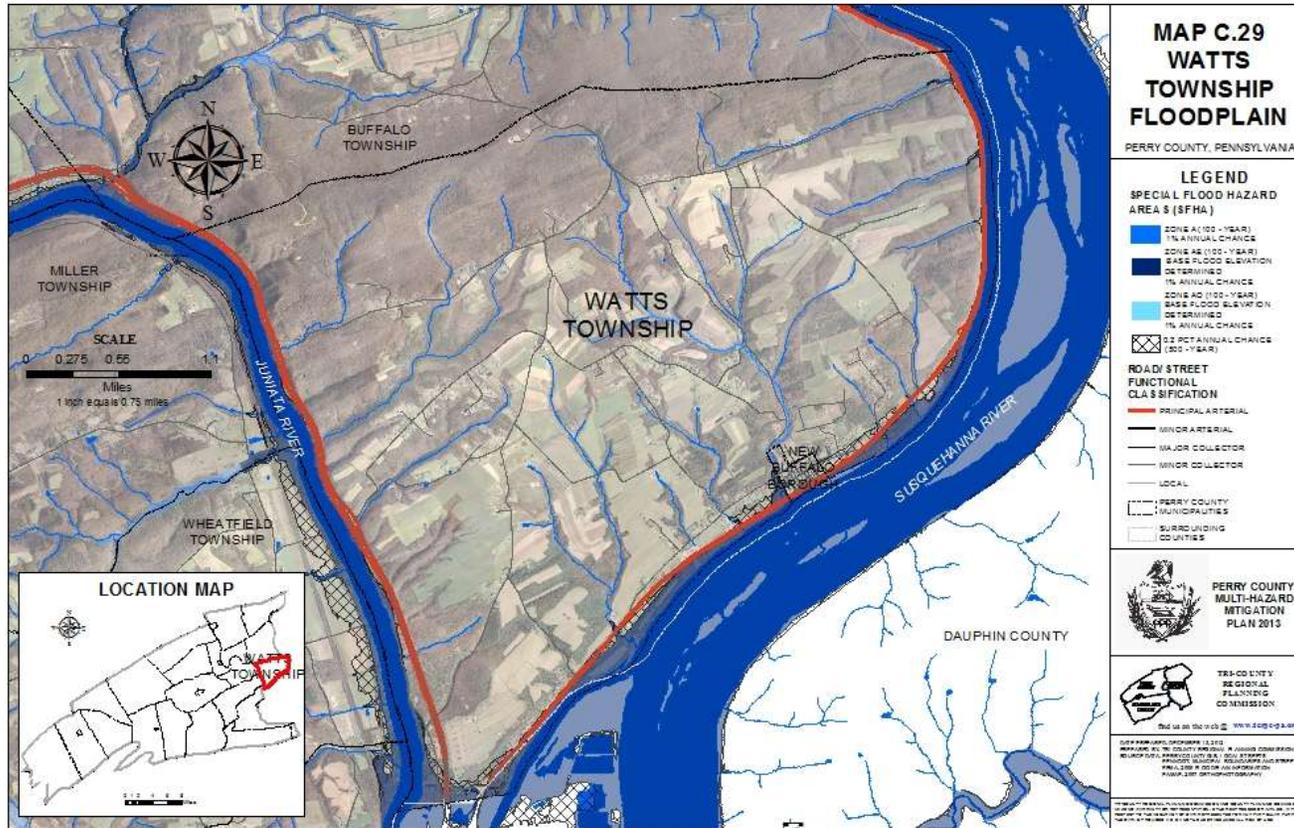


**Watts Township**

The Township of Watts is located in the eastern section of Perry County. The Borough is bordered by Buffalo Township on the north, Halifax Township and the Susquehanna River on the east, Reed Township on the south, and by Miller and Wheatfield Townships to the west.

The Susquehanna and Juniata Rivers are the two most prominent drainage features in Watts Township. The Juniata River and the Susquehanna Rivers are Penn Township's principal sources of flooding, with major flooding occurrences recorded in 1889, 1936, and 1972.

The map on the following page presents the 100-year floodplain risk for Watts Township.



**Wheatfield Township**

The Township of Wheatfield is located in the eastern section of Perry County, in south-central Pennsylvania near Duncannon, Pennsylvania. The township is bordered on the north by the Township of Miller, on the east by the Township of Watts and the Juniata River, on the south by the Township of Penn, and on the west by the Township of Carroll.

The Juniata River is the most prominent drainage feature in the township. Other notable streams include Little Juniata Creek and Sherman Creek. Flood hazard areas along these streams are mainly undeveloped; however, sporadic residential land use can be found, particularly along the Juniata River. It should also be noted that much of the undeveloped agricultural land in flood plain areas may be subject to crop damage from flooding.

The map on the following page presents the 100-year floodplain risk for Wheatfield Township.



**Probability**

The probability of a flooding event occurring in Perry County is high, as this hazard is an annual event. Flooding is a frequent problem throughout Pennsylvania. While Perry County can experience some degree of flooding throughout the year, the threat of flooding is compounded in the late winter and early spring months, as melting snow can overflow streams, rivers, and tributaries. As part of the Susquehanna River basin, areas adjacent to the river and its main tributaries are at significantly higher risk than interior municipalities; however, increased risk during key seasonal shifts can affect these regions as well.

**Maximum Threat**

Potential flooding impacts range from very low to catastrophic depending on the type and location of flooding. The maximum threat of flooding in Perry County is estimated by looking at potential loss data and repetitive loss data, both analyzed in the risk assessment portion of the Hazard Mitigation Plan.

FEMA defines a repetitive loss property as any insurable building that has experienced two or more claims of more than \$1000 that were paid by the National Flood Insurance Program within any rolling ten-year period, since 1978. A repetitive loss property may or may not be currently insured by the National Flood Insurance Program (NFIP).

Duncannon Borough has the most repetitive loss properties within Perry County. These 25 properties consist of 15 residential units and have a combined property value of more than \$5.5 million. Marysville Borough has 10 repetitive loss properties, all of which are single-family homes. The total value of these repetitive loss structures is more than \$1.5 million. A flooding event in Duncannon Borough or Marysville Borough could cause great monetary damage, as it has in the past with these repetitive loss properties (see Section 02: Hazard Vulnerability and Risk Assessment).

Carroll Township, Newport Borough, and Tyrone Township have the highest estimated potential property loss, as damages could reach more than \$20 million in all three municipalities. Damages in Carroll Township could be more than \$40 million. Damages in Newport Borough could be more than \$30 million and affect approximately 65.79 percent of the Borough's total market value (see Section 02: Hazard Vulnerability and Risk Assessment).

The potential for loss of life and injuries to occur in these areas is high. Additionally, the long-term impact severe flooding could have on the health and safety of the citizens is high. Depending on the scope and magnitude of the flooding, the likelihood of long-term economic disruption is possible. Flooding may have a moderate impact on property, facilities, and infrastructure with varying levels of damage to structures in the affected area. Mobile homes are especially threatened by high water levels. Basic services may experience moderate impacts, as disruptions for short periods of time could occur. Government operations are expected to continue without disruption. The

environmental impact should be minimal, unless hazardous materials are released as a result of the flooding.

### **Secondary Effects**

Power failures are the most common secondary effect associated with flooding. Coupled with a shortage of critical services and supplies, power failures can cause a public health emergency. Disruption in traffic flow may cause a transportation accident. Flooding also has the potential to cause other hazards, such as landslides, hazardous material spills, and dam failures.

Industrial, commercial, and public infrastructure facilities can become inundated with flood waters that also threaten the continuity of government.

Perry County's special needs population, which is often home-based, must be tracked and identified in flooding situations.

Severe flooding can have long-term secondary effects on the population, economy, and infrastructure of Perry County. Escalating costs of damages to private structures and the frequency of flooding can cause permanent population displacement. Small businesses that contribute to the local economy may close if they are unable to recover from a disaster. Disruption to commerce and/or transportation modes can have an adverse effect on municipal economies in affected areas. Critical infrastructure, such as sewage and water treatment facilities, can be irreparably damaged.