



## Appendix 18: Township of Union

This appendix is part of the 2016 Union County Hazard Mitigation Plan (HMP) update, and includes only jurisdiction-specific information about the Township of Union, which is one of the twenty (20) municipalities within Union County that is participating in the plan update. Union County led the planning process and outreach for this update. For a detailed description of the planning process and the public outreach efforts for this update, see Section 3 of the 2016 HMP.

### 1. Planning Process and Participation

The County formed a Steering Committee, which was responsible for key decisions during the plan update. This committee sent a letter to the Mayor of each municipality within the County. The Mayors and local officials selected a single individual to represent the town in the broader process. This person was the point of contact for the plan update, but worked with other municipal employees, consultants, volunteers, and other stakeholders throughout the planning process. This collection of participants, considered the local planning committee, is listed below. The committee was responsible for various decisions that informed the development of this appendix, including: prioritizing the natural hazards that can affect the community, reviewing and prioritizing the mitigation actions that are included in Table 18-1, and informing community leaders about the status of the County mitigation plan update.

The Township of Union Planning Committee evaluated and identified the hazards of concern, completed the request for information (RFI), reviewed the plan documents and vulnerability assessment, identified local stakeholders for outreach, and worked collectively to update the mitigation strategy. In order to complete the update process, Township of Union attended the kickoff meeting held by Princeton Hydro in May 2014. To further the plan development, the Township of Union Planning Committee met with Princeton Hydro to review the plan documents and revise the mitigation strategy in a workshop format on July 24th, 2014 and then again on February 26, 2015. Local ordinances, site plan requirements, emergency procedures and response plans, and stormwater management plans were reviewed for integration into this plan update. As the plan was developed, the Planning Committee reviewed all of the drafts and provided input on this individual appendix.

**Table 18-1**  
**Local Planning Committee (Source: Township of Union)**

Name	Title	Organization	Role in Process
Fred Fretz*	OEM Coordinator	Township of Union OEM	Coordinator
Tom Byrne	Chief, Union Fire Department	Township of Union Fire Dept	Assistant Coordinator
Joseph Venezia	Township Engineer	Township of Union Engineering	Engineering Support
Philip Haderer	Assistant Township Engineer	Township of Union Engineering	Engineering Support
Sergio Panunzio	Superintendent, DPW	Township of Union, DPW	Technical Support
Michael Romano	General Foreman, DPW	Township of Union, DPW	Technical Support
Daniel Zieser	Director, Union Police Dept	Township of Union, Police Dept	Technical Support

*\*Left the Township during the plan update process.*



## 2 Community Profile

The Township of Union has a total area of 9.09 square miles and is located in northern Union County, New Jersey. Major transportation elements include Routes 22 and 82, Interstate 78, the Garden State Parkway and a NJ Transit rail station.

As of 2010, the population was estimated at 56,642. This is a 4.11 percent increase from the 2000 population, which was estimated at 54,405. Township of Union is the 2nd largest town in the County, in terms of population and it experienced the 3rd greatest population growth over this period. Figure 18-1 is a map of the Township of Union. See Section 3 of the 2014 Plan update for a map of Union County.

Township of Union was settled in the mid 1600's and developed as a farming community, and was later known as Connecticut Farms in the 1700's. A Revolutionary War battle was fought at the site, and the Caldwell Parsonage Museum is a historic site on the National Register of Historic Places.<sup>1</sup>

Township of Union was incorporated on November 23, 1808 from portions of Elizabeth Township. Township of Union follows the Township format of government with a five-member elected Council. The Council members are elected to staggered three-year terms and the Mayor is selected annually from and by the Council members.

### 2.1 Land Use and Development

Union is a densely-developed residential community, with 88.06 percent of its 9.08 square miles of land area classified as urban/developed. Approximately 90 percent of the parcels within Union are classified as residential, based on tax assessment data. Between 2004 and 2012, 151 building permits were issued for residential homes within the Township. This is 1.84 percent of the total building permits issued for Union County during this time period. Just over 86 percent of these permits were for 1- and 2-family homes. Union has a population density of 6,238 people per square mile. The 2010 census estimates that 24.6 percent of the housing within the Township was renter-occupied, lower than the County average of 30.5 percent renter-occupied properties.

---

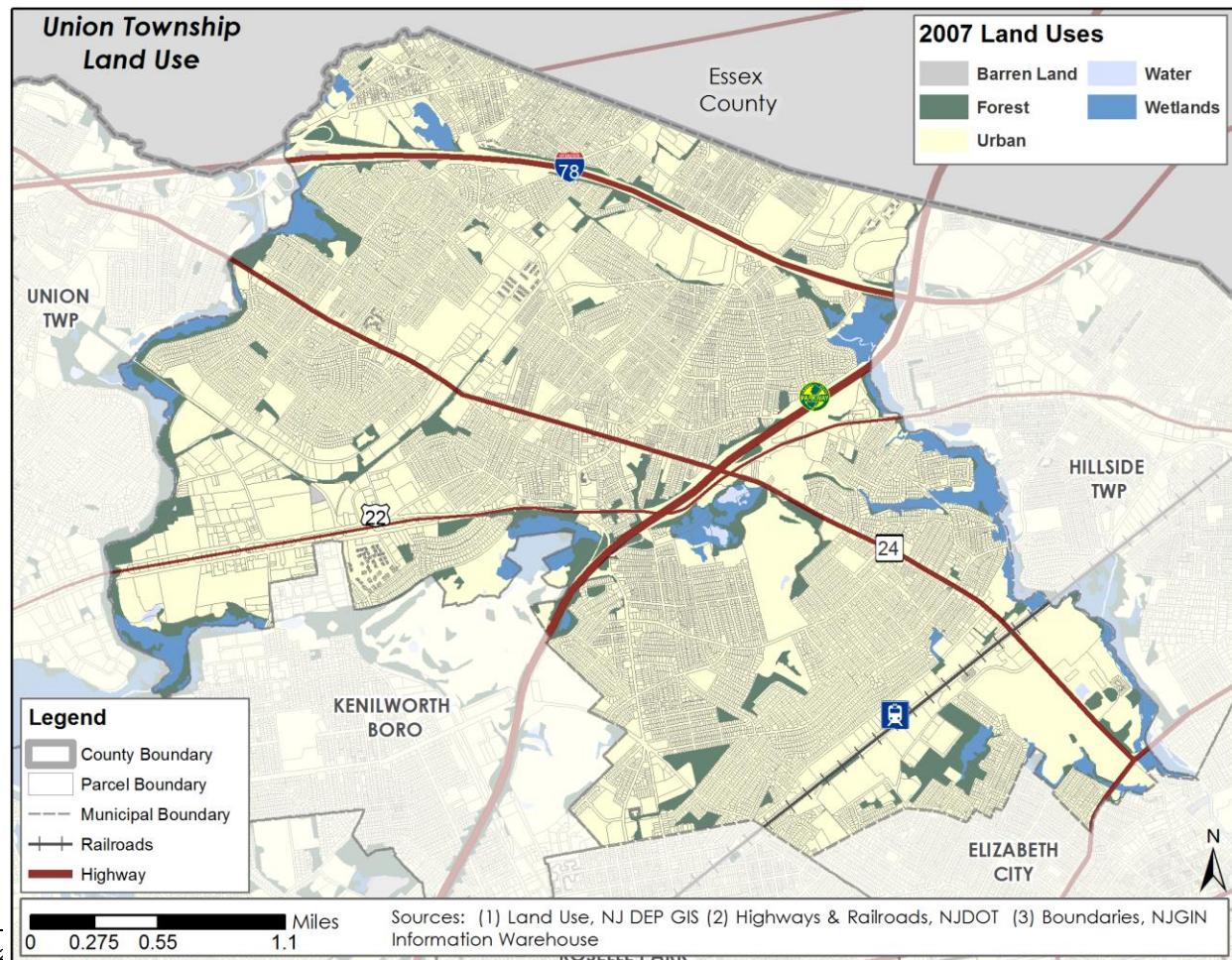
<sup>1</sup> Township of Union, New Jersey. <http://uniontownship.com/>



**Table 18-2**  
**Land Use/Land Cover Trends (NJDEP GIS, 2007)**

Land Cover Class	2002 (acres)	2007 (acres)	Percent Change	Percent of Total Land <sup>2</sup>
Agriculture				
Barren Land	35.60	6.49	-81.77%	0.11%
Forest	422.35	405.77	-3.93%	6.98%
Urban	5,072.20	5,117.59	0.89%	88.06%
Water	33.19	33.44	0.75%	0.58%
Wetlands	247.84	247.89	0.02%	4.27%

**Figure 18-1**  
**Land Use/Land Cover Map Township of Union**





### 3. Hazard Identification and Risk Assessment

This section of the Township of Union mitigation plan appendix describes the natural hazards and risks that can affect the community. It should be noted that -- in accordance with FEMA requirements -- only the hazards with aspects that are unique to the community are included in detail in this appendix.

#### 3.1 Background and Hazard Rankings

Like all the other jurisdictions in Union County, the Township of Union is potentially subject to the effects of all the hazards that are considered in this mitigation plan. However, the majority of these hazards have minimal impacts on the area, and are discussed in detail in the County part of the mitigation plan. FEMA mitigation planning guidance requires that County mitigation plans include a risk assessment section that “assess[es] each jurisdiction’s risks where they vary from the risks facing the entire planning area” (44CFR 201.6 (c) (2) (iii)). Because the Union County HMP update includes separate appendices for each jurisdiction, this requirement is met in the appendices, while risks that affect the entire County uniformly are discussed in Section 4.

One of the first steps in developing jurisdictional appendices was for participating municipalities to review and prioritize the hazards that can affect them. This was done based on how often a hazard has occurred, how significant effects have been in the past, the difficulty and cost of recovering from such events. Towns ranked the list of hazards as either high, medium, low, or no concern.

Table 18-3 shows Union’s hazard rankings. The level of discussion and detail about specific hazards in this section are based on these rankings. Hazards that are ranked *high* include the most detail, and to the extent possible include probabilistic assessments of risk. Hazards that are ranked *medium* have less detail and may in some cases refer to the main part of the county mitigation plan; they usually do not have probabilistic risk assessments, although potential future losses are discussed based on best available data. Hazards ranked *low* and *none* are not addressed in this appendix, but they are discussed in the Section 4, and there are no significant differences in risk between the County and the municipality.

**Table 18-3**  
**Township of Union Hazard**  
**Identification and Prioritization**

Hazard	Priority
Flood	H
Hazmats – Transportation	H
High Wind – Straight-line Winds	H
Ice Storm	H
Severe Storm – Winter Weather	H
Erosion	M
Extreme Temperature – Cold	M
Extreme Temperature – Heat	M
Hazmats – Fixed Site	M
Severe Storm – Lightning	M
High Wind – Tornado	L
Drought	L
Earthquake / Geological	L
Hail	L
Dam Failure	N
Landslide (non-seismic)	N
Storm Surge	N
Wildfire	N

*\*Only the hazards ranked high and medium are analyzed in this appendix*



## 3.2 Flood Hazard

### 3.2.1 Type, Location and Extent of the Flood Hazard in the Community

The most significant source of flooding in Union Township is overbank flooding from the East Branch of the Rahway River, which runs along the western border of the jurisdiction. As depicted in Figure 8.2 below, most of the FEMA Special Flood Hazard Area (also known as the 100-year floodplain) in Union is related to this source. There are also several other areas of floodplain in the central and eastern parts of the jurisdiction. As shown in Figure 18-2, there is a concentration of flood insurance claims in the area around Joe Collins Park, in the northwest part of the Township. There are relatively high numbers of claims on Liberty Avenue, Audrey Terrace, Carol Road, and Mount Vernon Road among others. These claims are somewhat evenly distributed across a number of events, going back to 1999, suggesting that it is not just major events that cause flooding in some of these areas. About ten years ago the Township constructed an earthen berm and floodwall in the area around Franklin Street, north of Route 78. This was designed to mitigate downstream flooding, and was designed to a 75-year storm. This measure has been effective in most events up to that level, but floodwaters from Hurricane Irene overtopped it, with resultant flooding downstream. The two smaller areas of floodplain directly east of the area described above are related to the Vauxhall Branch, a tributary of the Rahway. Historical flood claims in this area are found in the area of Vauxhall Road and Winslow Avenue. The flooding in all these areas is typically relatively minor, often requiring the Fire Department to pump out basements.

One of the best resources for determining flood risk in a jurisdiction is Flood Insurance Rate Maps (FIRMs), which are produced by FEMA. The FIRM is the official map of a community on which FEMA has delineated both the special flood hazard areas (1% annual chance of flooding) and the risk premium zones applicable to the jurisdiction.<sup>3</sup> The effective FIRM date for Union County is September 20th, 2006 and is shown in Figure 18-2.

Current FEMA guidance uses the term extent as analogous to potential severity. The extent of the flood hazard in Union Township is generally relatively minor. The most flood-prone areas of the jurisdiction can expect to experience flooding of a foot or two maximum (occasionally), with more frequent rain events causing a few inches of inundation at low spots, and those adjacent to culverts and stream channels. The current engineering design standard for the jurisdiction is a 25-year event (i.e. one with a 4% annual chance of occurring), so events more significant than that have the potential to inundate specific areas.

Table 18-4 shows the number of parcels in Union Township with at least 60% of their area in the 100-year (1% annual) and 500-year (0.2% annual) floodplain. Although these figures offer some insight into the flood hazard in this jurisdiction, they are not particularly reliable as a risk indicator because in many cases structures and infrastructure (where the risk-producing impacts occur) are not located in the specific areas that are in the floodplain.

---

<sup>3</sup> FEMA online - Floodplain Management. Flood Insurance Rate Map (FIRM) definition



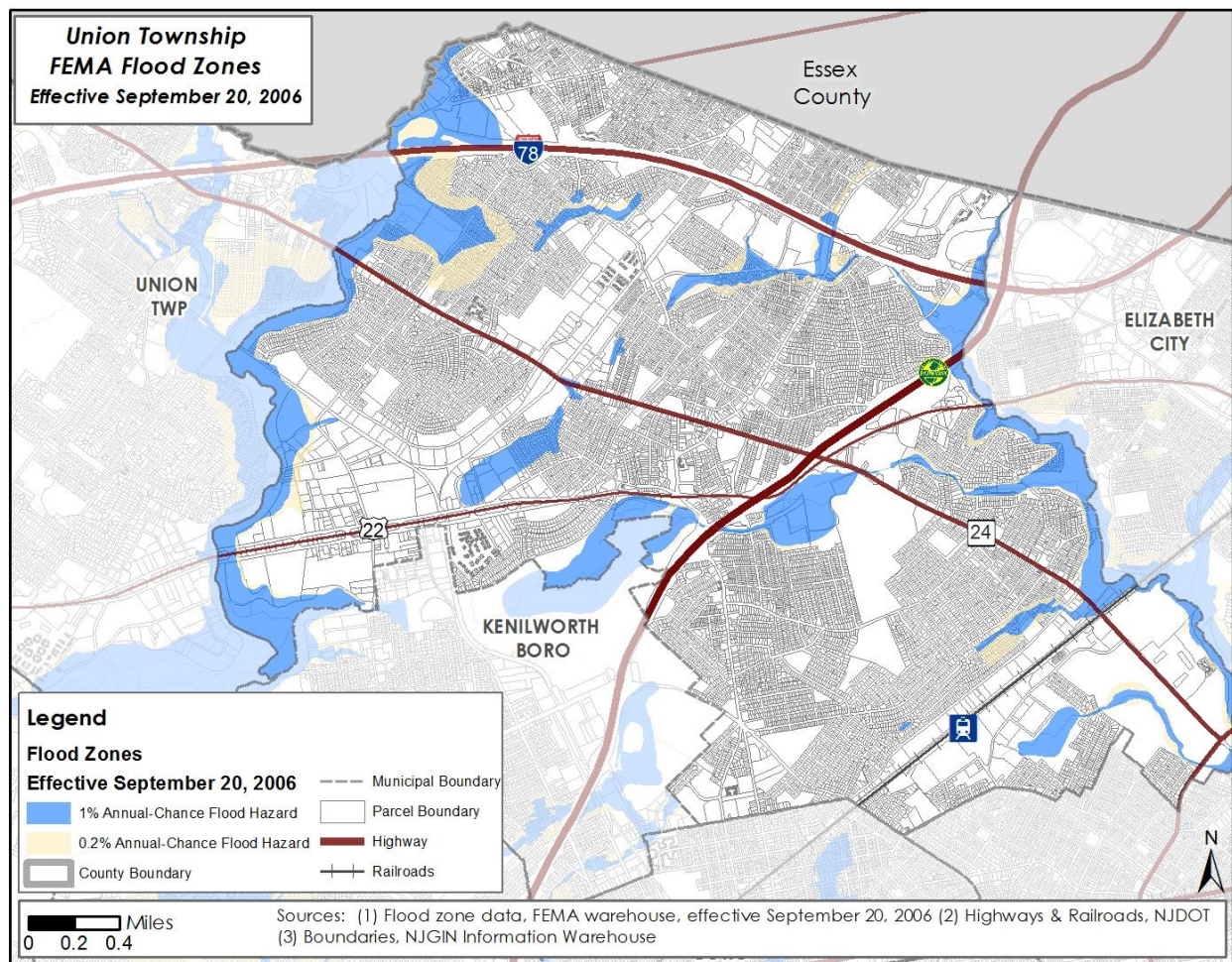
**Table 18-4**  
**Number of Parcels with at least 60% of Area in the Floodplain, Union Township**

Flood hazard area	Number of Parcels
100-year (1%) floodplain	603
500-year (0.2%) floodplain	523

### 3.2.2 Previous Flood Occurrences and the Probability of Future Floods

Minor flooding occurs in Union Township at least annually, although the severity of these frequent events is usually minimal. As discussed in the main section of the mitigation plan, more significant events like tropical cyclones and nor'easters occur every few years, and can result in significant flooding. Notwithstanding the potential effects of climate change on weather patterns, the Township can probably expect to experience some level of flooding every year or two, with more significant events happening every five to ten years on average. Section 4 of this HMP discusses past occurrences in detail, and that history and statistics are generally the same for Union Township.

**Figure 18-2**  
**Effective FIRM Township of Union**





### 3.2.3 Impacts on the Community, and Community Vulnerabilities to Flooding

As discussed elsewhere, flood impacts in Union Township as a whole are relatively minor based on various metrics such as NFIP claims, FEMA PA Program Project Worksheets, and the known history of flooding. There is no significant history of flood damage to critical facilities or populations in the jurisdiction.

The areas discussed in the paragraph above have experienced fairly shallow and low-velocity flooding at various times in the past, and this is the best indicator of extent in the future. However, the average amount of all claims (not just repetitive loss properties) is relatively high compared to many other communities in the area, at \$13,452, suggesting somewhat more significant flood problems. There are relatively few NFIP repetitive flood loss structures, but the average claim for these is somewhat high, at \$25,548, as shown in Table 18-5 below.

**Table 18-5**  
**NFIP Policies and Claims**

**Number of Parcels:**

Union:	17,831
Union County:	199,489

**Number of Policies In-Force:**

Union:	427
Union County:	6,055

**Number of Claims:**

Union:	371
Union County:	5,560

**Total Paid Claims**

Union:	\$4,990,549
Union County:	\$96,782,279

**Repetitive Loss Properties:**

Union:	38
Union County:	729

**Total Building**

Union:	\$1,646,610
Union County:	\$46,560,646

**Total Contents**

Union:	\$1,138,100
Union County:	\$46,560,646

**Number of Claims**

Union:	109
Union County:	2,115

**Average Claim**

Union:	\$25,548
Union County:	\$18,759,126

### 3.3.4 National Flood Insurance Program and Repetitive Loss Properties

To provide a sense of the flood risk in a community it is also beneficial to summarize the policies in force and claims statistics from the National Flood Insurance Program (NFIP). The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. Union Township has been a member of the NFIP since 1978.

FEMA NFIP statistics indicate that as of February 2014, federal flood insurance policies were in-force on 427 properties in Union Township. This represents a dollar value of property and contents coverage totaling \$112,056,100. Between 1978 and 2014, there have been a total of 371 NFIP insurance claims in Union Township with a total claims value of \$4,990,549. <sup>4</sup> Table 18-5 compares the number of policies in-force and paid claims in the jurisdiction. The Table shows

<sup>4</sup> FEMA – Policy and Claim Statistics for Flood Insurance



that Union Township comprises 7.1% of the NFIP policies in-force in Union County.

Union Township is not presently a member of the Community Rating System (CRS), a voluntary program for communities participating in the NFIP. The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. For CRS participating communities, flood insurance premium rates are discounted in increments of 5% based on creditable activities.<sup>5</sup> CRS communities are ranked between 1 and 10, with Class 1 communities receiving a 45% premium discount. The Township is pursuing an application for the CRS program in hopes of joining.

It should be noted that NFIP claims are not a direct or completely accurate proxy for flood risk in a community. The data does not include flood damages to structures that had no flood insurance. Also, in some cases, structures or contents may have been underinsured. The NFIP claims data also does not include any damages to public facilities, which may be insured via other means (such as self insurance or non-FEMA policies); such damages may also be addressed through other federal programs such as FEMA's Public Assistance Program.

FEMA requires a discussion of NFIP Repetitive Loss and Severe Repetitive flood loss statistics in hazard mitigation plans. The NFIP defines *repetitive loss* properties as those with two or more claims of more than \$1,000 each during any rolling ten-year period.

The flood risk assessment method is based on analysis of NFIP data on repetitive flood loss properties. The NFIP defines repetitive loss (RL) properties as those that have received at least two NFIP insurance payments of more than \$1,000 each in any rolling ten-year period. As of February 2014, Union County had 729 such properties based on a query of the FEMA BureauNet NFIP interface. Of this total, 38 properties were located within Union Township; this comprises 5.4% of the County total. Table 18-5 provides a comparison of the residential repetitive loss claims for Union County and Union Township. The tables below include the number of repetitive loss properties, building and contents damages, the total number of claims, and the average claim amounts. Union Township has properties, and the total of claims on them is relatively small, as shown in Table 18-5.

The RL claims can be broken down by focusing on specific areas in the jurisdiction where flood losses are concentrated. Table 18-6 provides a summary of the three streets with the most cumulative repetitive loss flood insurance claims in Union Township. The table includes the building, contents, and total claims data for the properties. Address data about individual sites is omitted for reasons of confidentiality.

---

<sup>5</sup> FEMA – Community Rating System (CRS).



**Table 18-6**  
**Summary of Residential NFIP Repetitive Loss Statistics, Union Township ordered**  
**by Total Claims Value (Source: FEMA NFIP query February 2014)**

Street Name	# Claims	Average
Audrey Terrace	18	\$28,705
Liberty Avenue	11	\$20,275
Franklin Street	16	\$10,792

### 3.3.5 Projected Flood Risk to Repetitive Loss Properties in Union Township

Residential flood risk is calculated by a simple methodology that uses the FEMA default present-value coefficients from the benefit-cost analysis software modules. To perform this calculation, the flood insurance claims data were reviewed to determine an approximate period over which the claims occurred. This method should be used only for very general estimates of flood risk because the NFIP data represents only part of the flood losses in any jurisdiction. This is because there are always properties that are uninsured or under-insured. Most of the flood claims in the most recent query occurred between 1992 and 2012, a period of 21 years.

As shown in Table 18-7, there have been 109 flood insurance claims in the 21-year period, for an average number of claims per year of 10.6. Based on a 100-year horizon and a present value coefficient of 14.27 (the coefficient for 100 years using the mandatory OMB discount rate of 7.0 percent), the projected flood risk to these properties is \$1,892,277. It must be understood that individuals can obtain and cancel flood insurance policies, and the flood hazard depends on many variables, including the weather, so this projection is simply an estimate of potential damages. Nevertheless, it offers a useful metric that can be used in assessing the potential cost effectiveness of mitigation actions, although in this case, site-specific loss estimates are fairly small, meaning that the amount of grant funds that could be expended on projects will probably be limited.

**Table 18-7**  
**Projected 100-year Flood Risk to Repetitive Loss Properties in Union Township**  
**Based on Historic NFIP Claims**  
**(Source: FEMA NFIP query February 2014)**

Data	Value
Period in years	21
Number of claims	109
Average claims per year	5.2
Total value of claims	\$2,784,710
Average value of claims per year	\$132,605
<b>Projected risk, 100-year horizon</b>	<b>\$1,892,277</b>



### 3.3.6 Flood Risk to Severe Repetitive Loss Properties in Union Township

The definition of Severe Repetitive Flood Loss is included in the County portion of this mitigation plan. As of February 2014, Union Township had one NFIP severe repetitive flood loss property. It has experienced five flood losses (insurance claims) totaling \$38,774. The losses extend back to 1979, with a large time gap between the first claim and the next one. Although it would be possible to estimate risks based on this information, the results would be highly unreliable. At some point the jurisdiction may decide to complete a more detailed evaluation of the property, which may incorporate data such as the elevation of the property relative to a flood source, etc.



### 3.4 Hazardous Materials Releases

The main section of this hazard mitigation plan includes more details about the hazardous materials hazards in the County as a whole, although by their nature such events are non-probabilistic. As such, it is impossible to estimate risk with any accuracy whatsoever. Hazardous materials releases are included in this appendix because the County required that it remain on the list of hazards, and Union Township indicated it as a hazard of high or medium concern. However, for reasons of security and a lack of open-source information, this subsection is necessarily short and very general.

This mitigation plan is a public document, and as such does not include any descriptions specific enough that they could be used for malicious purposes. As part of this HMP update, the planning team queried the New Jersey Department of Environmental Protection Right to Know database. The database includes reports of hazardous materials spills, listing their location, date of occurrence and the type of material. The database was queried from January 2000 to the present day. Results are a combination of occurrences on fixed sites and those related to transportation. For Union Township these tended to be in five categories soil contamination, underground tanks (presumably leakage), illegal dumping, improper storage/disposal, and abandoned containers.

#### 3.4.1 Hazardous Materials Releases – Transportation

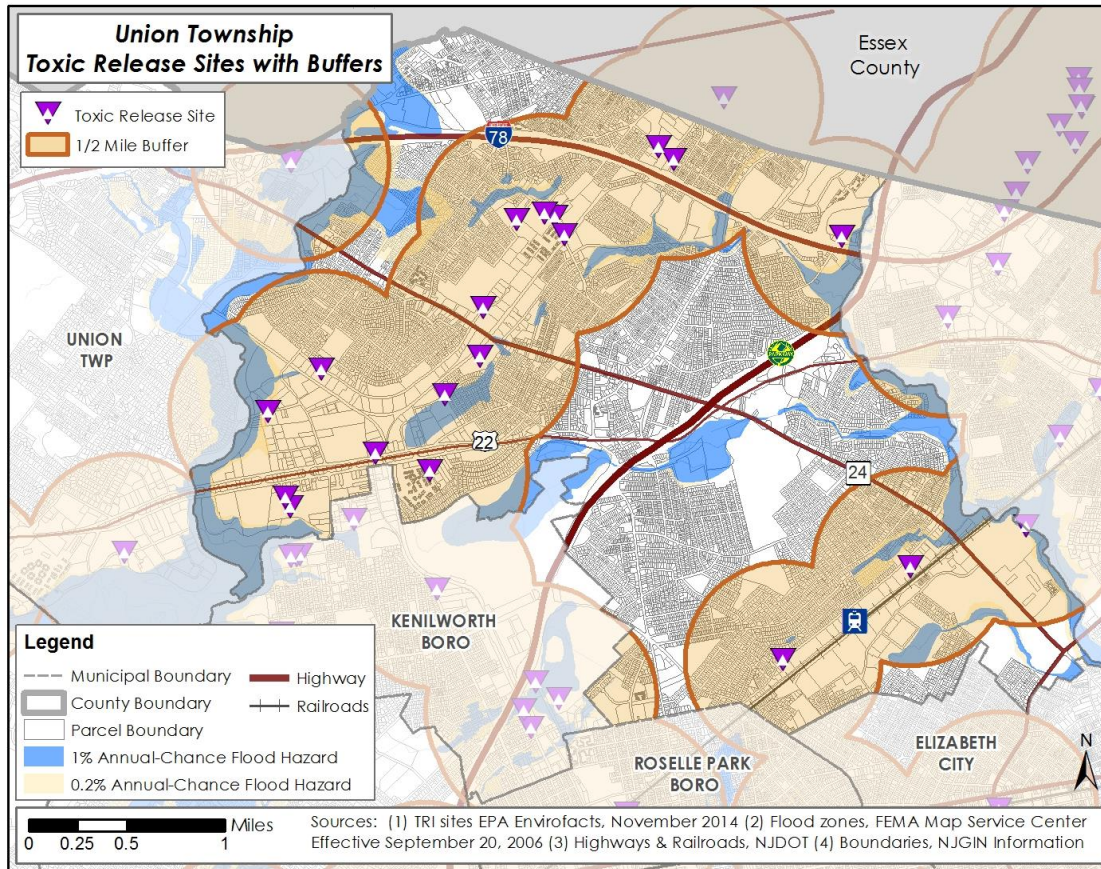
Because of the large presence of the chemical and oil industries in eastern New Jersey, many major transportation routes and rail lines carry a high volume of hazardous materials, many of which could cause damage, death and injury to Union County under some circumstances. As noted, there are few open sources of information about the materials that are transported on these routes, the routes themselves, or the carriers' schedules. For more information contact the New Jersey State Department of Environmental Protection or local Emergency Management offices.

#### 3.4.2 Hazardous Materials Releases – Fixed Sites

The US Environmental Protection Agency maintains a database of toxic releases by site. The database is known as the Toxic Release Inventory (TRI), and provides basic information about the locations, types and amounts of releases of hazardous materials. This is explained in detail in the County section of this mitigation plan. Union County has 138 such sites, 18 of which are in Union Township; there are seven sites that are within one half mile of the jurisdictional boundaries of this community. The following graphic shows the TRI sites in an around the jurisdiction, with a half-mile buffer depicted. This does not suggest a specific level of increased risk within the buffer, however, as the potential for exposure and possible effects are dependent on many factors, most of which are not explained in this appendix.



**Figure 18-4**  
**USEPA Toxic Release Inventory Sites in and around Union Township, with half-mile buffer**





## 3.5 Straight-Line Winds

### 3.5.1 Type, Location and Extent

The high wind – straight-line wind hazard (including type, location and extent) is uniform across Union County, and is discussed in detail in the County portion of this mitigation plan (see Section 4). For reasons of brevity these details are not repeated here. There are no wind hazards that are unique to Union Township.

### 3.5.2 Previous Occurrences and the Probability of Future Occurrences

Previously occurrences and the probability of future events are the same for Union Township as for Union County. Refer to Section 4 for that information at a County level.

### 3.5.3 Impacts on the Community, and Community Vulnerabilities to the Hazard

Union Township is a typical residential community, predominated by balloon-frame and unreinforced masonry residential structures, the majority of which have gable or hip roofs. As discussed in the County part of the plan, wind profiles in this area of the country indicate a relatively low potential for severe events, and adequate construction techniques and building codes have generally sufficed to keep risks low. There are two main sources of potential wind damage in such communities: (1) structural damage to residential and non-residential buildings, and (2) power losses, mainly due to trees falling on above-ground lines. There are established methodologies for completing general risk assessments for these hazards. These are explained in detail in the County portion of the plan (see Section 4). Table 18-8 below summarizes annual straight-line wind risks and cumulative risks over 50- and 100-year planning horizons in Union Township. Risks are in seven discreet categories: building damages, contents damages, inventory loss, relocation costs, business income lost, rental income lost and wages lost.

**Table 18-8**  
**Straight-line Wind Risks for Range of Loss Types,**  
**Union Township, Annualized and 50- and 100-year Planning Horizons**

Occupancy Class	Total SF	Total Annualized Damages	50-year Risk	100-year Risk
Residential	27,497,426	\$645,680	\$8,911,024	\$9,213,202
Commercial	8,343,118	\$106,780	\$1,473,676	\$1,523,649
Industrial	3,332,068	\$47,308	\$652,902	\$675,042
Agricultural	72,834	\$924	\$12,759	\$13,191
Religious	456,386	\$5,994	\$82,721	\$85,526
Government	57,884	\$842	\$11,617	\$12,011
Education	443,338	\$5,016	\$69,229	\$71,576
<b>Total</b>	<b>40,203,054</b>	<b>\$812,545</b>	<b>\$11,213,927</b>	<b>\$11,594,198</b>



The next table shows power loss risks in Union Township, again annualized and for 50- and 100-year planning horizons. The methodology for these calculations (and additional jurisdiction-level data) can be found in Section 4 of the County plan.

**Table 18-9**  
**Straight-line Wind Risks for Power Losses,**  
**Union Township, Annualized and 50- and 100-year Planning Horizons**

Period	Risk Value
Annual	\$437,567
50-year planning horizon	\$6,038,751
100-year planning horizon	\$6,243,753

## 3.6 Severe Storms – Winter Weather, Ice Storms, Extreme Temperatures - Cold

### 3.6.1 Type, Location and Extent of the Hazards in the Community

Because the hazards severe storm – winter weather, ice storms and extreme temperatures – cold are closely related, they are combined in this subsection of the appendix. Severe storms and winter weather risks are discussed in detail in Section 4 of the County portion of this mitigation plan. There are no significant differences in the type, location or extent of this hazard between the County and Union Township, and there are no aspects of the hazard that are unique to this jurisdiction.

### 3.6.2 Type, Location and Extent of the Hazards in the Community

Previous occurrences of the severe storm-winter weather/ice storm/extreme temperature - cold hazards are discussed in detail in the County portion of this hazard mitigation plan (see Section 4), and for reasons of brevity are not repeated here. There are no meaningful differences between the County as a whole versus Union Township with regard to occurrences or the future probability of these hazards.

### 3.6.3 Impacts on the Community, and Community Vulnerabilities to the Hazard

The impacts from these three hazards in Union Township are substantially similar to the County as a whole, and include lost productivity, traffic accidents, downed trees (and related power losses), medical events (such as heart attacks), and hypothermia (which rarely causes any significant or long-term problems). The community has no unique or pronounced vulnerabilities to these hazards. Like most established communities, over time Union Township has adapted its systems and infrastructure to minimize the effects of cold weather and associated meteorological effects. In rare cases, buildings may experience structural problems due to snow loads, and public or private infrastructure may fail due to freezing. However, these problems are usually minor and are addressed by private citizens (through their own work, or via insurance proceeds) or by the government in the case of infrastructure.



Perhaps the most significant potential impacts of winter weather are traffic accidents (with related injuries and fatalities), and power losses from ice and downed trees. For the most part, damage to vehicles is addressed via private insurance, records of which are proprietary. However, there are national statistics regarding injuries and deaths related to such weather. Local values for injuries and deaths can be deduced from national statistics. Figures for Union Township are displayed in the table below. Refer to Section 4 for source citations and an explanation of the methodology.

**Table 18-10**  
**Winter Storm-related Risks (traffic injuries and fatalities), Union Township**  
**50- and 100-year Planning Horizons**

	Injuries (combined)	Deaths
Snow/sleet	\$7,779,539	\$883,455
Icy pavement	\$6,052,541	\$666,325
Snow/slush	\$5,833,950	\$587,055
Total annual risk (all hazards)	\$19,666,030	\$2,136,836
50-year risk	\$271,391,216	\$29,488,336
100-year risk	\$280,634,250	\$30,492,649

An additional source of risk from cold and winter weather is hypothermia deaths. Although the risk from this hazard is relatively small, it can nevertheless be calculated by deduction from national statistics. Annual deaths nationwide were obtained from a U.S. Centers for Disease Control report (National Health Statistics Reports, *Deaths Attributed to Heat, Cold and Other Weather Events in the United States, 2006-2010.*)

**Table 18-11**  
**Risks from Hypothermia, Union Township**  
**Annually and 50- and 100-year Planning Horizons**

2010 Population	% of US	Annual Death \$	50-year Horizon	100-year Horizon
56,642	0.017%	\$1,528,412	\$21,092,088	\$21,810,441

## 3.7 Erosion

### 3.7.1 Type, Location and Extent

The Township of Union has ranked erosion, meaning riverine and not coastal erosion, as a medium hazard because of its imminent concern within the municipality. Within the Township, rapidly moving stormwater erodes the bank of open channels, which sometimes can cause the collapse of masonry retaining walls.



### 3.7.2 Previous Occurrences and the Probability of Future Occurrences

Riverine erosion is a naturally occurring process within a streamshed and therefore will continue to happen within the Township. There have been several occurrences of retaining wall collapses due to erosion over the last 15 years. The most notable being the retaining wall collapse near Balmoral Avenue caused by the April 2007 Nor'easter. Erosion will continue to be a potential hazard within streamsheds where banks have become unstable from increased runoff and flows.

### 3.7.3 Impacts and Vulnerability to Erosion

Albeit erosion is listed as a hazard of high concern on municipal level, there is limited information on actual riverine erosion hazard. More information is needed to perform proper risk assessment of erosion hazard in Union Township. The erosion can result in subsidence of land and property, which may result in damage. However, it also causes deposition of sediment and debris that can constrict flows and exacerbate flooding.

## 3.8 Lightning

### 3.8.1 Type, Location and Extent of the Lightning Hazard in the Community

Lightning weather risks are discussed in detail in Section 4 of the County portion of this mitigation plan. There are no significant differences in the type, location or extent of this hazard between the County and Union Township, and there are no aspects of the hazard that are unique to this jurisdiction.

### 3.8.2 Previous Lightning Occurrences and the Probability of Future Occurrences

Previous occurrences of the lightning hazard are discussed in detail in the County portion of this hazard mitigation plan (see Section 4), and for reasons of brevity are not repeated here. There are no meaningful differences between the County as a whole versus Union Township with regard to occurrences or the future probability of this hazard.

### 3.8.3 Impacts on the Community, and Community Vulnerabilities to the Hazard

Lightning impacts in Union Township are substantially similar to the County as a whole. These include occasional impacts on electrical systems, and (very infrequently) damage to structures. The most common impact is damage to trees. The community has no unique or pronounced vulnerabilities to lightning, but it is possible to complete a basic quantitative estimate of potential risks from lightning deaths and damages based on open source information found in a publication entitled *Lightning Fires and Lightning Strikes* (Marty Ahrens, June 2013; National Fire Protection Association, Fire Analysis and Research Division). The County portion of this hazard mitigation plan includes citations and further discussion of the methodology and figures (See Section 4). The table below provides estimated risks in Union Township from lightning deaths and damages based on statistics described in this publication.



**Table 18-12**  
**Lightning-related Risks, Union Township**  
**Annual, 50- and 100-year Planning Horizons**

Horizon	Deaths	Damages
Annual risk	\$31,360	\$20,201
50-year risk	\$432,774	\$278,768
100-year risk	\$447,513	\$288,261

## 3.9 Extreme Temperature - Heat

### 3.9.1 Type, Location and Extent in the Community

Heat risks are discussed in detail in Section 4 of the County portion of this mitigation plan. There are no significant differences in the type, location or extent of this hazard between the County and Union Township, and there are no aspects of the hazard that are unique to this jurisdiction.

### 3.9.1 Previous Lightning Occurrences and the Probability of Future Occurrences

Previous occurrences of the heat hazard are discussed in detail in the County portion of this hazard mitigation plan (see Section 4), and for reasons of brevity are not repeated here. There are no meaningful differences between the County as a whole versus Union Township with regard to occurrences or the future probability of this hazard.

### 3.9.2 Impacts on the Community, and Community Vulnerabilities to the Hazard

Heat impacts in Union Township are substantially similar to the County as a whole. There are various potential impacts from this hazard, including stresses on electrical systems, damage to infrastructure such as roads, and illness/death. There are no reliable data related to the first two effects, but there is some information related to deaths from heat-related hazards from a U.S. Centers for Disease Control report (National Health Statistics Reports, *Deaths Attributed to Heat, Cold and Other Weather Events in the United States, 2006-2010*). As explained in the County portion of this mitigation plan, national-level data about such deaths was scaled to the local level by population.

**Table 18-13**  
**Heat-related Risks, Union Township**  
**Annual, 50- and 100-year Planning Horizons**

Horizon	Damages
Annual risk	\$546,845
50-year risk	\$7,546,462
100-year risk	\$7,803,479



## 4. Public and Critical Facilities

Name	Address
St. Michaels School	1212 Kelly Street
Main Public Library	1980 Morris Avenue
Union Hospital	1000 Galloping Hill Road
Main Post Office	1130 W. Chestnut Street
Connecticut Farms School	875 Stuyvesant Avenue
Washington School	301 Washington Avenue
Livingston School	960 Midland Blvd.
Senior Center	968 Bonnel Court
Police H.Q.	981 Caldwell Avenue
Burnet Middle School	1000 Caldwell Avenue
Post Office Branch	1965 Morris Avenue
Fire Station #3	1221 Morris Avenue
Hannah Caldwell School	1120 Commerce Avenue
Vauxhall Branch Library	123 Hilton Avenue
Franklin School	1500 Lindy Terrace
Municipal Bldg.	1976 Morris Avenue
Jefferson School	155 Hilton Avenue
Main Firehouse	1 Bond Drive
Post Office Branch	611 Chestnut Street
Union Train Station	900 Green Lane
Battle Hill School	2600 Killian Place
Holy Spirit School	970 Suburban Road
Fire Station #2	2493 Vauxhall Road
Department of Public Works H.Q.	1 Swanstrom Place
Liberty Ave. Pump Station	1174 Liberty Avenue
Pinewood Rd Pump Station	681 Pinewood Road
Progress St Pump Station	86 Progress Street
Milltown Ct. Pump Station	3 Milltown Court
Franklin St Pump Station	15 E Branch Street
Robert St Pump Station	1211 Robert Street
Sumner Ave Pump Station	Sumner Avenue
Overlook Emergency Services	1000 Galloping Hill Road
Kean University	1000 Morris Ave
Nora Gardens	1775 Burnet Ave
Schaefer Gardens	35 Sumner Ave
Erhardt Gardens	100 Francis Court
Cornell Hall	234 Chestnut Street
Fire Department Training & Equipment Storage Facility	970 Jefferson Avenue



## 4. Township of Union Mitigation Strategy

This section contains hazard mitigation goals, objectives, and action items for the Township of Union. The goals are similar to the goals outlined in the County plan, but the objectives are adjusted for the jurisdiction. The definitions for these terms can be found in Section 5 of the Union County Plan Update.

### 4.1 Goals

- Goal 1: Improve **LOCAL KNOWLEDGE** about the potential impacts of hazards, and the identification of specific measures that can be taken to reduce their impacts
- Goal 2: Improve **DATA COLLECTION, USE, AND SHARING** to reduce the impacts of hazards
- Goal 3: Improve **CAPABILITIES, COORDINATION, AND OPPORTUNITIES** to plan and implement risk reduction projects, programs, and activities
- Goal 4: Pursue a range of **MITIGATION OPPORTUNITIES**, including addressing NFIP repetitive and severe repetitive loss properties, and reducing risk to public properties and infrastructure

### 4.2 Objectives

- Objective 1.A: Increase risk awareness among officials and citizens.
- Objective 1.B: Maintain and improve jurisdiction-level awareness regarding funding opportunities for mitigation, including that provided by FEMA and other federal and State agencies.
- Objective 2.A: Improve the availability and accuracy of risk- and mitigation-related data at the local level, as the basis for planning and development of risk-reduction activities.
- Objective 2.B: Ensure that government officials and local practitioners have accurate and current information about best practices for hazard mitigation planning, project identification, and implementation.
- Objective 2.C: Develop and maintain detailed data about critical facilities, as the basis for risk assessment and development of mitigation options.
- Objective 3.A: Continue support of hazard mitigation planning, project identification, and implementation at the municipal level.
- Objective 3.B: Continue close coordination with the County in a range of risk-related areas, such as FEMA programs, mitigation planning, development of hazard mitigation projects, etc.
- Objective 3.C: Increase property owner participation in the National Flood Insurance Program.
- Objective 3.D: Implement activities to improve the community's CRS rating.
- Objective 3.E: Work towards increasing the integration of mitigation principles and activities in a range of local regulations, plans, ordinances and activities.
- Objective 3.F: Maintain and improve coordination with surrounding communities with regard to understanding and reducing risks.
- Objective 4.A: Facilitate development and timely submittal of project applications meeting state and federal guidelines for funding (1) for RL and SRL properties and (2) for hardening/retrofitting infrastructure that is at the highest risk.
- Objective 4.B: Maintain and enhance local planning and regulatory standards related to future development and investments.



## 4.3 Mitigation Strategy

### 4.3.1 Existing Mitigation Actions

The table below lists prioritized mitigation projects and actions identified by the Township of Union.

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost	Current Status
Stormwater management system upgrade and improvement for Carol Road, Audrey Terrace, Eleanor Terrace, Liberty Avenue, Lori Court, and Mount Vernon Road.	Flood	High	Floodplain Management	Township of Union OEM	2013	1-Year	\$900,000	Completed clearing/desnagging project in the Vauxhall Branch and Rahway River In 2013
Hardening/retrofitting of Police Department	High Wind/Severe Weather	High	Capital Improvement	Township of Union Police Chief	2011	1-Year	\$350,000	New roof membrane Installed Oct 2011; New hardened windows installed April 2014



Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost	Current Status
Hardening/retrofitting of Municipal Building	High Wind/Severe Weather	High	Capital Improvement	Township of Union Administrator	2012	1-Year	\$350,000	New boiler installed Oct 2013
Hardening/retrofitting of Department of Public Works	High Wind/Severe Weather	High	Capital Improvement	Township of Union DPW	2015	1-Year	\$50,000	Electrical System Upgrade Completed
Conduct all-hazards public education and outreach program for hazard mitigation and preparedness.	All	High	Emergency Management	OEM Coordinator, in coordination with NJOEM	2015	1- Year	Staff Time	Ongoing
Sanitary Sewer Pump Station upgrades at Liberty Ave, Pinewood Ave, and Milltown Ct	Flood	High	Capital Improvement	Township of Union DPW	Jan 2014	1-Year	\$250,000	Pump Stations elevated along Rahway River
New Emergency Standby Generator – Firehouse Headquarters	High Wind	High	Capital Improvement	Township of Union Fire Department	Mar 2014	18 months	\$150,000	Completed
New Emergency Standby Generator – Senior Center	High Wind	High	Capital Improvement	Township of Union Administrator	July 2014	24 months	\$100,000	75% complete



### 4.3.2 New Mitigation Actions

Mitigation Action, Program, or Project	Hazard	Priority	Implementation Mechanism	Responsible Party	Target Start Date	Project Duration	Estimated Cost
New Emergency Standby Generator – Police Department	High Wind	High	Capital Improvement	Township of Union Police Department	Jan 2016	15 months	\$265,000
Irvington Branch Retaining Wall Repairs	Erosion/Flood	High	Capital Improvement	Township of Union Engineering Dept	Jan 2016	12 months	\$2,000,000
Flood Control Project on the West Branch of the Rahway River	Flood	High	USACE Funds	U.S. Army Corps of Engineers	Unknown	Unknown	Unknown
Elevation or acquisition of repetitive loss properties not mitigated through other projects	Flood	High	Grants	Township of Union OEM	Funding dependent	--	Varies
Join CRS program	Flood	High	Emergency Management	NFIP Administrator	2015	12 months	Staff time/minimal resources



## 4.4 Capability Assessment

As part of this plan update each town self-assessed their existing planning and regulatory tools, communication and emergency response capabilities, staff and personnel, and their capabilities to leverage municipal funds to achieve hazard mitigation planning objectives. This capability assessment should be updated as part of the ongoing maintenance process.

### 4.4.1 Planning and Regulatory

Tool	Township Has (y/n)
Zoning Ordinance	Y
Subdivision Ordinance	Y
Flood Damage Prevention Ordinance (per NFIP)	Y
Special Purpose Ordinances (e.g. wetlands, critical or sensitive areas)	Y
Stormwater Management Plan/Ordinance	Y
Comprehensive Plan / Master Plan	Y
Capital Improvements Plan	Y
Site Plan Review Requirements	Y
Habitat Conservation Plan	N
Economic Development Plan	N
Local EOP	Y
Continuity of Operations Plan	N
Post Disaster Recovery Plan or Ordinance	N
Wildfire Protection Plan	N/A
Real Estate Disclosure req.	N
Other (e.g. steep slope ordinance, local waterfront revitalization plan)	N
Freeboard	N
Cumulative Substantial Damages	N
Shoreline Management Plan	N/A

### 4.4.2 Communication and Emergency Response

	Does the Township have this (y/n)
Outdoor warning system	N
Nixle	N
Auto-Dialer/Reverse 911/Emailer	N
Social Media	Y
Website Updates	Y
Other Emergency Communications	Y – Code Red
Mutual Aid Agreements	Y
Emergency Operations Center	Y
Evacuation Vehicles	Y
Swift-water rescue	N
Shallow water boats	N



#### 4.4.2 Staff/Personnel

	Does this Township have this expertise on staff?
Staff with expertise or training in benefit/cost analysis	Y
Grant Writer(s)	Y
Emergency Manager	EM Coordinator
Professionals trained in conducting damage assessments	Y
Scientist familiar with natural hazards in the municipality.	Y
Personnel skilled or trained in "GIS" applications	Y
Surveyor(s)	Y
NFIP Floodplain Administrator	Y
Planner(s) or Engineer(s) with knowledge of land development and land management practices	Y
Engineer(s) or Professional(s) trained in construction practices related to buildings and/or infrastructure	Y

#### 4.4.3 Fiscal Capabilities

Fiscal Mechanism	Does the Township have this capability?
Community development Block Grants (CDBG)	Y
Capital Improvements Project Funding	Y
Authority to Levy Taxes for specific purposes	N
User fees for water, sewer, gas or electric service	Y
Impact Fees for homebuyers or developers of new development/homes	N
Incur debt through general obligation bonds	Y
Incur debt through special tax bonds	Y
Incur debt through private activity bonds	N
Withhold public expenditures in hazard-prone areas mitigation grant programs	Y



## 5. Plan Maintenance and Adoption

### 5.1 Plan Maintenance

The Township of Union will review this Appendix of the County's hazard mitigation plan appendix each year and give the County's HMP Coordinator an annual progress report. The Township Engineer is responsible for convening the LPC, initiating the plan review, and submitting the annual progress report. The LPC may use worksheets #1 and #3 in the FEMA 386-4 guidance document, to facilitate the review and progress report. FEMA guidance worksheets are provided in Appendix G. Local progress reports shall be provided to the County HMP Coordinator at least two weeks prior to the annual plan review meeting.

Additionally, the LPC will convene and review the plan when major hazard events impact the jurisdiction, potentially yielding opportunities for mitigation grant funding, or when new information suggests that plan elements do not accurately reflect the community's risk or its mitigation priorities.

If necessary, the Township Engineer will convene a meeting of the LPC to review and approve all changes. The Township retains the discretion to implement minor changes to the document without formal procedures involving the Township Council subject to local policies and regulations.

In addition to the annual progress report, the Township of Union will provide Union County with a copy of the written notice of any changes to the jurisdictional appendix at the time such changes are implemented.

The LPC shall document, as needed and appropriate:

- Hazard events and losses in Union and the effects that mitigation actions have had on impacts and losses,
- Progress on the implementation of mitigation actions, including efforts to obtain outside funding for projects,
- Any obstacles or impediments to the implementation of actions,
- Additional mitigation actions believed to be appropriate and feasible,
- Any changes to local capabilities,
- Efforts to integrate the information included in this plan into other local planning mechanisms including, but not limited to, the comprehensive plan, capital improvement planning, budgeting, zoning amendments, and variance approvals,
- All public and stakeholder input and comment on the Plan that has been received by the Township.
- Copies of any grant applications filed on behalf of the Township



### 5.1.2 Continued Public Input

The Township of Union is committed to incorporating public input into its ongoing hazard mitigation planning. The public will have an opportunity to comment on the Plan prior to any changes and during the 5-year plan update. The annual progress reports will be posted on the County mitigation website in addition to the adopted Plan.

All public comments and input on the plan will be recorded and addressed, as appropriate. Opportunity to comment on the plan will be provided directly through the County's website. Public comments can also be submitted in writing to the County's HMP Coordinator. All public comments shall be addressed to: Union County Office of Emergency Management c/o All Hazards Pre-disaster Mitigation Plan Coordinator 300 North Ave East, Westfield, NJ 07090.

The Township of Union's LPC shall ensure that:

- Copies of the latest approved Plan are available for review at Town Hall along with instructions to facilitate public input and comment on the Plan.
- Public notices are made as appropriate to inform the public of the availability of the Plan, particularly during Plan update cycles.
- For minor changes to this appendix, the Township of Union will post a notice on the Township's website and invite the public to review and comment.
- For major changes involving Town Council approval, the Town will use its standard public notice procedures inviting the public to review the document and provide feedback.

## 5.2 Plan Integration

The Hazard Mitigation Plan is a critical tool to help identify vulnerabilities and develop specific projects to reduce studied risk within the jurisdiction. However, it is not the only tool that may help minimize the impact of future hazard events on the people, infrastructure, and economy in the community. Using the data included in this Plan update to inform future updates of its Comprehensive Plan, Capital Improvement Planning and annual budget, stormwater management, zoning and code updates, and variance and subdivision applications will improve the resiliency of the community and reduce future risk to persons and property. All efforts to integrate the plan into other local mechanisms can be reported to the Plan Coordinator at each annual update.

## 5.3 Plan Adoption

On [insert date] Union County submitted the initial draft of the 2016 Plan Update to NJOEM for review and comment. After addressing NJOEM comments in the document, the HMP was resubmitted for final consideration and approval by NJOEM and FEMA. FEMA approved the plan on [insert date], and the Plan update was forwarded to the Union County Board of Chosen Freeholders for adoption, which occurred on [insert date].



The Town Council approved the plan on [insert date]. The Township's resolution for adoption and the County's adoption resolution are provided as Appendix E of the 2016 HMP update. Following adoption, the plan update was resubmitted to FEMA for final approval, which occurred on [insert date]. The FEMA approval letter is included as Appendix D.